INTERACTIVE SPACE(S) – THE CTSG: BRIDGING THE REAL AND VIRTUAL

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ABSTRACT

In this paper, ideas will be presented how to realize games or playful activities in interactive space(s), having a real (spatial) component as well as a representation in virtual 2D or 3D space, by means of web pages and/or online games. Apart from general design criteria, the paper discusses a number of sample scenarios resulting from a workshop with students from the Creative Technology curriculum on the theme of *Creative Technology Superpower Games* (CTSG), where the main focus is to investigate playful applications of technology to emulate or support players' superpowers, such as invisibility, telekinesis, etcetera. Although the paper does not intend to provide a methodological framework, we will briefly discuss the various logics underlying spatial and locative games, or more generallly games that may take place in interactive space(s).

INTRODUCTION

Technology increasingly invades our private and public space(s), partly as a result of our own efforts and demands for being informed, entertained and served, that is our supposed convenience, and partly due to causes beyond our immediate personal control, such as security, public transport systems, and other bureaucratic concerns that apparently require an extensive application of monitoring and tracking devices, including cameras, RFID scanners, etcetera.
The complexity of such systems requires what may be called *research in context*, and has led to interdisciplinary research laboratories for research with interactive space(s) as the main theme, across domains such as domestic entertainment, smart workplaces and healthcare. At the University of Twente, we have recently opened the SmartXP facility, with as a mission statement:

smartxp.ewi.utwente.nl

> Research in ubiquitous computing is inherently a multi-disciplinary activity. Creative application and development of technology is one essential ingredient of ubiquitous computing which however requires in-depth access to the relevant technologies that goes beyond a mere literature study or an occasional cooperation.
>
> (...) We are establishing a living environment as an open resource and show-case facility for ubiquitous technology in realistic settings: the Smart eXperience lab (SmartXP).

To be clear, although the environment provides ample technology, research in this area is explicitly meant to be interdisciplinary:

multi-disciplinary research

> The SmartXP is an important tool for prioritising the research agenda, both in the technical and social sciences. The SmartXP provides essential facilities for small and medium scale projects with flexible experimentation grounds in a realistic setting, with knowledgeable users and competing technology.

There is by now a rather long standing tradition in academia to deploy games as a format for doing research in ubiquitous computing as well as other areas demanding a multi- or even trans-disciplinary approach. In our bachelor curriculum Creative Technology, moreover, we have opted for an approach that takes games and playful applications as a core element of the program, as a means to bridge the gap between the primarily technical disciplines of engineering and mathematics, and the exploration and creativity needed for innovation and novel solutions to the technological dilemmas of the twentyfirst century. Relying on the intrinsic motivation(s) and creative aspiration(s) of our students, we find support in the following characterization of creativity:

> creativity = connecting dots one would not look at, normally ... Alain Kay

From a pioneer in innovative computer applications, Alan Kay's original characterization provides a guideline for both the design and realization of systems that deal with interactive space(s), bridging the real and the virtual.

structure The structure of this paper is as follows. We will start with a brief overview of spatial and locative (aspects of) games, after which we will sketch the design space for our exploration in the design of games for interactive space(s). The main body of the paper, then, consists of samples and scenarios resulting from a workhop with our Creative Technology students, followed by a discussion of the underlying logic(s) and game mechanics. We will look at how these scenarios may be used for the CTSG, the Creative Technology Superpower Games, identifying the main challenges, after which we will present some conclusions and indicate directions for future developments.

SPATIAL & LOCATIVE GAMES

In her fascinating book, *Critical Play*, Mary Flanagan relates how artists have explored games and playful applications to bring about awareness of (the) human (living) condition(s), and more in particular, in recent times, how *situationism* critically investigated urban space using mechanisms of *unplay, re-skinning & re-writing*, Flanagan (2009). In addition, an exhaustive inventory of existing games, and their application in critical play, is given, ranging over doll houses, board games (such as Monopoly), language games, as well as more recent performative and locative games, such as C2BK[1].

Another source of inspiration is provided by the interactive new media installations exhibited at cinekid.nl[2] (in Dutch), where cameras, scanners and light sensors were used as interaction devices, allowing children to play with sound, motion graphics and animations.

Apart from design issues and technical possibilities it is, however, before we start our exploration of possible scenarios, worthwhile to consider why people would like to play (...) games, following the **when we play games** blog from the *Ubiquitous Play in the Everyday* class, with world-famous instructor Jane McGonigal, at thismightbeagame.blogspot.com[3]:

values (1)

> When we play games, we experience relaxation, concentration, cohesion, elation, adventurous thinking, constant challenge, and relief. We want more of these things in everyday life.

However, not only positive experiences or motives may induce playing games:

values (2)

> When we play games, we feel awed, sneaky and backwards. We should feel like this in real life, too.

Ultimately, games may be considered as empowering the player(s), as a means to improve oneself:

beliefs (1)

> A well-designed game can make someone more responsive to clues in the environment. It can help someone recognize opportunitIes.

PLAYGROUND DESIGN SPACE

The starting point, or impetus, to our explorations was provided by a student in the course *web technology* who, in his turn inspired by google wave(s)[4], created a simple application, using javascript and sqlite, to make collaborative text collages. Extending the data format with a state variable for each item allows for displaying simple narratives or slogan(s)[5], that progress on each movement, as illustrated in fig. 1.

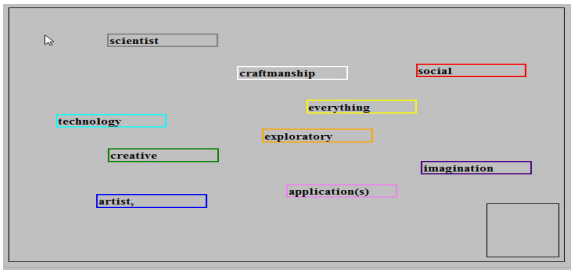

Fig 1. colored story markers

Albeit simple, a two dimensional display, with positional information, may be used for a variety of purposes:

positional marker(s)[6]

- storytelling – undirected token with temporal sequence
- grading – positional markers with interpretation
- voting – place attachments with posts or milestones

For grading, when giving the x and y axes an interpretation, as for example, respectively, level of technical skill and creativity, we may simply map each students' performance on this display and assign a color along these dimensions, with red for creativity and blue for technical skills, using the formula:

positional color(s)

R = (255 * ((height-y)/height)) % 255)
G = ((255-abs(R-B)) * (R/255) * (B/255)) % 255
B = ((255 * (x/width)) % 255)

which effectively assigns black to a student that does not perform at all and white to the overall excellent student.

[1] cruelgame.com
[2] www.cinekid.nl/nl/festivalprogram/part/19
[3] thismightbeagame.blogspot.com/2007/02/why-we-make-ubiquitous-game-our.html
[4] wave.google.com
[5] www.cs.vu.nl/∼eliens/media/sample-jquery-slogan.htm
[6] www.cs.vu.nl/∼eliens/.CREATE/marker-nm1-09.html

SAMPLE(S) & SCENARIO(S)

Following the format of the workshop(s) game design, as described in Eliens (2010), and taking into account the playground design constraints indicated in the previous section, the students Creative Technology were given the instruction to design a visual representation of the player(s), to develop a playground with a clear relation to (the) real (SmartXP) space, and to write down narratives or scenarios for game play, that involve both the real and virtual space(s). In summary, the assignments were:

assignment(s)

1. avatar – for (self) representation
2. playground – relating real & virtual space(s)
3. scenario(s) – narrative(s) & game mechanics

The participants were strongly encouraged to take the SmartXP lab as the real playground, but were left free what kind of game to develop and their topic of choice, that is a game for pure entertainment, or a serious game, possibly reflecting their own struggle in mastering the technical disciplines of the curriculum. The total time available for the assignments was thirty minutes.
A first look at the results learns that both the playgrounds and scenarios are highly divergent, which may be due to the allowed free choice of the topics. Nevertheless, despite this diversity, a closer look at the proposals produced by the students is instructive, perhaps not for the realization of a final game, but as a first exploration of the design space for a playground encompassing real and virtual space(s).

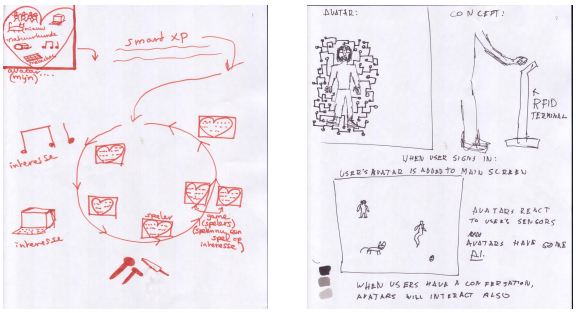

Fig 2. (a) physics & stuff (b) (rfid) identity

The first sample, fig. 2(a), takes physics as a topic, and features as tags

sample 1

> **physics & stuff** – *SmartXP interest avatar physics miauw*

with the final tag *miauw* (representing the sound of a cat), as an obviously playful or nonsensical element.
The second sample, fig. 2(b), involves both avatars and rfid terminals:

sample 2

> **(rfid) identity** – *when user signs in user's avatar is added to main screen, avatar reacts to user's sensors, avatars have some A.I., when users have a conversation avatars will react also.*

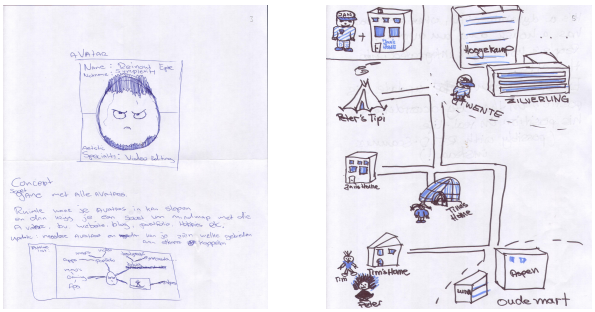

Fig 3. (a) personal avatar(s) (b) dynamic city

The third sample, fig. 3(a) is centered around avatars with personal skills, and proposes a sports game:

sample 3

> **personal avatar(s)** – *e.g. with skills (video editing); concept: sport game with all avatars; space where avatars can be dragged to, resulting in a mind map of that avatar, e.g. with a website, portfolio, blog, hobbies, etc.*

In sample 4, fig. 3(b), a city is taken as the location of activity:

sample 4

> **dynamic city** – *where everybody has a house and an avatar: People's houses get integrated into the city. Everybody can update his position in the city according to his position in real-life. (possibly with RFID scanners instead)*

Note that updates in position are realized using RFIF scanners.

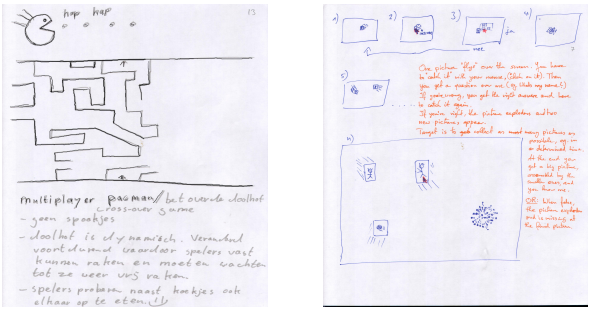

Fig 4. (a) pacman labyrinth (b) catch the image

Both sample 5, fig. 4(a), and 6, fig. 4(b), may be characterized as entertainment or action games, with in sample 5 an interesting, though slightly morbid, twist.

sample 5

pacman labyrinth – *multiplayer pacman / haunted labyrinth / cross-over game; no fairytales! labyrinth is dynamic. It changes continuously, so that players get stuck and have to wait until they are released. Apart from eating cookies, players also eat eachother*

How to translate encounters between players to real space is not entirely clear, unfortunately.
Sample 6 may, moreover, be interpreted as a puzzle game, to uncover the global picture:

sample 6

catch the image – *one picture "flies" over the screen, you have to "catch it" with your mouse (click on it). Then you get a question about me (e.g. what is my name?). When you're wrong, you get the right answer and have to catch it again. When you're right, the picture explodes and two new pictures appear. Target or goal is to catch as many pictures as possible, e.g. in a determined time. At the end, you get a big picture assembled by the smaller ones, and you have me!*

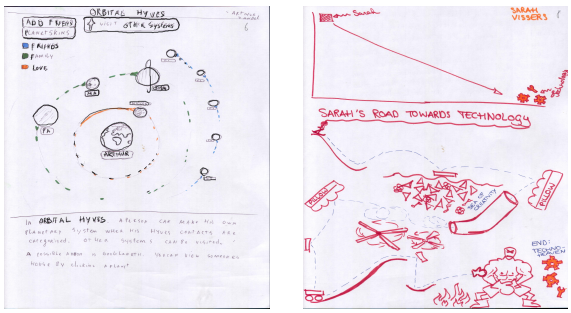

Fig 5. (a) orbital hyves (b) road to technology

Sample 7, fig. 5(a), uses space to visualize a social network, or more in particular, the proximity of relations expressed by social connections:

sample 7

orbital hyves – *friends / family / love; a person can make his own planetary system, where his hyves contacts are categorized, other systems can be visited. You can view someone's house by clicking a planet.*

Sample 8, fig. 5(b), takes again the study trajectory as a topic, which might be mapped to real space as a sequence of hordes, that is obstacles to take, possibly in competition with fellow players/students:

sample 8

road to technology – *the idea is quite simple: a sketch of my interpretation of getting towards the required knowledge to be a great creative technologist. It turned into some sort of a "classic" Mario-ish game in which I am facing different obstacles.*

It would be nice to have our entire class to enter this game, some floating quicker than others and people perhaps bumping into eachother, creating more speed.

As a final scenario, for which no suitable drawing was produced, look at the following story which takes the original suggestion of progress in the study along the dimensions *creativity* and *technology* as its theme:

story of SmartXP

SmartXP – 2 planes [creativity / technology]

SmartXP is divided in two planes, full with a variety of objects. Objects in the Creative part look at first sight creative, but are deep inside still Technologic. For objects in the Techology part, it is the other way around.

A person walks around, observes, and uses. After that s/he goes to the CreaTester, which tests the person on what s/he observed in the objects, what choices s/he made, etcetera.

The system computes the location of the person, and beams it on the screen.

The *story of SmartXP* does not only take the constituent dimensions of Creative Technology as its theme, but does also provide opportunities for critical play, in encouraging the player to discern the creativity underlying technological applications but, on a deeper level, to discover the technological substratum underlying all creativity.

SPATIAL GAME LOGICS

In *Expressive Processing*, Noah Wardrip-Fruin provides a thorough analysis of the computational processes underlying games and interactive storytelling. He observes that most classic games, including Pong as well as adventure games, are based on spatial logics, that is governed by the dynamics of navigation, motion and collision detection, Wardrip-Fruin (2009). He introduces the notion of *textual machines* to counter-act the dominance of spatial logics and to advocate what he calls *lyric engagement*, that is more closely related to the experience of music, as opposed to physical manipulation and visual experience in for example action games.
As indicated in the introduction and the section(s) delineating the design space of our interactive playground(s), our challenge in realizing interactive space(s) is to find suitable mappings between the symbolic space of for example learning trajectories and spatial representations, where we may freely use basic game play mechanics

such as motion and collisions, to represent challenges such as mathematical puzzles, language games or role changes in strategy games. In the realization of the game(s), the player must be able to understand such referential jumps, without being interrupted in game play. Cf. Bolter and Grusin (2000).

THE CTSG – WORKFLOW(S)

In the aforementioned new media installations at cinekid.nl, one stood out because of its underlying metaphor, which may be expressed as:

metaphor(s)

I am a pencil, and I walk the earth ...

characterizing a navigation tracker, using GPS.
In our effort to create games for interactive space(s), we may rely on our previous work when facing subtasks such as *replicating real environments*, cf. Eliens & Bhikharie (2006), Eliens et al. (2007a), *providing charts, maps or blue print of regions*, cf. Eliens et al. (2007b), Eliens et al. (2008), or *defining trajectory of repeatable challenges*, cf. Eliens & Ruttkay (2008), Eliens & Ruttkay (2009).
Our main technological efforts, primarily in terms of development and maintenance, may be summarized as:

technology exploration(s)

- identity – RFID, image analysis
- track individual change(s) – data management

Additional technologies that are worthwhile to look at are, among others those used in geodart[7] that allows for creating games about geographical trivia using embeddable flash maps[8], a technology that for the same token may be used for one of our voting games, or for visualizing events that occur in our interactive space(s)! Our main challenges, however, are to find a coherent scheme in which to fit the various ideas, and to develop a framework that allows for the adaptation of our game(s) to the particular usage context of (y)our interactive space(s).

CONCLUSIONS

In this paper, we have sketched our ideas and sample scenarios for games in interactive space(s), within the ongoing theme of game development in the Creative Technology curriculum. Although a significant part of the development effort remains unexplored, the material presented here should clarify issues involving mappings between real and virtual spaces, as well as metaphors and logics suitable for dealing with the technological innovations leading to interactive space(s) in the private and public domain.

ACKNOWLEDGEMENT(S) Again, thanks to the students Creative Technology, for (continually) providing the inspiration and motivation, and ultimately the workforce, for the CTSG.

[7] www.umapper.com/pages/geodart
[8] www.umapper.com/blog/?p=1596

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