Tidy City: A Location-based Game for City Exploration Based on User-created Content

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Abstract

Tidy City is a mobile location-based game concept that is easy to appropriate. The game has been designed with simplicity in mind so that everyone can implement their own designs within the given structure and share it online. The system comprises a game-client for Android devices and a pair of dedicated authoring tools that combine in-situ mobile use with browser-based desktop use. This paper briefly describes the reasoning behind this approach, the game design and mobile client implementation, and then describes the two integrated authoring tools in more detail. The complete set of *Tidy City* tools and the game-client are available free of charge for non-commercial purposes at http://totem.fit.fraunhofer.de/tidycity.

1 Introduction

Location-based games and, more broadly spoken, mixed reality experiences have been around for at least a decade, which is when the artificial degradation of GPS has been disabled and its real public use began. Although GPS is not the only enabling technology, it must be seen as a driving force behind such experiences. Based on the announcement of the public availability of this positioning technology by US president Clinton on 01 May 2000, the game *Geocaching* (Cameron & Ulmer 2004) was proposed on the same day on an Internet newsgroup. Conceptually, the game is as simple as a mixed reality experience can be. It has very simple rules (coordinates of secret caches are published on the Internet, GPS devices are used to find them, objects are traded from the caches) and low technical requirements (Internet and any GPS device), yet it can result in very compelling player experiences. Studies have shown that there is more to Geocaching than the core treasure hunting activity, i.e. social interaction between participants (both in-situ and online), the practice of building

up achievements over time, providing reasons for planning a trip and getting out, and content creation activities all contribute to the overall experience (O'Hara 2008). The secret of the success of *Geocaching* arguably lies in the simplicity of its core mechanism, the freedom it leaves to its players, and its effortless staging concept. Since its inception *Geocaching* has been played by millions of people all over the world and is still very popular today. Contrasting this broadly successful minimalistic design are many more elaborate designs, such as *Can You See Me Now?* (Benford et al., 2006) or *Time Warp* (Wetzel et al., 2010). Mixed reality experiences like these are much more technical and demand a much higher effort for staging; often requiring more staff than players to run.

The question of how best to author mixed reality experiences accompanied their development from the beginning and resulted in different approaches. One common way, which is especially found in early works, is to come from a technical perspective, concentrate on building the system, and have the content be integrated by the technical people (Feiner et al., 1997), usually based on the grounds that the job would be best suited to them. This technocentric approach is contrasted by the use of dedicated authoring tools, which liberate the authors from the engineers, while trading in some design flexibility for ease of use through pre-defined structures, and requiring these tools to be built in the first place (Hull et al., 2004, Naismith et al., 2005).

With *Tidy City* we present a complete set of authoring tools for complementary mobile and desktop use (Weal et al., 2007), and an accompanying mobile application for playing the game.

2 Game Design

Tidy City was inspired by the work of the Swiss artist Urs Wehrli and his project *Kunst Aufräumen* (*Tidy-up Art*) that represented the notion of (dis-)order and tidyness in a playful way. In the game, players encounter elements of the city scattered seemingly-random around the area. It is their task now to first collect these elements and then return them to their original position: Players have to tidy-up the city. The elements in question however are not easily identified and are therefore named "riddles". Each riddle consists of a name, difficulty, category, picture and a descriptive text. It is now up to the player to interpret all information correctly to deduce the original identity and position of the riddle. This can often also be done by just walking through the game area with eyes open and paying close attention to the real environment. Harder riddles require more thoughts by the players, and perhaps further research or questioning of fellow citizen.

Figure 1 (left) shows an example for a riddle in Cologne, Germany. The accompanying descriptive text reads: "Love is a bridge, and Niklas and Verena are no exception." The player might find this riddle in front of the Cologne Cathedral, and now has to figure out where it really belongs. In this case the riddle can be solved by walking over the Hohenzollernbrücke (Hohenzollern bridge) where hundreds of couples have sworn their love by attaching a lock

to the fence and throwing the key into the river Rhine. This tradition started in 2008 and has become quite popular since then, as also illustrated in Figure 1 (right).

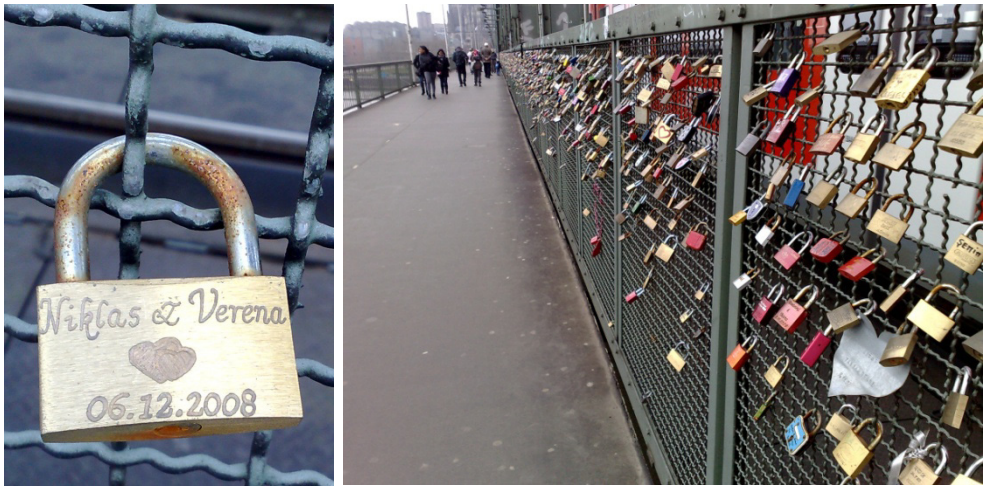

Figure 1: Example for riddle image displayed to the player (left) and correct real world location (right)

Riddles are always grouped together as “missions” that can be played independently and which are created by different users. The game itself is played without a time limit and therefore allows for casual exploration of the city.

Motivation

The development of the game design for *Tidy City* has been influenced by a reductive method called "minimally playable games" (Straeubig 2008). It is based on the observation that game designs are sometimes overly complex and combine a large range of different game mechanics that are all seemingly crucial for the success of the game. This not only requires meticulous balancing in later stages of game creation, but complicates the development process in general as well at making the game less approachable to new and/or inexperienced players. The approach consists of taking games or game categories and reducing their core mechanics to the point where the game would lose its specific character. An example would be a jigsaw puzzle with three (some argue: two) parts.

The initial concept for the location based game *Tidy City* also included rather complicated game mechanics and features, e.g. a market place where players could exchange riddles with each other for a certain price, or an augmented reality view as made popular by current AR browsers. Applying the reduction method however resulted in a single minimal interaction, based on the well-known principle from adventure and role playing games: “pick up an item and bring it to its place”.

In the context of a mixed reality experience, the sole remaining decision then is to distribute the game elements between the real and the virtual realm (see Figure 2). Basically this constitutes a full description of the game.

The urge to add more complexity to *Tidy City* has been resisted by the development team for a number of reasons:

- It enables us to identify and validate essential interactions suited for location based games.
- It simplifies the game creation aspect that is core to the TOTEM project (of which *Tidy City* is a showcase).
- It opens the audience range and allows for casual and lateral gameplay.
- It lets game creators and players concentrate on the content that identifies the "correct" location of the place.
- It enables the player to focus on the physical surroundings instead of ongoing activity on the screen of the device.

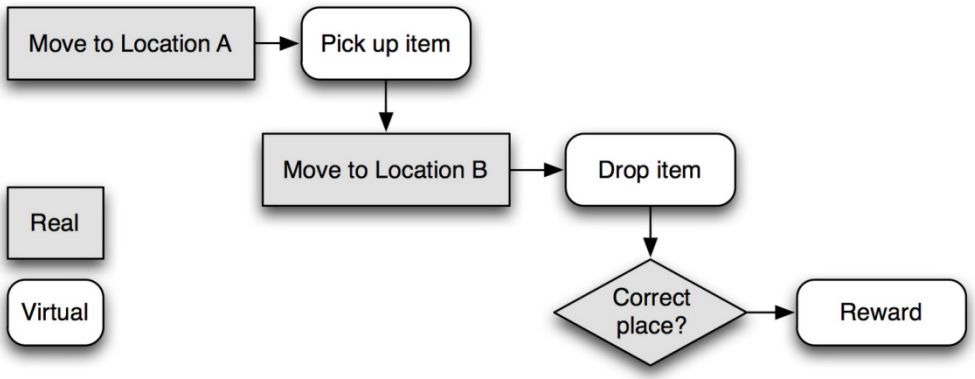

Figure 2: Basic interactions in relation to reality and virtuality

This last argument is especially worthy of discussion in the field of location based games, where reduction of complexity in the game facilitates drawing the player's attention to the physical environment. In *Tidy City*, the world takes the center stage as the game board and the mechanism just serves to discover its richness. Moreover, just like with *Geocaching*, the technological aspects of the overall experience are "backgrounded" (O'Hara 2008) and do not hinder the social interaction between participants. *Tidy City* is thus particularly well suited for being played in groups of people.

3 Game Client

Tidy City can be played on mobile phones running Android 2.1 and up. When starting the game, the player first need to register an account and can then have a look at the available missions. These are presented on a map so that the player can quickly see if and what type of missions are available in the vicinity. After the selection, the mission is downloaded to the mobile phone which includes all images that are part of the riddles. The players can then start the mission and are transported to a map view that shows the borders of the playing area as well as all currently unsolved riddles and the current position of the player.

By tapping on the riddle icons on the map, the player gets some more information about the specific riddle. While being far away, only the name, category and difficulty are displayed. When the player is in close range, an image and a descriptive text are displayed and the riddle can be added to the inventory. From there, the player can access the riddle again to make an attempt at solving it. If standing at the correct position, the player is rewarded with points and can also see the solution image and description. A typical game flow is illustrated in Figure 3.

While playing the game, the player can also check his current score and progress on the statistics view as well as the scores of all other players who are playing the same mission or have done so before.

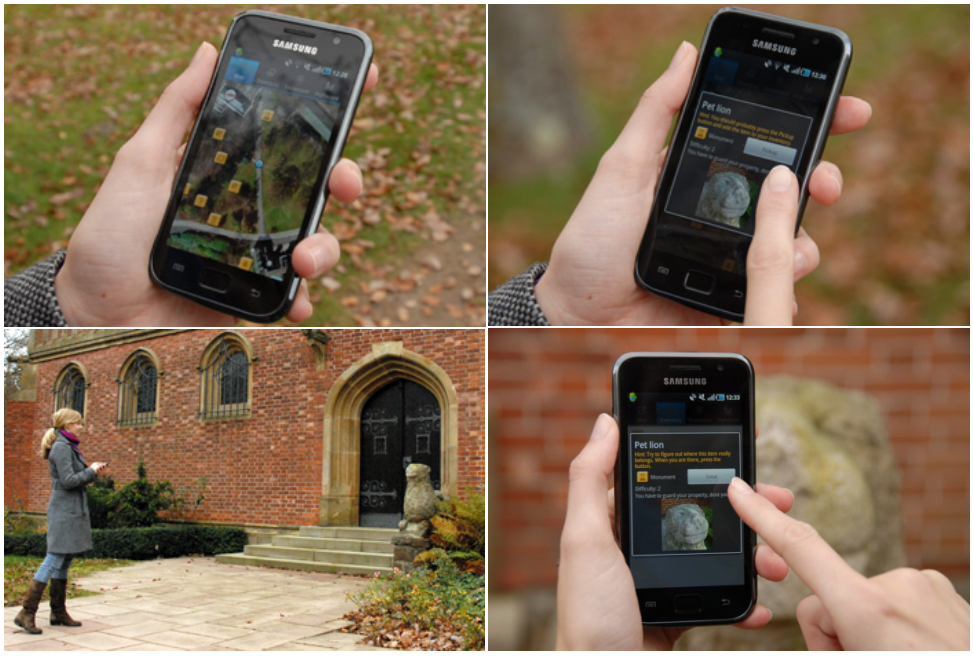

Figure 3: Player walking to find a riddle (upper left), picking up a riddle (upper right), walking to find the correct location (lower left) and solving the riddle (lower right)

4 Authoring

The creation of a *Tidy City* mission incorporates an integrated two-step process which is supported by adequate tools for mobile and desktop use. The *Tidy City Scout* allows exploring interesting places directly on-site, the Web Authoring Tool helps authors to refine their mission and let them take time to polish the mission's riddles at home. In the following sections we describe each tool in more detail.

4.1 Tidy City Scout

Like the *Tidy City* game client the *Tidy City Scout* runs under Android 2.1. The *Scout's* purpose is the assistance in exploring the mission area and letting the author mark interesting places while walking around. For this, the tool makes use of the mobile phone's built-in sensors such as the GPS module and the camera. On-site the user can add new riddle items with title and notes and take riddle and solution photos for the new items (see Figure 4).

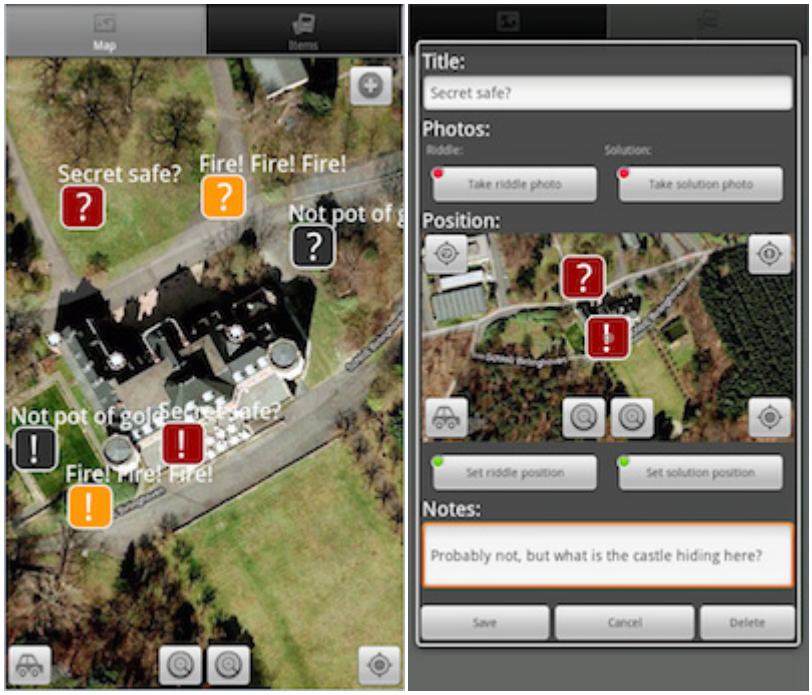

Figure 4: Overview of all created riddles (left) and edit view of one specific riddle (right) in Tidy City Scout

The GPS positions for riddle and solution are set by simple button clicks and can directly be monitored in the map view of the user interface. The *Scout* also assists the user in keeping track of the completeness of the created riddle items. Each important form element contains a

red dot that changes to a green color if a value was set. Thus, the user can easily get feedback on what is missing to create the item.

An overview of the spatial distribution of all the riddles and solutions is given by the map overview page. Corresponding riddle and solution are visualized in the same color but with different marks and can therefore easily be recognized. This helps the author to disperse the riddle and solution locations equally balanced over the entire mission area. Having finished all the riddle items, the author can upload them to an account in the *Tidy City* Web Authoring Tool, where all values can still be changed during the second step.

4.2 Web Authoring Tool

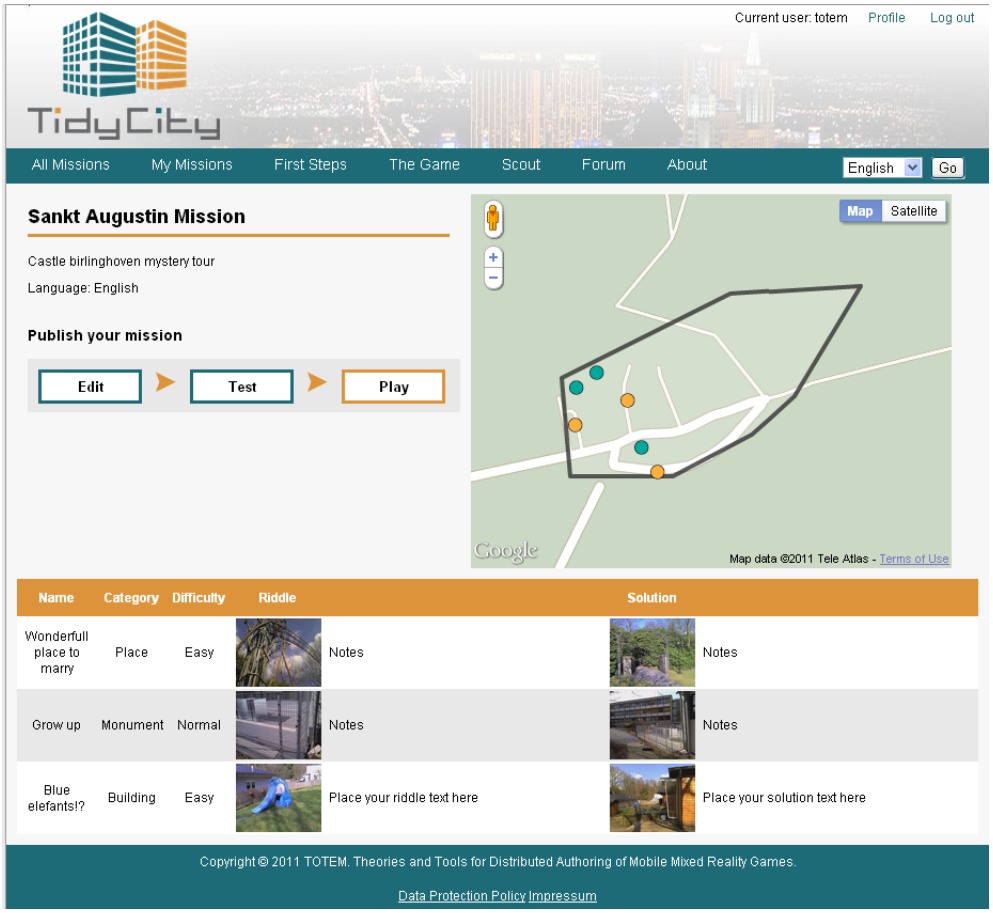

Figure 5: Overview of a mission in the web-based authoring tool

The Web Authoring Tool is a website used to create new missions, finalize the riddle items created by the *Scout* and manage the access state of the mission. The author starts by creating a new mission and sets the relevant information such as mission name, language, description and the borders for the mission area.

Riddle items that were uploaded with the *Scout* can easily be imported into the mission and from there can be edited further. As typing longer texts on mobile devices can be cumbersome and tedious, the Web Authoring Tool here provides a comfortable way to rephrase riddle and solution information and recheck your positions and photos. The riddle and solution positions can be adjusted by intuitive drag-and-drop actions in the edit mode. If the *Scout* was not used, it is also possible to create new riddle items directly and assign positions and images manually.

The mission overview (see Figure 5) shows all riddle items in a clearly laid out list and additionally displays all riddle and solution positions of the mission on a common map. It also provides a state management for the mission that influences the visibility of the mission to other *Tidy City* players. Initially all missions are "inactive" and therefore not visible to anybody in the *Tidy City* game client. Transferring a mission to "test" mode makes it available for the user account of the corresponding mission author. The author can therefore login to the *Tidy City* game client, select the desired test mission and play it.

The *Tidy City* game client also provides "cheat" settings for test missions that allow collecting and solving riddles regardless of the user's current GPS position. While this greatly speeds up the development workflow it is nevertheless recommended that mission authors finally test-play their own missions under actual conditions to check if all items are placed in locations that can be reached by players (e.g. in areas with good GPS coverage) and that make sense in the context of the game. If the author is satisfied with the mission, it can be published by a click on the "active" button which makes the game visible to everybody. Active missions cannot be edited but can be reset to "test" again to edit aspects that were only discovered at a later stage.

5 Conclusion

Tidy City has been staged at several events. An especially noteworthy one was organized together with the Zeitungsverlag Waiblingen (Newspaper publishing Company Waiblingen) near Stuttgart, Germany. We met with a group of four kids aged 10 to 12 who first played a simple pre-prepared mission and then started to use the authoring tools under our guidance to create their own scenario for their hometown. Their mission was then staged as an event by the newspaper on two weekends in March, and a total of 20 local families played the game during that time.

While a detailed evaluation of these events is still being prepared, our experiences so far have led to the following conclusions:

- The simplistic game mechanics allow people of all ages and backgrounds to quickly grasp the concept of the game.
- For the same reason, people have an easy understanding of how to create new missions and riddles.
- Using a mobile authoring tool inspires people to explore their surroundings and makes the mission creation a fun and engaging activity.
- *Tidy City* is well suited to being played in small teams and allows for social interaction between participants.

The game concept is flexible enough to support a wide variety of different types of riddles and thus each mission can have a unique atmosphere and cater for different target audiences, e.g. tourists that want to explore famous sights, history students interested in architectural landmarks, families wanting to spend time together, etc.. One interesting feature to further increase the possible applications of *Tidy City* is the inclusion of other ways to track the player's location (e.g. Wi-Fi triangulation, NFC) so that the game can also be played when GPS is not available, especially indoors.

Acknowledgements

Tidy City was developed as part of the German-French research project *TOTEM - Theories and Tools for Distributed Authoring of Mobile Mixed Reality Games* (http://www.totem-games.org). The work was supported by the Programme Inter Carnot Fraunhofer from BMBF and ANR (Grant 01SF0804). We would like to thank our project partners from Telecom & Management SudParis for their support and collaboration. *Tidy City* makes use of the *COSMOS* context management framework (Conan et al 2007).

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