International Journal of E-Planning Research
Volume 6 • Issue 4 • October-December 2017

City Makers:
Insights on the Development of a Serious Game to Support Collective Reflection and Knowledge Transfer in Participatory Processes

Teodora Iulia Constantinescu, Hasselt University, Diepenbeek, Belgium
Oswald Devisch, Hasselt University, Diepenbeek, Belgium
Georgi Kostov, Playful Interactive Environments Research Center, Hagenberg, Austria

ABSTRACT

Having the ability to give form to cooperative environments while easing the process of collective reflection, serious games have been put forward since the sixties, as a way to overcome challenges in participatory processes. This paper discusses the City Makers game prototype and reports on the game development process, with a focus on five key game-testing sessions. The overall aim of the serious game is to foster collective reflection and facilitate knowledge transfer in and across multidisciplinary groups. The hypothesis is that framing the participation process in a game format facilitates idea generation and dialogue between stakeholders. Therefore, the paper concludes with a set of challenges a serious game has to overcome in order to communicate knowledge from one group to another

KEYWORDS

Civic Learning, Co-Creation of Neighbourhood Projects, MDA Framework, Participation, Serious Games

INTRODUCTION

In her book, *The Death and Life of Great American Cities*, Jane Jacobs (1961) defines cities as systems that follow specific rules and generate easily identifiable patterns. She argues that cities are intricate, organised ecosystems rather than linear organizations. As such, a more horizontal relationship between citizens and policy makers is needed in order to implement urban projects that will support various interactions and create distinct-macro behaviour. These urban projects typically require the involvement of multiple stakeholders who can all significantly affect the budgets, civic support and overall success. Policy makers have been experimenting with participatory forms of governance to support the development of urban projects. These new forms of governance resulted in participatory paradigms such as advocacy planning, collaborative planning, communicative planning and trans-active planning, revealing various challenges. In spite of these paradigms, participatory projects keep on failing in maintaining long-term participant motivation and reaching traditionally underrepresented members of the population. Adding to this, misunderstandings related to differences in expertise and incapacity to overcome unequal resource distribution (Arnstein, 1969, Healey, 1997; Pares and March, 2013) make the process not only slow but sometimes inefficient. Horelli (2002) argues that participation is not an isolated event, but a constant communication between different groups that can be assured by using different methods. Games have been put forward as one such method,

DOI: 10.4018/IJEPR.2017100103

ever since the sixties (Duke, 2011; Feldt, 2014). They are used as communication devices and have the potential to transfer knowledge from one group to another and form cooperative environments. This paper explores how a particular game addresses this aspect of participation. As such, the main research question is: What challenges should be addressed when using games as drivers for knowledge exchange between multidisciplinary groups? In order to answer this question we are going to report on the findings of a game development process.

Salen and Zimmerman (2003) refer to games as complex problem solving spaces: (1) they provide an abstracted model of a problem, fostering an accelerated understanding of a complex issue, (2) they provide a structure for interaction, a model for learning while having a finite set of rules and (3) they allow individuals to see direct consequences of their actions as of the actions and decisions of others. However, the development and use of such games within the context of urban planning is still very much a scarcity. Cross-disciplinary teams, where both game designers and urban planners take part in experimenting with games are rarely encountered (Brandt, Messeter, 2004). This leads to either game prototypes that do not support spatial decision making processes or activities that are not games, as they lack a clear set of rules and a balance between abstraction and reality, fun and seriousness. Advances in our understanding of technology, education and play, led to the creation of, so called, serious games that more effectively connect game play and learning (Crookall, 2010; Deterding et al., 2011; Kapp, 2013).

In order to develop serious games that are both fun and can support decision making, this paper proposes to expand the scope of the game design process to include multiple stakeholders from the very beginning of the process, integrating their expertise and capabilities of expressing and negotiating ideas, through a game prototype. There exist a series of methods to develop games that support particular goals such as communicate knowledge between multidisciplinary groups. One such method is the MDA framework (Mechanics, Dynamics and Aesthetics). This paper takes the MDA framework as part of its research methodology and uses it as a lens to reflect on the conditions needed to develop a serious game, dubbed City Makers.

The paper starts by presenting the methodological approach. The next section describes the background for developing the City Makers game and identifies a number of issues translated into game design goals. The four main iterations and the respective game-prototypes are then presented, followed by challenges of their application. The paper concludes with a set of reflections, conditions within the process of designing a game that would better serve participatory projects.

Framing the Methodological Approach

Participatory processes have used various enabling tools to engage citizens over the years. As a multidisciplinary process (Horelli, 2002), one of the main challenges of participation is ensuring communication among the different groups taking part in the process. Games are one such enabling tool and have the potential to communicate transactions between different groups (Horelli, 2002). The research is guided by an overarching question: How can games communicate, pass on knowledge from one multidisciplinary team to another?

As argued earlier, participatory processes typically involve a diversity of actors, with different levels of knowledge and experience on the topic at hand, with different agendas, different (verbal) skills, etc. The research objective of this paper is to understand the challenges that a serious game has to overcome as to better serve participatory processes and facilitate learning for cross-disciplinary groups. The iterative mechanism of the MDA framework is used in order to develop a game that can address the aforementioned objective. The MDA framework introduces an iterative way of developing games, in which each iteration leads to a new game-prototype that is validated against a set of pre-

defined design goals. The central notion of the MDA framework is that a game is defined in terms of three components: Mechanics, Dynamics and Aesthetics. Through this conceptualisation, the relationship between designers and players and player experience and game rules, is assessed. The rules of the game are referred to as the 'Mechanics' of the game – defining the restrictions under which the game operates. 'Dynamics' refer to the player interaction with the game rules once these are set in motion, in short: the observable behaviour of players, while the 'Aesthetics' refer to the player experience of the game as opposed to visual elements: the effects the Dynamics have on the players themselves. These three components are presented as different 'lenses' for game analysis:

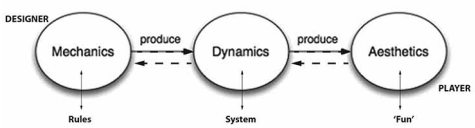
Mechanics describes the particular components of the game, at the level of data representation and algorithms. Dynamics describes the run-time behaviour of the mechanics acting on player inputs and each other's outputs over time. Aesthetics describes the desirable emotional responses evoked in the player, when she interacts with the game system (Hunicke et al., 2004, p. 2).

The MDA framework introduces the three lenses in a dynamic, symmetrical and complementary relation (Figure 1).

While Mechanics are created by the game designer, the Dynamics arise from the Mechanics and the Aesthetics from the Dynamics. As such, the outcome of the game is unpredictable at the time the game is designed; even if the game designer builds up a set of rules and narratives that might lead to the expected experience, it is not said that the desired play experience will emerge from that precise rule set, or from other artefacts introduced by the designer. In order to obtain a specific outcome, the game design is subject to an iterative process within which, the designer skews the mechanics to then observe the dynamics and aesthetics. This action is repeated until the goal is reached. Thus, game design becomes a second-order design problem (Zimmerman, 2003) as it does not define a solution but a medium that creates the solution. This incremental design process makes it possible to 'quantify' the development of games, as one can 'measure' the dynamics and as such validate the choice for particular mechanics. One of the biggest challenges comes in balancing fun and seriousness. The MDA framework introduces an important element: a non-exhaustive list of 'funs' as part of the Aesthetics of the game. The taxonomy proposed by the framework is divided in eight different types of 'fun' referred to as: sensation, fantasy, narrative, challenge, fellowship, discovery, expression and submission (Hunicke et al. 2004); it allows to describe games and understand what are the specific game elements that attract certain players in particular moments in time. This taxonomy however, does not detail on how to achieve the aforementioned balance, nor gives a particular recipe on the mixture of elements or element ratio in order to achieve 'fun'.

Finding a balance between the engagement of serious games and the rigor of long-established practices becomes a priority given the shortcomings of participatory processes. Research on serious games often refers to motivation and fun as the main drivers for learning (Papastergiou, 2009; Garris et al., 2002). The more fun people have during a process, the more they are motivated and when motivated, they will automatically learn (Gee, 2007). However, a serious game entails the educational aspect as well as entertainment: 'to motivate players as learners it is necessary to find an optimal balance between entertainment and learning' (Bente, Breuer, 2010, p. 13). Adding to this, players'

Figure 1. The MDA Framework (Adapted from Hunicke et al., 2004)



pre-game experience has a big impact on the outcomes of game sessions and influence participants involvement in participatory processes. Most of the times, people taking part in participatory processes have previous involvement in such processes due to their interest in the topic a/o context they are part of (Bergold, 2012). All these are factors that influence the 'fun' element one has during a game session. Researchers argue that the experience becomes more 'fun' and the outcomes considered more valuable when participants had preceding self-education in games (Feldt, 2014).

The data collected during the play sessions was obtained and analysed following a spiral model principle (Boehms', 2000) and the methodological approach to participatory planning and its overlapping phases (Horelli, 2002). By closely monitoring the play sessions we observed how the iterative process of the game development becomes an arena for learning and knowledge exchange between groups. The participatory process has an iterative, spiral-like flowing evolution (Horelli, 2000), an experimental learning cycle that passes on knowledge. The logic of working with iterations of games in order to understand how this comes to be, is therefor, enforced. In the process of designing City Makers, each stage of the game design payed close attention to the needs and limitations of the end users (e.g. mixed groups of city officials, architects, planners, citizens with no background in gaming, etc.). This user-centred design, user-driven development of the game, followed the research methodology of a multi-stage problem solving process that requires designers to analyse and predict how participants might interact with the game (Boehm, 2000, Ziegler, 2007). Moreover, the team had to evaluate to what extent their assumptions regarding player behaviour were met when playing the game in real life scenarios.

Based on a set of rules, both playing games and designing evolved over time. The MDA framework stresses a two-sided aspect of game design: as designers follow the Mechanics growing outwards into Aesthetics with the Dynamics in between, the players will not experience the game in the same way. If we think of a game as a sphere, with the Mechanics as the epicentre, the player will first observe the surface – the Aesthetics. One may be aware of the Mechanics and Dynamics, however the Aesthetics will bring the immediate impression about the game in question. As such, the game becomes this dual element, designed from inside out, but experienced, played from the outside. Our first design goals came from the preliminary analysis of the context, after conducting a set of in depth interviews with city officials and citizens. The interviews focused on games and experience in participatory processes and revealed two problems: (1) even though much effort is placed in organising various participatory processes, there is a low attendance rate as the tools used (i.e. power point presentations, open discussions, etc.) to mediate the dialogue between groups is not efficient, and (2) games are not seen as an option, most of the interviewees see them as childish. This was the first challenge to overcome when framing the game.

After testing the game with the first groups, we concluded that most participants enjoyed playing the game. This was based on direct observation and responses of questionnaires filled in by participants at the end of the sessions. Even with no game training, a player could immediately asses if he or she had fun while playing the game. It was difficult to articulate the exact reason why the game was good, fun, boring, bad, and so on, however, the players could express the way the game made them feel by experiencing the Aesthetics. In order to make the game assessment easier, we gradually introduced complementary methods of communication. One such method is the debriefing at the end of the play session. Taking part in the individual and group debriefing helped participants to explain why they liked or disliked a specific kind of interaction with the game a/o other players.

By monitoring the play tests we observed a set of challenges the game encounters when used as a medium to pass on knowledge from one group to another: framing the game, documenting it, 'levelling' and debriefing it. Through the iterative process of the game design we explore how to meet these challenges and conclude with a generalised set of results.

City Makers: An Iterative Process of Multiple Play-Sessions

City Makers is a card game developed to foster social interaction between players by implementing, adapting and testing game mechanics in specific scenarios. The game went through multiple iterations, being constantly tested and adapted to the design goals: introduce people to different topics concerning their communities and stimulate brainstorming and discussion. More specifically, the design goals revolved around fostering collective reflection and cross-disciplinary groups learning, balancing individual and collective. A few limitations guided the design process from the beginning. The game should be playable by up to six players in a mixed group (different age, sex, education, game experience) and be adaptable to the scenarios of the three involved partners of the project (i.e. Genk, Vienna and Groningen). The game used business as a metaphor, which fits the entrepreneur scene in Genk. Game events and interactions between players should make sense in each of the settings since they would later be compared with each other and evaluated.

The prototype was developed over the course of six months and went through twenty iterations from which four major ones. During the design process, the Mechanics of the game were evaluated and adjusted in order to meet the design goals. The different testing sessions added up to more than one hundred participants taking part in this process (see Table 1). The first step was to test it with groups of game designers as brainstorm sessions over the Mechanics of the game. As the Mechanics became clearer, the play tests were extended to mixed groups: architects, planners and city officials, students and fellow peers. Observation methods of the game evolved throughout the testing sessions, starting from qualitative interviews and photos to observation sheets, questionnaires, player moves tracking sheets, individual and group debriefing and video recordings. These methods were used to provide cues and improve user performance. The methods allowed us to gather data on player interaction: dynamics before, during and after a play session. Participants gave information on their relation with the people taking part in the workshops, their background in participatory processes as well as their experience with using a/o playing games. This data was collected with the use of questionnaires and in depth interviews conducted before playing the game. Player surveys (see Table 2) used at the end of the play tests gave information on the experience during the game play and previous experience by posing questions such as: What was the main reason for you to participate, Was the game entertaining?, Did you understand the goal of the game?, How did your sense of comfort within the group change from the beginning to the end of the game?, etc. The surveys, conducted after each game session resulted in a bundle of detailed biographies that helped tune the game prototype. The survey itself was adjusted after each game iteration maintaining the initial structure. The game master and tracking board (see Figure 11) offered a visual support to the debriefing. Player moves were registered and later discussed individually and collectively.

This section presents the process of each main iteration of the game - referred to as *Prototype 1*, *Prototype 2*, *Prototype 3* and *Prototype 4* - its findings, the thought process behind the design and the reasons for changes in approach and implementation. Each new prototype builds on ideas and lessons learned from previous ones, while game Mechanics are adjusted to provide a fun, easily understandable experience. Following the methodology of the spiral model (Boehm, 2000), this process reflects the development of the four prototypes and works further on the improvement of these prototypes.

Prototype 1

Design Goals and Methodology

The initial purpose of the game was to help stakeholders to understand the importance of networks between small businesses, entrepreneurs in the city and recognize the added value of a collective gain as opposed to the individual one. Some of the early use cases for the game included establishing supply and business networks, resource management, strategic placement, importance of networking, cooperation, recognizing trade-offs, planning forward, discovering the best move and more effective strategies. The first prototype included a game board, rules, playing pieces and various winning

conditions. *Prototype 1* went through six iterations played with a total of twenty-four participants. Players were selected from three disciplines: game design, architecture and spatial planning. As such, the first trials were organised with mixed groups of two game designers, one architect and one planner. The game and player feedback was observed with the help of photographing the game play and qualitative interviews conducted with each player after the game session. Each interview lasted one hour and comments were given on the Mechanics, how and if they meet the design goal of the game, how can they improve in order to better address these goals.

Mechanics

The first version of the prototypes' game board (Figure 2) represents an abstraction of a city area, where the game is played with a couple of schematic iconic buildings a/o places in the city. It is divided into four types of areas – residential, commercial, industrial and unoccupied (grey). Each of the areas, except the unoccupied ones, provides access to a resource or additional cards: industrial - energy, residential - people, commercial - money.

The game material components are made up of business, network and resource *tokens* in different colours and different type of construction, event and effect *game cards*. In the beginning of the game all cards are shuffled and placed in the centre of the table. Players take turns clockwise from player to player. They receive a predefined number of business, network and resource tokens. Each of the players is given a colour and a set of business, network and resource tokens. During the first turn players have to make the same number of moves and establish their first business and network. Networks are

Figure 2. Prototype 1: Game board

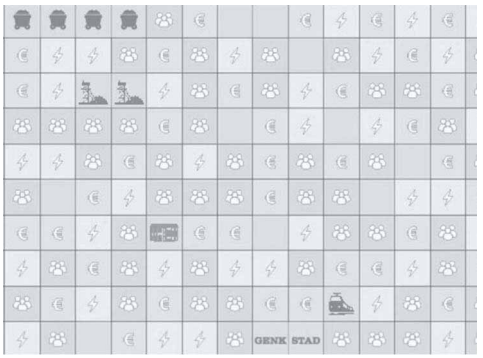
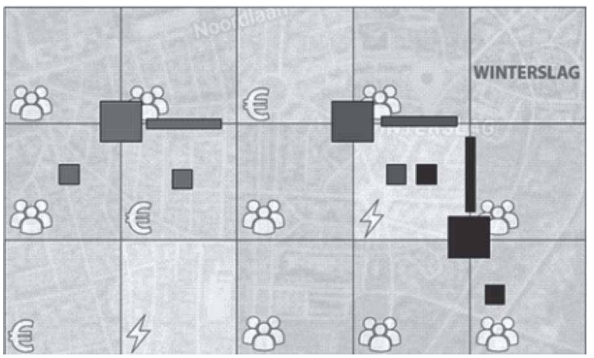


Figure 3. Business, resource, and network tokens placement



placed on the side of areas (Figure 3) and used for expanding and connecting to other players, while resource tokens are an investment currency which unlocks the use of resources in an area (Figure 3).

Each business generates one resource token per turn and placed in a chosen area, so that the player can use the resources of the respective area. If the business is built next to areas that generate more than two resources of the same kind, the player is rewarded an additional token per turn. This stimulates players to strategically place their businesses and plan their future expansion.

Dynamics

The type and amount of resources required, is displayed on the card (Figure 4). Construction and interaction in the game revolves around cards, which players draw in the beginning of their turn. Players need to micro manage resources and calculate how many are needed for each card that they want to play. Expansion through networks and businesses allows them to acquire new territories and prevent other players from growing in nearby areas. Upgrading businesses focuses on the establishment of strong economy that can support future expansion and card play. Multiple strategies can form, depending on the desired winning condition. Equally, players can establish alliances by connecting their businesses via network tokens. The Business Connection allows both players to trade cards with each other and to place an additional resource token in their partner's areas and use its resource until the end of the current turn (Figure 3). A player connected to two other players, does not automatically ensure connection between the two, thus motivating players to negotiate connections and consider the benefits and drawbacks of expansion in a certain direction. Another option for domination is to slow down and use sabotage, theft or scheme cards to affect other players. Events are implemented as an unexpected element in the game and are randomly placed in the card deck. When drawn, they are automatically triggered and affect all players. The financial crisis for example forces players to return all their currently active resource tokens back to their hand. This way a player is always under the risk of losing precious resources if he decides to keep them for the next round.

Aesthetics

After the six test sessions with game designers, the first play-test with non-game developers was conducted in Vienna. Five people, a civil engineer, a landscape manager, a landscape planner, a mobility engineer and a spatial planner, participated together with two moderators. As the game play unfolded, several balancing and design issues became apparent. While the game was fun, captivating and easy to follow when tested with people used to playing games e.g. game designers, when tested in this setting, it became hard to follow. Too many rules were introduced at once and players had a hard time remembering and understanding all of them fast enough. A few rounds were needed for learning all the different possibilities. Constructing businesses and networks depended solely on the cards that players drew. Since there is no way to return the drawn card back to the deck, players often had a lot of unneeded cards in their hand and had to wait a long time until they obtained a network card, which allowed them to expand their businesses. As drawing random cards from a deck is based on chance, we observed that another mechanic is needed to provide players with better strategic choices and eventually balance the chance factor. A certain amount of confusion was caused by the game board, which displayed landmarks of the city as abstract orientation points. Players often thought that these

Figure 4. Prototype 1: Game cards

landmarks provide additional bonuses if a business is constructed next to them so they chose them as their starting point, to later realize that the names and signs do not play any role in the game. Despite the drawbacks, players had a good time trading, explaining, helping and preventing each other from winning. They developed different strategies throughout the game as they were going for one of the winning conditions or just trying to sabotage other players.

Conclusion

The data collected during the game play is an observation of player strategies and conversations, body language and player interaction. As such, we concluded that the game was both competitive and fun (Figure 5) as players would try to either achieve one of the individual winning conditions or the collaborative win. However, one play-through took more than ninety minutes, leaving some players in standby for a long time while waiting for their turn. After several rounds, this led to a monotonous game play. As such, we documented that a simplification of the rules is needed or an activity is required to keep players involved during that time. This will make the game shorter a/o provide an alternative fun element while one waits for his/hers turn.

The abstraction level of the game is one of the main issues: the distribution of resources that you might need is random with no real hierarchy cancelling thus the added value of the game board and leaving no room for strategic decisions on where to place a business. The board could benefit from a diversification of the way the resources are distributed. People only use a selective portion of the board, because the distribution of the resources is too even and not geographically spread. Once one player decided to set a shop in a specific area of the board the others would follow, trying to stay as close as possible to each other, as to benefit faster from the future networks they would establish. Furthermore, it was challenging to assess if and what players learned while playing; as the game was fun and engaged players, we had no means of measuring the learning aspect. Therefore, it was difficult to quantify to what extent the game achieved the aforementioned design goals. As such, we concluded that the main challenge to be addressed for future iterations was to properly document the game play as to be able to quantify the impact of the mechanics and focus on balancing the *fun* and *learning* aspects of the prototype.

Figure 5. Player interaction during the game play

Prototype 2

Design Goals and Methodology

Based on the feedback of the first iteration with non-game developers, we proceeded by reducing the complexity and introducing a more general metaphor for the game as a starting point for all partner locations. By using a generic approach, we offer the perfect scenery for context adaptation for each of the settings. The design goal becomes clearer and is limited to balancing between individual and collective actions, goals within the game and networking among peers e.g. entrepreneurs. *Prototype 2*, as the previous one, went through six iterations. It was played with a total of twenty-two participants. Players were selected from different age groups, ranging from eighteen to forty, and game sessions were organised with players from the same field (Table 1). This prototype was tested with a group of four undergraduate architectural students, a group of four PhD researchers in the field of Architecture, two mixed groups of four players each with architects and designers and with a fifth mixed group of game designers, architects and planners. The game and player feedback was observed with the help of video recordings, player moves tracking sheet, player observation sheets filled in by the moderator and individual and collective debriefing conducted after the game session. Moreover, a questionnaire was given out to participants to fill in after the session. Valuable feedback was given on the flow of the game, game rules and Mechanics.

Mechanics

The board was changed by introducing a shared project, in which players can invest and a new set of resources. Additionally, so called benefit tokens are randomly distributed over each grey area and provide players with bonus cards as soon as a business is constructed next to that area (Figure 6).

The core principles of construction and expansion on the game board are the same, implemented differently. Constructing and upgrading require a specific number of coloured cards that players can draw from a deck each turn and the right combination allows them to perform the action (Figure 7). Players are limited to three actions per turn, including the construction of a network free of cost. This mechanics prevents them from waiting for the correct construction card and reduces the role of chance in expansion. The amount of available actions becomes a limited resource each turn.

A game master tracks the progress of the game on a tracking sheet. He explains the game and assists players, when questions arise. His/her main purpose is to keep track of the amount of turns played (each new global turn starts with the first player) and marks the accomplished achievements for each turn on the player sheet. He/she keeps track of player points by checking a cross for each point, acquired by a player. He/she is responsible for awarding the achievements and for producing a

Figure 6. Prototype 2: Board and token distribution

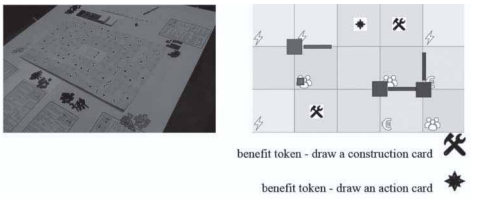


Figure 7. Prototype 2: Game cards

statistic of player performance in the end of the game. The tracking feature was introduced as part of the game, a debriefing part that would facilitate the debate between players. At the end of the game, participants would collectively reflect on their moves during the game, explain the choices they made and debate on 'best practices'.

Dynamics

The first round of the game is identical for all players: after the starting player is announced, players make their first move in the established order. No additional actions can be used, only benefit tokens (additional cards) from areas are collected. The complex micromanagement of resource tokens from the first prototype is avoided in order to speed up the game and shift the focus of players towards their cards and the state of the game board. Resource tokens are replaced by idea tokens, which are a limited luxury resource that can be exchanged for cards or invested in the common project (Figure 8). The investment triggers a positive, negative or neutral event, depending on a die roll. In this version events have a risk-reward role, allowing players to either receive cards in exchange for an idea token or risk it by investing in the common project for an even greater possible benefit.

Action cards (Figure 9) are also tweaked according to the new rules and provide players with additional options such as rolling the event die for free or forcing players to reveal a card and then stealing it. Their role is essential for keeping player to player interaction lively and creating a social dynamic between participants.

Aesthetics

After the six game sessions, *Prototype 2* was brought to city officials that would use it as part of participatory processes in urban development strategies of the city and tested for further feedback. In this iteration, participants were representatives of the municipality and local project initiatives. The game was set up in a Living Lab environment for five players and three game masters – one responsible for tracking player actions, one observing, one for guiding and assisting the players. The adjustments made to the first prototype concentrated on making it more accessible to participants, allowing them to focus on the learning aspect of the game. Despite that, the game was still too difficult for the audience. The metaphors were not clear enough, leaving space for various interpretations. Once more, the session took a long time and players were confused with the available choices. However, the dialogue that emerged from player interaction maintained a fun game play and idea exchange.

Figure 8. Common project

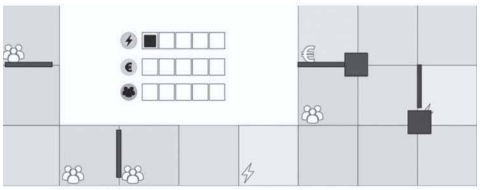


Figure 9. Action cards

The game acted as a platform for interaction, discussion and reflection over possible projects that could contribute to the development of the city. One of the shortcomings of the game was the set of guidelines, still too complex: the game master had to explain multiple times the rules as players were not used to the game methodology. Even though some were sceptical at the beginning, considering the method not serious enough to address the topic at hand, the added value of the game environment was clear for all participants during the debriefing part.

Conclusion

We addressed the importance of learning by introducing the debriefing element. Starting with the hypothesis that there is no durable collective learning from games without debriefing, we identify the moment of collective reflection and learning as the debriefing itself. The experiential learning process is defined by Kolb (1984) as composed by four intertwined parts: concrete experience, reflective observation, abstract conceptualization and active experimentation. Gibbs (1988) similarly describes the process as having four phases: planning for action, carrying out action, reflection on action, and relating back to theory whatever happens. How would we then define an experiential learning process? Learning from experience generates an afterthought which reflects upon the experience and projects new possibilities to draw lessons, analogies, parallels for future application; "learning by doing" would therefor expose the areas which would need improvement to enable the application in practice of the new concepts acquired, even expanding them to new areas horizontally or vertically in the chain of thought. (i.e. Grant and Marsden, 1992; Minsky, 1996). An iteration of play or training sessions allows simulation of the underlying model (similar to Monte Carlo simulations or probabilistic theories) which would test the robustness of the hypothesis and variables presented, the variance of "errors" observed providing factors to calibrate and strengthen the initial model – similar to repeated observations which provide continuous feedback for a learning machine which would fine tune the response each time before applying the model in practice (Minsky, 2010; Fanning & Gaba, 2007). Highly dynamic team-based activities sometimes prevent people from fully assimilating and analysing learning experiences on their own (Fanning & Gaba, 2007). We therefor define debriefing as the process of linking the experience one has during an event with the understanding of that particular event. This 'post experience analysis' is shaped by steered reflection while guiding people in an active way. As such debriefing is in itself also an activity, on the same level as the game, as it emphasises concrete solutions for applicable methods versus abstract notions, proposes practical functions and has a hands-on policy as opposed to simply observing (Dennehy et al., 1998).

Prototype 3

Design Goals and Methodology

Building on the positive outcomes of the previous iterations, the design goal was extended. Thus, a complementary main question was introduced: 'Who/what do we need, in order to implement this collective project?' The goals of balancing individual and collective goals, as well as recognizing the importance of networking were kept and emphasized. The design goals were developed in order to support collective learning and, as such, particular Aesthetics are expected. The goals became more precise through the whole process of designing the game as to identify the conditions necessary for a game to support civic space learning.

After the aforementioned adjustments were made, *Prototype 3* was tested four times (Table 1). It was first tested with a group of five players, all researchers in the field of sustainability and energy efficiency. Players gave feedback on the flexibility of the Mechanics and how the game could be adapted and used as a data collection tool in their own research. Representatives of Studio Refugee took part in *Prototypes' 3* first test. Studio Refugee is an ongoing project linking designers and student with refugees, to design products that tell their stories. It is a leather sewing studio based in Genk (Belgium) where asylum seekers and refugees can attend free classes to learn how to make various leather products. These products are then commercialised as to support refugees in their integration

and work experience. The project manager, with a background in object design and three asylum seekers, all former tailors, were part of the play session. The game was adapted to the projects' goal and the testing session was videotaped. Participants were asked to fill in a questionnaire when the game ended, while an observation form was filled in by the moderator during the game. A short debriefing moment succeeded the game play. The prototype was further tested with a group of six participants, architects and spatial planners. As in the previous tests of this prototype, the session was videotaped, an observation sheet was filled in by the moderator and the session ended with a debriefing part. Questionnaires were not used in this particular iteration as all of the points were covered during the debriefing section. The last test of *Prototype 3* involved a mixed group: two game designers and two architects. The iteration was photographed and the session ended with a debriefing moment. The feedback from all four sessions was analysed and translated into a new, improved version of the game.

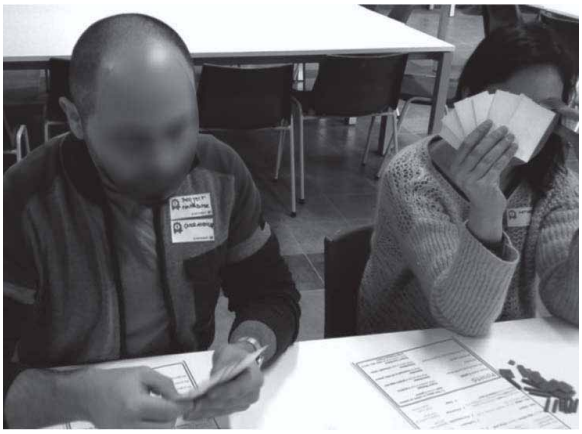
Mechanics

Playtests and analysis of previous versions of the prototype allowed us to extract and define the core mechanics that influence the flow of the game. As such, we focused on tuning the project tokens to real projects that happen in the city, where the game is played. Instead of businesses and resources, *projects* and *ideas* are used as metaphors. The game winning conditions were adjusted multiple times in search of a balance between game duration, fun and challenge. Turn-based, point-based and time-based solutions were explored until the decision was made to limit the game to six turns in which players should do their best to acquire points and different achievements, depending on their strategy. This way even though the winning player is the one with the highest amount of points, players can earn an additional reward for their strategy and play style. Players that achieve a specific quest first, get a sticker with that particular achievement (Figure 10).

Dynamics

To strengthen the collaborative element in the final version of the prototype, players are allowed to construct projects in adjacent areas and multiple networks on one field. Connections between projects now provide both players with an additional win point. They are also allowed to trade cards at any point during their individual turns. The common project is a shared goal of all players that benefits them personally through a winning point, but can also be positive for everyone, depending on the triggered event. Players can contribute to the common project by placing their idea tokens in the common project area. The common project is located in the middle of the map and also serves as

Figure 10. Prototype 3: Game play



a hub for networks so that players can easily expand to different areas of the map and connect with each other faster.

The game is limited to six turns so that players have a limited time of achieving their goals. It is also important to provide a consistent data set so that comparison between strategies and the effect of different mechanics can be easily observed.

Aesthetics

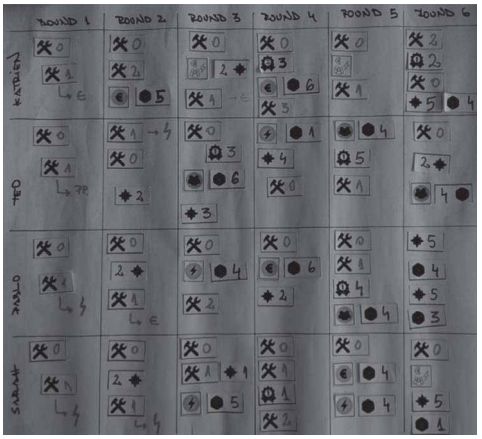
When tested multiple times in Genk with students, researchers, game designers and people involved in specific projects, we observed player interaction as a fun activity, while specific dynamics emerged between players. Nevertheless, rules were still not completely understood and participants encountered difficulties when deciding what to do next. The presence of achievements motivated players to compete and a more dynamic pace was noticed. Players had the possibility to change their strategy during the game and this led to an engaging play session. The addition of stickers for tracking player achievements and progress introduced a new feeling of accomplishment and made space for new conversation. The stickers were one of the main new elements that fostered a fun experience. Their names (e.g. project manager, perfectionist, networker, overachiever, project contributor) gave players the opportunity to make connections with their real-life position and joke on each other's' behaviour in the game. Equally, participants enjoyed the possibility of preventing one of their fellow colleagues from reaching a certain achievement. However, the play session was still too long and not fully efficient.

Conclusion

By analysing individual mechanics and their effect on the game we were able to discover bottlenecks and replace them with more suitable rules. After testing the debriefing methodology, the role of the game master is also introduced more clearly in this version of the game, as a person tracking and recording player progress and taking important notes. Stickers, representing possible actions and events in the game are printed and placed on a board each turn for each individual player. At the end of the game, the board (Figure 11) presents a summary of what actions and events took place in each round and provides the game master with data for discussion with the players.

We found that the game is still too complex and long for participants with no gaming experience and does not fit our goals perfectly. This type of presentation does not fit all audiences and needs to be adjusted according to the target group and setting. The game combines elements of board and card-based games and provides players with too many possibilities, which can be frustrating for

Figure 11. Prototype 3: Tracking board



non-experienced players. A different approach of either simplifying the game or introducing rules over time would be a possible solution. The decision was made to remove the board element of the game and produce a simple card game, based on the ideas and mechanics of the previous one, which people can learn and play in less than thirty minutes.

Prototype 4: City Makers - The Card Game

Design Goals and Methodology

The City Makers card game is a final, yet improved version of the same game, which sums up the results of the games' iterative prototyping process. It has one simple idea at its core - present projects as a set of steps that people need to collect resources for. By doing so, players will learn about the different resources needed for particular projects happening in the city.

Prototype 4 was tested with forty people over the course of five iterations (Table 1). The debriefing part was kept for all tests as well as the player observation sheet that was filled in by the moderator during the game. All five sessions were taped and photographed. At the end of each game test, participants were asked to fill in a questionnaire that would reflect their previous background with games, participatory processes as well as feedback on the experience they had during the game. Two mixed groups of game designers and architects, two groups of undergraduate architectural students and one group of researchers in the field of architecture took part in this exercise. The sessions were organised in a Living Lab environment where players were assisted by two game masters.

Mechanics

The game adapts abstract terms such as material, permit and location as resources, which players obtain in the form of cards. Each player receives a project that they need to finish to acquire points (Figure 12). For example - to start a business one might need to have a budget, idea, location and people to work with. The player, who reaches ten points first wins.

The game consists of four sets of cards: project, resource, market and action cards (Figure 12). They are placed in the predefined deck positions. One city project and four market cards are drawn from the decks and placed so everyone can see them. In the beginning of the game each player rolls the die and then start clockwise from the player with the highest number. Everyone receives three colour tokens – one for representing them on the field and two for investments, three player cards and a project. Players are then allowed to draw an additional resource card each turn, trade with everyone and do only one of the following: finish one step of their project, invest in the common project or another player's project or play an action card.

Dynamics

Players can obtain special resources in the market (Figure 13) in exchange for some of their resource cards. Any time someone buys a card from the market, all currently displayed cards are removed and new ones are placed. This way resources are constantly shifted and players need to act fast and strategically plan which resources are more important for them now or at a later stage.

Figure 12. City Makers game cards

Players place their projects on the table, visible for everyone. Steps must be finished in the correct order by placing the required resource on the right side of the project. Players can invest in each other's projects by contributing one of their cards and a token, which awards them a point if the project is completed. The idea of the common project is still present in this version of the game - players can contribute their resources to it in order to obtain action cards, which provide them with actions such as rolling the die to trigger an event, sabotage or a universal resource. The common City Project (Figure 13) is a project that requires resource investments from all players. Players can invest as many resources as they want in one turn. They get an action card every time they invest. Each consecutive investment allows the player to draw one card from the Action Deck. Once the project is completed all investors receive one point. If the project is not completed until the end of the game, players don't get any points for it.

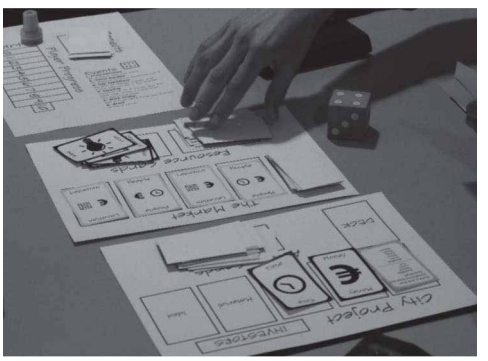
Aesthetics

The game was tested in Genk, using project cards, adapted to the specific local community projects. Each test took about 30 - 40 minutes with 15 minutes for debriefing. Emergent game situations were observed, when people started roleplaying and establishing alliances. Players formed their strategy based on the current state of the game, depending on what projects and resources are available and what social dynamics have emerged between them. People traded with each other constantly and invested in other projects more than in their own with the goal to obtain additional points when other players succeed. The game proved to be equally fun and motivating for participants. Players adopted the metaphors used for the resource cards (e.g. people, time, money) to envision fun scenarios where they would be the main actors responsible for one of the resources. They would then develop a storyline where a particular type of exchange would take place and detail on the impact of their imagined actions. At the end of the game, players were asked to customize a project of their own with available resources. The goal is to make them reflect about the steps they need to take in their real-world projects by motivating them to think within the constraints of the game. This way they can adapt what they learned in the game and strategically plan the steps and resources they require in real life for accomplishing their ideas. Herein lies the learning aspect of the game - through the abstraction of resources and social interactions players attain certain ideas about how this can work in real-life scenarios.

REFLECTIONS

The research conducted revealed that games were rarely or never used to engage people in participatory processes, in the particular setting the prototype was tested. However, participants showed interest in

Figure 13. City Makers game components



playing, with the specification that the game should be very accessible and not difficult to explain. It was underlined by the interviewees that games work well in some cultures while in other not. Facilitators should take in account the risks when using games: people see them as childish, there is always a balance one should make in addressing something playfully, without leaving the impression that the action is mere entertainment and that the game addresses real public issues, resulting in a concrete outcome. Equally, the advantage of using games sits in the low threshold, low design, people buy easily into it. Games create a relaxed, fun atmosphere, appreciated by participants. They are flexible and can be designed in a multitude of ways with various objectives to include and diffuse many different kinds of knowledge, ranging from the very technical to the very opened and unstructured.

Any topic can be more accessible via the use of games, mostly the politically and societally loaded ones. In the collaborative session, where people come together, games are most useful and can be accomplished through digital technology where you can, from various location, address the same issues and space, maybe not at all times but at the moment of explicit negotiation. The use of games can lower the drop-out rate and make the participatory processes more appealing. One of the goals is to establish trust among the participants, by warming the process with games and by working together, building something together, people have more trust to act and take the word in a group. Games can be used as an icebreaker, in the early stages of participation, there are obvious possibilities for games: requirements are not very stringent, the setting is relaxed. The flexibility of the game format lies in the fact that it can be used in any stage of the participatory process as long as it is well designed. Complex challenges can benefit from the game like approach, be it urban planning, new technologies, technology assessment, civic dialogue about the emerging economies, etc. Any process that has a high technical and social complexity combined with an emotional component, is a good candidate for a game supported interactive process.

The serious game, City Makers, is developed to foster social interaction between players in order to facilitate learning in and across multidisciplinary groups. It went through multiple iterations, constantly tested and adapted to the design goals defined by the project. The different groups involved in the games' iterations revealed various challenges that were addressed with each new version of the prototype. We observed that the mixed groups of game designers and architects as well as the groups of architectural students found all prototypes fun and easy to follow, they engaged quickly in the game play and had clear strategies within the game rules. These were the groups with previous game experience and were able to give feedback on specific Mechanics that could be improved. Expected experiences and dynamics were set at the beginning of the game design process and later compared to the actual ones. Each iteration of each prototype revealed a new challenge to be considered when using games to communicate between multidisciplinary teams. The most difficult groups were the ones with less to no previous game experience. The main provocation: validating the methodology, as participants considered games not very serious when addressing specific topics. Nevertheless, they gave valuable insight in improving the design goals and what type of projects would most benefit from this methodology. As such, each iteration builds on ideas and lessons learned from previous ones, while game mechanics are adjusted to provide a fun, easily understandable experience. To guarantee this understanding, the goal of the game and the end users should be clear from the beginning of the design process. This understanding will be further enhanced when involving all stakeholders from the beginning of the process, as to include the feedback from the early stages of the design process.

Using games to communicate knowledge between multidisciplinary groups provides the benefit of interpersonal communication, allowing and/or forcing participants to verbalize and therefore more profoundly concern themselves with their own opinions, beliefs and ideas, as well as those from others. During the iterative game-design process, we identified a number of challenges that games have to overcome as to best serve the aforementioned goals. The mixed and varied typology of participants, as well as the open design process the game undertook, make these challenges valid not only for this particular process. As such, we conclude by presenting a generalised approach on how to address these challenges:

1. The challenge of framing the game: the framing of the game and its level of abstraction may, at first, offer limited relevance to a real-world situation. However, abstract models are used to explain concepts in every discipline, from economics to physics. As Wagner et al. (2013) experienced with their involvement with the serious game Ludwig, achieving a measurable transfer of knowledge, skills or behavioural change requires multiple iterations, and in a best-case scenario, a teacher or trainer who mediates gameplay and post-play discussion. Games are by nature a participatory medium and such, by carefully addressing different artefacts, players have the possibility to create their own gameplay experience by observing and reacting to the dynamics, or combined mechanics, of the game system that was conceived by the game designer.
2. The challenge of documenting the game: real-time documentation is a pre-requisite to allow for individual and collective reflection after the play-session. By documenting the moves players make and giving space to discussion, decisions in the game are no longer subject to interpretation thus making the data more valid and relevant to incorporate in the following play-sessions. Proper documentation of the game-play is important in bringing the generated knowledge, decisions, data, etc. to the next session.
3. The challenge of 'levelling' the game: how do you insert the previous knowledge into the next game session, i.e. bring the game to a next level. Players learn from both game mechanics and narratives. From the game mechanics, they will learn the meaning-making – meaningful communication and strategical moves (e.g. how can they use different resources, allocate them). The narratives improve reading skills through written mission texts, will bring in new vocabularies and game semantics. This knowledge builds on previous game session by using common language and references to the previous play-sessions. Nevertheless, it is important to avoid including all feedback in the game and keep it as simple as possible in order to be easily playable.
4. The challenge of debriefing the game-play: how do you make the relevance of each play-session clear? And how do you stimulate them to keep on playing? Players learn by becoming interested in an in-game project and expand their knowledge on this project by studying outside resources without obligatory reinforcement (Floyed and Portnow, 2008). The game master is part of the game and is important that he/she knows how to 'sell' the game and keep it fun.

With these challenges in mind, City Makers is currently being used as part of a mini-games set to support citizen participation. The iterative process the game went through, reinforced its flexible structure making it very easy to play and adaptable to different contexts.

REFERENCES

Abt, C. (1969). *Serious Games*. New York: Viking Press.

Bergold, J., & Thomas, S. (2012). Participatory Research Methods: A Methodological Approach in Motion. *Social Research*, *13*(1), 30.

Boehm, B. (2000). Spiral Development: Experience, Principles, and Refinements (Special Report CMU/SEI-2000-SR-008).

Brabham, D. C. (2009). Crowdsourcing the public participation process for planning projects. *Planning Theory*, *8*(3), 242–262. doi:10.1177/1473095209104824

Brenner, N. (2004). *New State Spaces: Urban Governance and the rescaling of statehood*. Oxford: Oxford University Press. doi:10.1093/acprof:oso/9780199270057.001.0001

Caillois, R. (1962). *Man, Play and Games*. London: Thames and Hudson.

Canossa, A. (2009). Play-Persona: Modeling Player Behaviour in Computer Games [PhD Dissertation]. Danish Design School of Copenhagen, Denmark.

Chin, M., Paw, A., Jacobs, W., Vaessen, E., Titze, S., & van Mechelen, W. (2008). The motivation of children to play an active video game. *Journal of Science and Medicine in Sport*, *11*(2), 163–166. doi:10.1016/j.jsams.2007.06.001 PMID:17706461

Coburn, J. (2003). Bringing Local Knowledge into Environmental decision making: Improving Urban Planning for communities at risk. *Journal of Planning Education and Research*, *22*(4), 420–433. doi:10.1177/0739456X03022004008

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. 2011. From Game Design Elements to Gamefulness: Defining "Gamification. In A. Lugmayr, (Ed.), *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments* (pp. 9–15). doi:10.1145/2181037.2181040

DiSalvo, C. (2012). *Adversarial Design*. Cambridge, Massachusetts: The MIT Press.

Duke, R. D. (2011). Origin and Evolution of Policy Simulation: A Personal Journey. *Simulation & Gaming*, *XX*(X), 1–17.

Emilson, A., Hillgren, P. A., & Seravalli, A. (2014). Designing in the Neighborhood: Beyond (and in the Shadow of) Creative Communities. In P. Ehn, E. M. Nilsson, & R. Topgaard (Eds.), *Making Futures: Marginal Notes on Innovation, Design, and Democracy* (pp. 35–61). Cambridge, MA: MIT Press.

Fainstein, S. S. (2000). New Directions in Planning Theory. *Urban Affairs Review*, *35*(4), 451–478. doi:10.1177/10780870022184480

Fanning, R. M., & Gaba, D. M. (2007). The Role of Debriefing in Simulation-Based Learning. *Society for Simulation in Healthcare Journal*, *2*(2), 115–124. doi:10.1097/SIH.0b013e3180315539 PMID:19088616

Feldt, A. G. (2014). Experience With Simulation/Gaming. 19602010. *Simulation & Gaming*, *45*(3), 283–305. doi:10.1177/1046878114543983

Gordon, E., & Baldwin-Philippi, J. (2014). Playful Civic Learning: Enabling Reflection and Lateral Trust in Game-based Public Participation. *International Journal of Communication*, *8*, 759–786.

Gordon, E., Balwin-Philippi, J. & Balestra, M. (2013). Why We Engage - How Theories of Human Behavior Contribute to our understanding of Civic Engagement in a digital era.

Hunicke, R., Leblanc, M., & Zubek, R. (2004). *MDA: A formal approach to Game Design and Game Research. sl*. AAAI Press.

Kapp, K. M., Blair, L., & Mesch, R. (2013). *The Gamification of Learning and Instruction Fieldbook: Theory into Practice*. New York: John Wiley & Sons.

Koskinen, I., Zimmerman, J., Binder, T., Reström, J., & Wensveen, S. (2011). *Design Research Through Practice. From the Lab, Field, and Showroom*. Waltham, USA: Morgan Kaufmann.

Oak, J. W., & Bae, J. H. (2014). Development of Smart Multiplatform Game App Using Unity 3D Engine for CPR Education. *International Journal of Multimedia and Ubiquitous Engineering*, *9*(7), 263–268. doi:10.14257/ijmue.2014.9.7.22

Parés, M., & March, H. (2013). *Short Guides for Citizen Participation, 3: Guide to Evaluating Participatory Processes*. Barcelona: Department of Governance and Institutional Relations.

Poplin, A. (2014). Digital serious game for urban planning: "B3-Design your Marketplace! *Environment and Planning. B, Planning & Design*, *41*(3), 493–511. doi:10.1068/b39032

Raphael, C., Bachen, C., Lynn, K.-M., Baldwin-Philippi, J., & McKee, K. A. (2010). Games for Civic Learning: A conceptual Framework and Agenda for Research and Design. *Games and Culture*, *5*(2), 199–235. doi:10.1177/1555412009354728

Salen, K., & Zimmerman, E. (2003). *Rules of play. Game design fundamentals*. The MIT Press.

Schell, J. (2008). *The Art of Game Design - A Book of Lenses*. Burlington, MA: Morgan Kaufmann Publishers.

Storni, C., Stuedahl, D., Binder, T. & Linde, P. (2015). Designing Things Together: intersection of Co-Design and Actor Network Theory. *Journal of Co-Design*, *11*(3-4).

Van Herzele, A. (2004). Local Knowledge in Action: Valuing Nonprofessional Reasoning in the Planning Process. *Journal of Planning Education and Research*, *24*(2), 197–212. doi:10.1177/0739456X04267723

Walz, S. P., & Deterding, S. (Eds.). (2014). *The Gameful World: Approaches, Issues, Applications*. Cambridge, MA: MIT Press.

APPENDIX

Table 1. Game iterations

Iterations	Nr. Players	Player type	Nr. Rounds played	Duration round minutes	Duration session minutes	Duration Debriefing minutes	Location
Prototype 1	3	game designers architects/planners	10	15	150	–	Hagenberg, Austria
2	4	game designers architects/planners	5	10	50	–	Hagenberg, Austria
3	5	game designers architects/planners	9	7	63	–	Hagenberg, Austria
4	6	game designers architects/planners	6	7	42	–	Hagenberg, Austria
5	6	game designers architects/planners	5	4	20	–	Hagenberg, Austria
Prototype 2	5	Play!UC partners architects/planners	6	10	60	–	Vienna, Austria
7	6	game designers architects/planners	6	5	30	10	Hagenberg, Austria
8	4	designers architects/planners	6	8	48	15	Hasselt, Belgium
9	4	architects designers	8	3	24	15	Genk, Belgium
10	4	PhD architecture	4	7	28	20	Hasselt, Belgium
11	4	architecture students	5	12	60	15	Hasselt, Belgium
Prototype 3	5	city officials	5	12	60	30	Genk, Belgium
13	5	PhD architecture	6	8	48	12	Hasselt, Belgium
14	4	Studio Refugge_ migrant workers	6	5	30	15	Genk, Belgium
15	6	Play!UC partners architects/planners	6	5	30	20	Genk, Belgium
Prototype 4_City Makers card game	4	game designers architects/planners	5	3	15	10	Genk, Belgium
17	5	game designers architects/planners	5	3	15	5	Genk, Belgium
18	5	PhD planning	5	4	20	10	Groningen, Netherlands
19	10	architecture students	10	4	40	15	Genk, Belgium
20	8	architecture students	10	3	30	15	Genk, Belgium

Table 2. Player survey

1 Activation	
How did you find out about the game?	○ Local Action Group / Neighbourhood Initiative ○ Neighbourhood Manager / Wijk Manager ○ Friends ○ Work colleagues ○ Email Newsletter ○ Dropped by Other: _____
How do you feel about the time setting of the game?	
What was the main reason for you to participate?	○ Because I am interested in urban - economic issues, issues related to 'work' happening in my: ○ neighbourhood ○ city ○ Because I am interested in the community projects happening in my: ○ neighbourhood ○ city ○ Because I am in general interested to participate in decision making ○ Because I am interested in games ○ Other: _____
Do you know the other players?	○ yes ○ no ○ partially
2 Pre-Knowledge / Experience	
How often are/were you part of participatory processes/participatory projects?	① ② ③ ④ ⑤ ⑥ very often never
Are you aware of the projects happening in your neighbourhood?	① ② ③ ④ ⑤ ⑥ very often never
Are you aware of your possibilities to participate in neighbourhood projects?	① ② ③ ④ ⑤ ⑥ very often never
Are you playing analogue games? (i.e. board games)	① ② ③ ④ ⑤ ⑥ very often never
Are you playing digital games?	① ② ③ ④ ⑤ ⑥ very often never
Do you have experiences with Serious Games i.e. Urban Planning Games?	① ② ③ ④ ⑤ ⑥ very often never
3 Aspirations	
How important do you consider your involvement in decision making in your daily environment e. work, education, neighbourhood)	① ② ③ ④ ⑤ ⑥ very often never

continued on following page

Table 2. Continued

How important is the topic of 'work' for you personally?	① ② ③ ④ ⑤ ⑥ very often never
How important is it for you personally to be involved in decision-making regarding 'work' in your city?	① ② ③ ④ ⑤ ⑥ very important not important
How important is it for you personally to be involved in decision-making regarding 'work' in your neighbourhood?	① ② ③ ④ ⑤ ⑥ very important not important
How important is the topic of 'local projects' for you personally?	① ② ③ ④ ⑤ ⑥ very important not important
How important is it for you personally to be involved in decision-making regarding new projects in your city/neighbourhood?	① ② ③ ④ ⑤ ⑥ very important not important
How important do you consider information/ knowledge sharing regarding 'work'?	① ② ③ ④ ⑤ ⑥ very important not important
How important do you consider information/ knowledge sharing regarding local projects?	① ② ③ ④ ⑤ ⑥ very important not important
Do you feel connected to your local community?	① ② ③ ④ ⑤ ⑥ very much not at all
Do you believe a single person can trigger change?	① ② ③ ④ ⑤ ⑥ very much not at all
Do you believe your local community can achieve something collectively?	① ② ③ ④ ⑤ ⑥ very much not at all
4 Game Play	
Did you like the game City Makers?	① ② ③ ④ ⑤ ⑥ very much not at all
Did you understand the goal of the game?	① ② ③ ④ ⑤ ⑥ yes not at all
Were the game instructions clear?	① ② ③ ④ ⑤ ⑥ yes not at all

continued on following page

Table 2. Continued

Was the game entertaining?	yes ① ② ③ ④ ⑤ ⑥ not at all
To what extent would you agree with the following statements? It was easy for me to link in to the topic of 'local projects'	true ① ② ③ ④ ⑤ ⑥ not at all
It was easy for me to follow the game	true ① ② ③ ④ ⑤ ⑥ not at all
It was easy for me to decide to contribute to the community project	true ① ② ③ ④ ⑤ ⑥ not at all
It was easy for me to follow the actions of other players	true ① ② ③ ④ ⑤ ⑥ not at all
Did you have enough time to personally contribute/to express your personal interest/ opinion?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you feel it was important to contribute to the community project?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you feel it was important to contribute to other players projects?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you feel it was important to establish 'partnerships' with other players during the game?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you feel it was important to convince other players to contribute to your project?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you feel that your actions depended on the actions of other players?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you follow the actions of other players as part of your game strategy?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you feel players pursued a common goal ?	yes ① ② ③ ④ ⑤ ⑥ not at all
Did you feel that your actions affected other players?	yes ① ② ③ ④ ⑤ ⑥ not at all
In general, the game was…	unchallenging optimal over challenging ① ② ③ ④ ⑤ ⑥

continued on following page

Table 2. Continued

The duration of the game was....	too long ok too short ① ② ③ ④ ⑤ ⑥
The outcome of the game is	① ② ③ ④ ⑤ ⑥ complex superficial
Are you satisfied with the result of the game?	① ② ③ ④ ⑤ ⑥ yes not at all
5. Knowledge Exchange/Information	
Did you obtain and explore new perspectives on the given topic?	① ② ③ ④ ⑤ ⑥ very much not at all
Did the game show you a new perspective on the interests and concerns of other players?	① ② ③ ④ ⑤ ⑥ very much not at all
Did the game allow you to established personal connections with other players?	① ② ③ ④ ⑤ ⑥ very much not at all
Did the game show possibilities of participation and involvement?	① ② ③ ④ ⑤ ⑥ very strongly not at all
Would you mention this game experience to your family, friends or colleagues?	① ② ③ ④ ⑤ ⑥ very likely not at all
6 Group Dynamics	
How did your sense of comfort within the group change from the beginning to the end of the game?	positively no change negatively ① ② ③ ④ ⑤ ⑥
I felt comfortable to express myself in the group	① ② ③ ④ ⑤ ⑥ very comfortable not at all comfortable
Did your concerns and interest got appropriately addressed during the game?	① ② ③ ④ ⑤ ⑥ very much not at all
How were your interests and concerns regarding the project / topic influenced by the reactions of other players?	strengthen no influence weaken ① ② ③ ④ ⑤ ⑥
How other players reacted to my concerns and statements made me…	① ② ③ ④ ⑤ ⑥ very satisfied not satisfied at all

continued on following page

Table 2. Continued

Did you have the feeling players pursued a common goal/objective?	① ② ③ ④ ⑤ ⑥ yes not at all
Did you experience the group as a community?	① ② ③ ④ ⑤ ⑥ yes not at all
What is on your mind after playing the game ? Draw a picture / write a word / phrase / symbol ….	
7 Digital Media (important for the further development of the project-components)	
How familiar are you with digital media?	① ② ③ ④ ⑤ ⑥ very familiar not familiar at all
How often do you use digital media?	○ Several times per day ○ Several times per week ○ Occasionally ○ Rarely ○ Never
I have (can use) the following appliances	○ PC ○ Tablet ○ Smartphone ○ Game Console (i.e. PS3, X-Box, Wii).
I use Digital Media….	○ as a source (i.e. for data, webpages, etc.) ○ Image editing and data processing (i.e. PowerPoint, word) ○ Communication and networks (email, Facebook, Twitter, etc.) ○ Passive entertainment (Film/Movies/music ○ Active Entertainment (games) ○ I do not use digital media ○ No answer
8 Personal Data	
You are….	○ male ○ female ○ transgender
How old are you?	_____years.
What is the highest educational degree that you obtained?	○ Primary education ○ Secondary education ○ Higher education ○ No Answer
If you want to stay informed about future game sessions, please fill in your e-mail.	

Teodora Iulia Constantinescu is an architect and urban designer with a Master's degree from the Katholieke Universitei Leuven, Belgium. She is a member of the Architect's and Urbanist's Chamber of Romania since 2012. As of 2014 she is a researcher within the Spatial Capacity Building research group at Hasselt University, Belgium. She explores themes such as spatial capacity building, spaces of urban migration, digital social innovation, urban games and spaces of multicultural micro economies. Her research topic focuses on The Role Games Play in Re-valuing Spaces for Work.

Oswald Devisch (1975) is a civil-engineer architect and urban designer. He studied at the Catholic University of Leuven, Belgium and at the Bartlett School of Architecture, London, U.K. He obtained a doctoral degree at the Technical University of Eindhoven, the Netherlands, on spatial simulation models. Since 2006 he is a lecturer and researcher at the Hasselt University, Belgium, where he explores theme's such as spontaneous transformation processes, new media, private planning, urban games and spatial capacity building.

Georgi Kostov is a game designer, working on the PlayUC project within the Playful Interactive Environments Research Lab, Hagenberg, Austria. He is currently focused on trans-reality entertainment such as co-located and virtual reality games. His Goal is to create new types of experiences for people, show them innovative ways to interact with technology, but also – with each other. He believes multimedia can influence people in a positive and liberating way by expanding their minds and bringing them closer together.