Discovering the invisible city: Game design for learning in technology enhanced places

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Abstract. In this paper we discuss the design of location-based mobile games supporting learning in technology enhanced public spaces. We describe the process of game design and we identify the main challenges faced. We briefly elaborate by discussing the case of Invisible City: Rebels vs Spies, a game to be played in a city centre. Through this case we highlight the adaptation of an original party game into a mobile game, the role of game narrative structure and user participation in game construction, and the key aspects conducive to learning. It is claimed that learning through mobile city games is a new challenge, as our city landscapes are augmented with an increasing number of layers of digital information in which a new generation of city games are played.

1 Introduction

Technology enhanced places, in which sensing and responsive technologies have been embedded, may support new kinds of learning. A typical example is through location-based mobile games. These games take the form of playful activities situated in urban contexts and are believed to be conducive to social, experiential and situated learning [2], that may lead to acquisition of 21\textsuperscript{st} century skills, like critical thinking, curiosity, creativity, collaboration, consideration of multiple perspectives, social awareness, responsibility and media fluency [4]. The underlying idea is that with these games the players relate knowledge with physical activities situated in the real world, in particular with places rich in historic value, like historic city centers. However these claims have yet to be thoroughly studied and verified.

In a recent survey of location-based games different kinds of games built to support learning were identified [3]: scavenger hunt games, participatory simulators, games for situated language learning and educational action games. However not all these games were effective as learning activities. In this paper we focus on a city game called Invisible City: Rebels vs Spies (RvS for short) [1], a typical site-specific game, from our own recent experience. Various aspects related to the design of this game are discussed here, including the design of the game using existing game patterns, the role of narratives in supporting the players’ experience and various ways for increasing learning potential through user participation in the game construction.

In particular, the design process that was investigated in RvS relates to adaptation of game patterns from a traditional game. This transformation process poses a number of challenges. The most important relates to the spatial expansion of the game activi-
ty. The game mechanics need to be altered to account for a game that is played in a space that is often much more extended. An additional challenge lies in the seamless incorporation of contextual knowledge in the game. In order to tackle these issues, we analyzed the traditional form of the game concept that was adapted using new game patterns, suitable for location-based mobile games. We have followed this process in designing games for museums and historical sites. In the case of Rebels vs. Spies the game rules were inspired by the party game Mafia.

The second challenge, the incorporation of contextual knowledge, proved more difficult to overcome, especially in RvS where the players receive mission descriptions that require identification of landmarks and answering of questions that relate to them. A solution that was proposed is to create a background narrative that binds the various locations, landmarks and other physical objects to a coherent story. The design challenge then shifts into creating such a story, connecting it to the physical context in a way that is meaningful with learning potential, as it was found that a strong narrative supports meaningful incorporation of contextual knowledge in the game [5].

Various researchers have identified the importance of active engagement and student agency in learning. Analysis of the roles of players in Frequency 1550 game identified that the director view (i.e. the one that involved multiple perspectives and design of the paths of the game) is more effective to learning than the just acting role [7]. In [6] it was argued that involving players in the process of designing mobile games can enrich the learning experience of game play with the active role of learners who participate in the process of creation, develop a sense of ownership over the content by creation of public meta-artifacts that can be integrated in the urban landscape, as discussed in the final part of the paper.

2. Background

In recent years, location-based multiplayer mobile games have gained in popularity. These games are multiplayer playful activities where location matters and where collaboration or competition between the players is an important trait. They are played in specific locations using networked mobile devices and result in what is considered to be the breaking of borders and the merging of digital and urban space [8,9]. The main features that support learning are mobility, location awareness, interaction between the players and various ways of interaction with real-world objects. These characteristics make these games useful for situating playful learning activities in real contexts and they have been used in recent years to situate play in the relevant physical environment, employing this new relationship to space to support social, experiential and situated learning [2]. The underlying idea is that with these games the players associate information with physical activities in the real world, experiencing immersion in a physical and social space, augmented with digital media. The new affordances of modern cities [10] in which a layer of digital information has been embedded and new sensing and responsive technologies are used, further promotes and facilitates such activities.
In a recent survey of location-based games [3], in which the 14 most cited location-based games were discussed, it was found that among these games, 11 games are played outdoors in city centers, which were characterized as spatially continuous games, i.e. can be played in any place that players gather (examples are Feeding Yoshi, UncleRoy, CitiTag, CityExplorer, Hitchers, Jindeo), while other games were designed for specific places in cities usually augmenting the place with historic information and asking the players to explore historic buildings, or public spaces, examples being: Relive the Revolution (in Lexington, Massachusetts), Riot! (in Bristol, UK), and Frequency 1550 (in Amsterdam, the Netherlands). The games of this last subgenre are called site-specific mobile games, as they are designed for specific places and usually have some associated learning objectives. In this context, questions of particular interest are raised about how to design these games and how to achieve the learning objectives.

The design process aims at an engaging playful experience that will involve players, (visitors or inhabitants), into exploring invisible facets of parts of the city. Many issues need to be tackled during this process. First definition of the game mechanics and of technology to be used. Then implementing the game in a specific site, i.e. selection of the physical space, places and artifacts of interest in it, identification of the learning goals, etc. Some of these issues are discussed here. We put special attention on the game design, while the implementation of a game in a specific location will be briefly discussed through a case study, next.

Many location based city games have been inspired by traditional board or party games. The transformation process however is not trivial. Characteristics of a familiar game need to be employed that are engaging and motivating such as story-playing roles and playing strategies in order to support informal learning in site. In this paper we discuss the lifecycle of design and implementation of RvS that was inspired by an existing party game. The game has been implemented as an Android-based mobile multi-player game [1], and was deployed in the city centre of Patras, Greece, as presented in the following.

3. Adaptation of a traditional party game

The design goal was to create a multi-player location-based game that involves an engaging play activity which integrates tasks to be performed in parts of the city, so that players explore the city center and interact with places, monuments and other objects in the city. The goal can be restated into specific requirements that the final game has to fulfill, namely that the game offers situated action through which the participants' experience is associated with knowledge acquisition, that part of the game incorporates mental challenges that involve performing actions in the real world, in terms of solving puzzles by engaging with real-world objects and locations and finally that the players interact with each-other. The game was inspired by the popular party game Mafia (also known as Night in Palermo, Assassins or Werewolves), where the players are split in two groups [11]. Mafia belongs to a class of games that are based on the pattern of information asymmetry. In this pattern, a mi-
nority of the players hide the fact that they know an important piece of information, while the majority of the players try to discover the players who are informed.

The design task is to take specific structural game elements of the original game and adapt them for a location-based city game. The aim is to maintain or adapt most of the basic structural elements in the new game mode. The location-based games' appeal and the players' engagement can be attributed to four main characteristics [12]: a) physical experience, b) mental challenge, c) social experience and d) immersion.

Physical experience is akin to the player's experience when interacting with real and tangible objects in a context defined by the physical location where the game takes place. Players need to move and act in physical space, doing puzzles and problem solving tasks that drive the game forward. Requiring players to meet, socialize and combine their efforts widens the social experience, strengthens ties and contextualizes the play activity within a larger framework of social interactions. Finally, immersion in the game activity should provide players with a feeling of enjoyment. Given these characteristics of location-based games, in order to evoke learning, we should put effort into associating stimulating mental challenges to tangible or digital objects of historic relevance, integrating social experiences in these interactions and creating a motivating and engaging story [2].

In the next sections, we outline the process that was followed in designing RvS and discuss major decisions. We begin by establishing a descriptive understanding of the factors that make Mafia a compelling game and build on that to inspire a location-based game. In order to do that, we observed, participated and analyzed sessions of Mafia playing using an ethnographic approach, a participatory method suitable for developing understanding of complex group behavior [13]. A number of elements were identified, that constitute the character of the game. Subsequently we focused on three factors that affect the transformation process: spatial expansion, mobile technology and the characteristics of the site. We investigated alternative designs that would work in the new game space, and finally designed the rule set of RvS, as discussed next.

3.1 The starting point: the “Mafia” game

The Mafia game exists in many variations and in the following we will outline a simple form of it. The game is typically played by 9-15 players. The game is about convincing others, about being able to lie believably, and about being able to figure out if other people are lying. The narrative involves a once peaceful town which has been invaded by the dark forces of corruption - the Mafia. The Mafia's sole purpose is to murder the productive citizens in their bed. They have free reign of the town at night, but by day they appear to be normal citizens. One player acts as moderator and the rest take the roles of either citizens or Mafia members. The game starts by drawing cards from a shuffled deck that determines players’ roles. The moderator then announces the fall of the “night”, and all players have to close their eyes. Then, the Mafia people open their eyes and with gestures agree on which citizen to eliminate from the game. The day comes, all players open their eyes and the moderator asks the player who got eliminated by the Mafia to step out of the game. During the “day” time the
players debate and try to find who the Mafia might be. The Mafia try to convincingly act as citizens and draw the suspicions away from them. All players indicate a suspect and at the end of the day a vote is called and the player who receives most votes is removed from the game as a suspect Mafia. The game continues in successive phases of day and night until only Mafia or only citizens are left.

The game-play that emerges from the simple set-up of Mafia can be very engaging. Mafia has been the object of analysis of social activity. Salen and Zimmerman [14] offer a valuable analysis of Mafia as an example of emergent social play, where the interplay of trust, deception, observation and performance leads to an engaging experience.

The game is based on asymmetry between public and private information, through which the game provokes deep social involvement of the players. The citizens have very little information on which to base their decisions and for the Mafia success depends on how well they can pretend to be citizens. A number of structural elements can be identified that influence the player's experience. Applying the Mechanics, Dynamics & Aesthetics (MDA) framework [15], the elements of the Mafia game can be identified, where mechanics are the basic actions of the game, dynamics describe the play of the game and aesthetics are the emotional response that is evoked. The citizens are faced with a kind of prisoner's dilemma, which provokes rich emotional involvement of the players — the aesthetics component of MDA: they suspect everyone of being a Mafia but at the same time they need to trust and cooperate with some of the players in order to win against the Mafia. During the game, no factual way exists of assuring the allegiance of a fellow player, so everyone may plausibly claim to be a citizen. This leads to debates during the “day” phases when the players engage in deception and bluffing, the Mafia members try to manipulate the citizens into ostracizing a fellow citizen, who in turn try to observe the behaviors of the other players and to guess bluffs. The mechanics that give rise to such emotions are supported through role-playing and identities that impose to the players restrictions on their possible actions. There is virtually no reliance on tools, besides the initial mechanism for assigning roles. Also the narrative component is rudimentary but serves as the context that gives meaning to the rules, primarily as a way for naming the two factions, their motivations and facilitating the succession between the two phases of day and night. The game is played in a confined space such as a room, where everybody can observe and expects to be observed. These mechanics lead to a game that relies heavily on observation. The players are also spectators and through comments they provide trajectories for competition or narratives that are external to the game, for example by referencing past experiences. In this sense, a critical element of the game is that signs of emotion such as mimicry or facial expressions are visible to all players. The space as such does not play any role; the game can be played in principle anywhere. The players who are eliminated from the game do not stop participating but step out of the game, observing how the game unfolds [14]. Since the eliminated players are no longer obliged to follow the day/night phases, they discover who the Mafia members are and the game gains new meaning for them as a performance: they can now observe and interpret actions and behaviors of the players through the lens of the newly acquired information.
4. Design process

4.1 Spatial Expansion

The most radical modification of the original game is that of designing for physical experience: the spatial expansion of the game. By taking Mafia out of the room and placing it in a city, the game is spread out, the players cannot observe each other and the narrative structure of the game does not hold any more, since it is fragmented in different locations. Also an implication of the spatial expansion is that the players who are ostracized cannot observe how the game unfolds and the performance element of the original game cannot apply as a mechanism that engages ostracized players. In the original game it is acceptable to be eliminated and to continue participating as a spectator and in fact this is an essential element of the game. In the case of a city game this is not feasible as the players who get expelled one by one cannot observe the unfolding of the remaining game. The performance and ostracism elements cannot work in an open location because the game takes place over a larger area.

The issue of players simply waiting for the round or the game to end was addressed in other adaptations of the Mafia game. In Train Mafia [16], an earlier attempt of transferring the game out of the room, the ostracized players participate in a new game. A more effective solution was introduced in Resistance [17], a board-game variation of Mafia. In Resistance, scoring was introduced as a replacement for ostracism. Instead of expelling players, either faction gained a “base” in each round. Resistance is also played in a confined space as a card game, and while scoring helps to avoid ostracism, the game mechanics still maintain a strong performance element: In each round of Resistance, only a subgroup of players participate while the others observe waiting for the round to end.

In RvS we addressed this issue by introducing the concept of critical and non critical missions and scoring rules: In each round the players have to complete individual missions in a part of the city. Some missions are critical and others not. In each round, all critical missions must be completed successfully for the rebels to win a point. If at least one critical mission fails, then the spies win the round. The not-critical missions have no impact on the round's outcome, however the players who perform them are unaware of which missions are critical or not. The number of critical missions in each round is equal to the number of spies. All missions are assigned by an elected leader for that round who has to gain the trust of all players. The leader is able to make a judgment on the identities of the other players, based on the round result and knowledge of the critical missions. If the elected leader is a spy, then she does not need that extra information as she belongs to the group of informed minority. In this case, the leader has the chance to determine the outcome of the next round by deciding if the spies can afford to lose a round but protect their identity, or to risk being detected by winning a round, i.e. failing a critical mission. There are numerous “strategies” one can build in his or her attempt to deceive or win the trust of the other players, a factor that maintains the intriguing dynamics of the original Mafia game.
4.2 Situated play

The ultimate goal of RvS is to relate learning with the physical experience of playing in an urban setting and being involved with puzzles about interesting buildings and landmarks, thus discovering historic information on an area of the city. Physical involvement creates engagement and invigorates the learners in a way that is not possible with passive observation. This approach was the basis of similar games, such as Frequency 1550 [18]. In RvS, the challenges were individual missions that require the player to a) locate a position in the city, b) visit it and solve a riddle which can be accessed using a QR tag attached to a monument, or a physical landmark such as an inscription, c) suggest an answer to the riddle according to his/her role on the game. As discussed earlier, the player may decide to fail the mission by intentionally giving a wrong answer. This pattern of playing activity is similar to scavenger hunt games, contextualized in the narrative of RvS.

![Figure 1. The first three meeting points for a RvS game session, played in Patras.](image)

In Figure 1 the locations of the activity of the first three missions of the game are displayed in the city centre of Patras. As it can be seen from the map, the locations of the missions and the meeting points were a few hundred meters away from each other. The puzzles had the form of questions such as “What symbol of a secret society is above the entrance of house X”, where the player had to locate the mansion that belonged to a member of a group of conspirators who had engraved the symbol of the conspiracy above the entrance of the mansion.

4.3 Rebels Vs Spies game description

In the implemented version of Rebels vs. Spies, the rebels are the team of the uninformed majority and the spies are the informed minority. The rebels try to successfully carry out missions but their team has been infiltrated by spies who will fail the
missions while remaining undercover. The game is structured as alterations between meetings of the players, where they discuss and vote for a leader, and individual missions in various locations in a city centre. This cycle of: (a) player gathering, (b) voting for a leader, (c) carrying out of missions, is repeated until the spies have been exposed or until one of the teams wins a minimum number of rounds.

At the beginning of a round the players assemble and use their hand-held devices to vote for a leader. The elected leader of the round has to assign missions to all the players. The players receive their missions in their devices. Some missions are critical, and if a critical mission fails, the round goes to the spies, otherwise, if all critical missions of the round succeed, the round goes to the rebels. Only the leader knows which missions are critical. There are as many critical missions as spies. If the elected leader is actually a spy, she can assign critical missions to her fellow spies who can then try to fail the missions. After the assignment of the missions, the players move out to locations for performing the individual missions. Each player can choose to perform the mission correctly or fail it, but has no way of knowing whether the mission was critical. When a player completes the mission, the location of the next meeting is disclosed. At the end of the round all players meet at the new location and the new round begins with the voting for a new leader. In fig.2 some typical mobile device screenshots in various phases of the RvS game are shown.

![Figure 2. RvS screens: (a) voting for leader, (b) mission assignment, (c) mission execution](image)

### 5. Evaluation study

The game has been field-tested in the city center of Patras, Greece. The aim of the field test was to evaluate the game design in terms of game concept, game implementation and user experience with emphasis on learning. The game was played during a limited evaluation study discussed next. The players considered the game as an enjoyable experience and asked to play it again. At the end of play two research instruments were used: a) a questionnaire asking the view of the players on several issues and b) a focus group with emphasis on the learning experience and game mechanics.

During the design and implementation phase we were faced with two issues that influenced the learning impact and the mechanics of the game. One related to the selection and formulation of the riddles. The other concerned the role of narrative in
the game. The future direction of work is structured around these two issues and includes a) user involvement suggesting city sites and riddles and b) the evolution of the rules of RvS to support a stronger narrative line where the player’s choices alter the flow of the story.

5.1 Study Setup

RvS went through a formative evaluation study in the field. The objective of the study was twofold: a) to capture user experience of typical players and their interaction with the city during game play activity and b) to evaluate the game design in terms of the game concept, and the specific game implementation based on the instance that was played. The number of players in the study was limited by the available devices (at the time of the study five) and by the available number of missions. Since in each round each player had to perform one mission, the number of missions had to be at least the number of players multiplied by the number of rounds. In our case we had 25 available missions, so a game of five players could not go beyond five rounds of play. For this reason we opted at employing a case study approach and examine a small number of players in context using data from various sources. At the time of the study, the game was in the form of a functional prototype. While the small number of players is a constraining factor as to the extent to which the results can be interpreted, the fact that the players used a functioning prototype in a real context partly offsets this drawback. As Abowed & Mynatt note in commenting evaluation in-context, "effective evaluation, in which users are observed interacting with the system in routine ways, requires a realistic deployment into the environment of expected use" [19].

Five players participated, all female, aged between 26-35 yrs old. The players were of varying educational and professional backgrounds. While all the participants lived in the city, four of them did so only after adolescence and had only cursory knowledge of local history. The demographics match the requirements of a target group general enough and with a technological and local knowledge background that varies and that can approximate intended users, either playing RvS as visitors of the city centre or as occasional local players. The game started in the main square of the city and each meeting point took place in a different square of the city center (see Fig. 1). The duration of the game was about 90 minutes at which point a server failure caused the game to stop just after round three had finished. Data from observation, questionnaires, log files and a focus group recording where collected. The questionnaire contained 51 questions that tracked seven factors (aesthetics, user interface and interaction, game mechanics and playability, immersion and game-play, player experience and satisfaction, and social interaction), which were considered orthogonal to three aspects of the game design: the game concept, the game implementation in this particular city and the particular instance of game play. In order to capture perceptions, concerns, impressions and user views in general, the open-ended interview was conducted in the form of a focus group. The focus group approach allows the emergence of a broader set of viewpoints than individual interviews. It was mentioned earlier that one of the objectives of the focus group was to describe and evaluate the
learning that took place during game play. Next we offer an analysis of the transcribed data collected from the focus group and we discuss the learning implications.

5.2 Study Findings: Learning as discovery of the invisible city

The focus group discussion of the learning that took place involved a reflection discussion in which we asked the players to explain what they had learned. In order to further elaborate on the learning aspects of the game activity we focused our questions on what we considered the main elements of the learning activity: i.e. the riddles and the sites of the city that were involved in the game.

1. R. Did you learn something about the city that you didn’t know before playing the game?
2. ALL: Yes!!!
3. A: We didn’t know any of it…. it was all new.
4. S: Yes, everything was new
....
5. M: …. we walk every day by these sites but we had no idea of all these things about them

[Extract 1]

Our first observation from the extract above is that players were surprised that they uncovered facets about their city which they didn’t know before. This element of new knowledge seems to be offering a new perspective into how players look at the sites of the city. This becomes more apparent if we consider the comment offered by player M in line 5. This comment seems to be indicating that the new knowledge she obtained makes things more interesting now especially if we consider that walking the same route everyday make somebody indifferent of the surroundings.

1. R: So, what would you say that you learned?
2. S: That the church of Pantocratoras was an ancient temple before.
3. M: I was impressed with the information about the Mayor (information about an ex Mayor during the period 1949-1967)

[Extract 2]

The discussion in Extract 2 makes clearer what this new knowledge is about. The comment S offers in line 2 touches an issue important at least from a historical point of view: in Greece many churches are build on and with material taken from the deconstruction of ancient temples. This piece of information is not so interesting per se but it becomes interesting if we see it as a trigger that could raise other aspects of “city-learning” related to the use of material, the symbolic and “sentimental” meaning of buildings, the position of temples, the habits and beliefs of people etc. Another observation that comes from this extract is that learning about the city, the way at least it is perceived from the players involves mainly gaining new information about the sites of the city. Considering that player S lives within 50m of the church, this
discussion extract highlights again the effect of uncovering new information about sites that are weaved into everyday experience.

1. R: Did you have the chance to look around when you were playing?
2. K: I knew the surroundings more or less.
   ....
3. R: Do you think that the game would be useful for a visitor who doesn’t know the city?
4. S: It would take ages for someone who doesn’t know the city to play the game because first he has to find out where the different sites are. Not easy if you don’t know where you are going.
5. A: The game is not about “getting to know” the city, it is about ”discovering the city”. The game is not designed for a visitor who wants to learn what the characteristic sites of this city are. The questions are about discovering the invisible city- things that were hidden and not obvious when you look at the buildings for example.

[Extract 3]

We included this extract in the analysis of learning because it reveals the learning dimensions required for and embedded in the game. One dimension is related to space. Players identify as a prerequisite for the specific game to know where the different sites are (line 4) and this is the reason they think that the game might be not appropriate for visitors. The researchers’ question in Line 1 and “K’s” response in Line 2 reveal how space is integrated in the game: it is not a route that connects the different sites but a set of disconnected and separate points. It is not important to the game which route you take to accomplish your mission or to reach a meeting point or which site you visited before. It is also not important what you observe during the route. What is important is to be transferred from one site to the other. Thus space in the game is not continuous it is rather perceived as a set of different points -which according to the players - seems to be appropriate not for visitors but for those who already know the city and can use the spatial knowledge they already have. In line 5 we see a distinction between getting to know the city and discovering the city which seems to indicate two different types of knowledge involved. Getting to know the city seems to be related to what we could call “content knowledge” i.e. the characteristic sites of a city, i.e. what you must see in a city when you visit it. Discovering the city is a different level of information that is not self explanatory –i.e. a building cannot always tell its story to a non experienced eye- it is about the city (its contents or also the space) and it can offer a new lens through which the city or its content can be seen.

6. Concluding Remarks

Research on mobile learning games with a special focus on addressing the historical aspect of a city, reports visitor engagement, motivation and knowledge about objects
of attention as important factors (see for example [18] and for a critical review see [6]). On the other hand there is a criticism questioning what the players seem to learn in the context of these games. In the analysis we offered earlier we see that the structure of the game and the riddles included in it involved mainly factual information (previous use of a building, information about the owner of the building etc). In this context the game becomes a vehicle for transferring new, “hidden” information to be stored by the player. On the other hand in the context of games the search of this factual information might take place in an intriguing and pleasant way and might involve interesting processes such as hypothesis testing, reflection on actions etc. [23]. There is no doubt that factual information is an important part of living the city experience. The discussion with the players helped us elaborate more on the different types of knowledge involved – way finding, getting to know the important sites of the city. But in order to design games that can support learning in the city we need first to think what this learning involves. Learning in the city is first and foremost an embodied experience that involves much more than information. It involves the smell, the light, the feeling of cold or warm, involves sounds; it involves the people living in it, their habits and their activities in various parts of the city, it involves taking in consideration what is called [27] the city narrative, the collective imagery of the place. A possible design choice towards this direction could involve infusion of more creative design activities in game play [6] where meaning making becomes an active process as it is introduced by the constructivist perspective [24] and it is further enhanced by the idea of developing a sense of ownership [25] over the created artifacts.

Another aspect we need to consider when designing games for learning in the city is which part of learning and what kind of learning we expect to take place during game play. In many cases, as the one showed in Extract 2, games can function as useful triggers for fruitful learning and not as direct mediators of the pursued learning. Learning design towards this direction could include user involvement in game construction. Technology here can mediate these activities by a) providing access to content which will allow players’ contribution of historic information b) allowing manipulation of game elements so that players can create different instances of mobile games c) generating mobile games based upon player manipulation of game elements and content d) supporting sharing, evaluating, ranking, reconstruction, enrichment and exchange of games among communities of players.

An example of a tool that facilitates this approach is the GameContentEditor, see figure 3. This is a tool under development (Google hangout app) for uploading and negotiating content in the form of puzzles, associated to a specific location and related to a theme. This facilitates generation of content by end users [26]. However, this tools needs to be extended since as discussed, it is not just the content that players may manipulate, since they need also to deal with rules of the game, like in RvS leader election process, criticality of missions, number of rounds, winning condition, etc.

This involvement of the players in the process of designing location-based mobile games can enrich the learning experience of game play with the active role of learners who participate in the process of culture creation, the development of a sense of ownership over the cultural content, the creation of public meta-artifacts that can be inte-
grated in the urban landscape and as a result, the creation of an enduring relationship between the player and the city.

Figure 3 Game Content Editor

7. References

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