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# Context Matters!

Exploring and Reframing Games in Context  
Proceedings of the 7<sup>th</sup> Vienna Games Conference  
FROG 2013

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**Proceedings of the Vienna**  
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**Exploring and Reframing Games**  
**and Play in Context**



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## **Context matters! Exploring and reframing games and play in context – an introduction**

The activity of play is situated within different contextual constraints. Games contextualize the way we play and, vice versa, our play recontextualizes the rules and goals of games, our culture, society and history. The context of play matters and influences the impact games have on players and player communities. The study of context, that frames play, raises the following questions: How can we understand the contextual characteristic of play? What forms of contexts and frames matter and why? What are constructive or problematic contexts of play? How can we study context and what methods appear appropriate to examine it? What context does game design and development establish? What is the contextual impact of technology on games and play? What media forms contextualize our play and how are they converging?

These were the question international scholars, designers and were tracing at the 7th Vienna Games Conference, “Future and Reality of Gaming 2013” (FROG13) in September 2013 in Vienna. Vienna’s annual Games Conference FROG13, offers an open international platform for leading game studies researchers and scholars, game designers, researchers and scholars from various other fields, education professionals, and gamers from around the world. The main objective of FROG13 was to explore how “Context Matters” in regard to questions of player communities, challenging or problematic play settings, game theory and development, impact of games, and cultural facets of play. The proceedings collects 28 contributions from FROG presenters and abstracts of poster and game presentations.

### **Why context matters**

Games and gaming constitute an incredibly complex phenomenon of mediated communication that is based on a global, multilayer, and mostly only virtual game culture. An observation of the contexts of game and play, especially in terms of their different characteristics and dimensions, will allow us to better un-

derstand these complex processes, although we still know very little about the highly diverse gaming genres and cultures.

In order to grasp the different contexts of game and play, we recommend considering the ideas of Mäyrä (2008). He claims that game studies should focus on the interaction between game and gamer and on the context resulting from this (similar to Juul 2005; Taylor 2006). According to Crawford and Rutter (2006, 149f.), we can almost speak of a “contextualist turn” in game studies: Digital games are seen here as “cultural artifacts which are given value, meaning and position through their production and use”. The insight that digital games always relate to different forms of context is emphasized by King and Krzywinska (2006, 38): “Gameplay does not exist in a vacuum, any more than games do as a whole. It is situated instead, within a matrix of potential meaning-creating frameworks. These can operate both at a local level, in the specific associations generated by a particular episode of gameplay and in the context of broader social, cultural and ideological resonances.”

Supporting this insight of the complex connections between game reality and societal reality, Hand and Moore (2006, 180) point out that game experience and game context are inextricably linked: „Digital gaming may be seen as both embedded within existing sociocultural frameworks (as “cultural artifacts”), and as enabling novel articulations of community and identity to emerge (as forms of “culture”). Digital gaming represents a distinct cultural form which at once problematizes current understandings of community and identity, and allows us to explore emerging patterns of community and identity formation.“

To understand the different dimensions of context it helps to imagine them as mostly mediated processes of articulation of a specific media culture, which is historically, temporally and spatially rooted and contextualised (see in general Hepp 2008). Based on this Wimmer (2012) distinguishes five specific contexts of game and play, which are of course strong interrelated:

- The context of *(Re)Production* of and within digital games which describes the structures, methods, and processes of creating games and play, especially amongst others and not confined to the gaming industry and consequently the field of game development and design.
- The context of *Representation* refers to the illustration of different topics in media products. In digital games, this process usually depicts, for example, violence or gender roles in games, their attributed meaning by gamers, and also the portrayal of games and game cultures in public discourse and mass media.
- The context of *Regulation* covers the influence of non-producing institutions and formations (e.g., politics) on a media culture. In the case of digital games, this involves the e.g. legal regulation of game content or the determination of age limits for the protection of minors.
- The context of *Appropriation* describes the process of actively embracing me-

dia in everyday life. A good example is the development of game-specific norms and rules within certain gaming communities, such as clans.

- The context of *Identification* refers to the (continuous) process of constituting identity based on communicated patterns and discourses. The level is observable, for example, when a gamer wears certain garments or use a special lingo in order to show a specific scene membership or wants to distinguish him-/herself from non-gamers.

## Structure of the book

The following chapters of this volume cover a wide array of topics relating to the questions of context described above. The contributing authors depict a diverse, well documented, but still under-researched image of how context matters. The book is organized along seven themes tackling the relations between games, players and context:

### Narrative context and immersion

First of all, we tackle those issues that appear to be related to the content of games: stories, genres, symbols and other narrative elements that enrich play-experiences but are also turned to matters of context by arguing that game designers are actually accessing cultural archives and meta-texts to create immersive, fictionalized experiences. Jonas Linderoth presents the concept of “Ecological Empowerment as a Ludo-narratological Construct”, that displays preferably the stories of superheroes, Greek gods and sport stars while empowering the gamer in the game worlds and in the game mechanics. Diane Carr is focussing not only on empowerment but on “Augmentation and Disability” mediated through Bodies in Dead Space and Deus Ex: Human Revolutions. She responds to the need of developing an understanding of player embodiment beyond standardized physicality, and therefore discusses links between interpretation, lived experiences, corporeality and representations with reference to disability literature. A designer’s perspective is taken up by Danny Langhoff Nielsen and Henrik Schoenau-Fog, who are “In the Mood for Horror.” Their investigation of absorbing player experiences is genre specific and primarily based on focus group interviews and questionnaires. It establishes a framework to explain three main causes of continuation desire: Narrative, freedom and victimizing. Marta Fernández, Simon Niedenthal, Manuel Armenteros spotlight “The Sense of Lighting” itself inside game worlds as a matter of visual culture’s history. They specifically assess the points of convergence and divergence between lighting in games and other media. Myth and meaning are not an extra, but rather contribute to gameplay and game mechanics.

## Contextualising playful contexts

Context can also be analyzed in regards to its own history and his own spatiality that are naturally wildly entangled and intersected. Especially while playing we are creating frames, in which meanings are shifting. Computers changed the way, these contexts are set up; they changed the way, we think about it and changed our ways of playing, cheating, acting at all by virtualized all these experiences. Therefore it is necessary to contextualize these playful contexts. Simon Huber wants to know, how to put modern game culture into historical context? Therefore he looks at “Huizingas Circles”, which are themselves situated in a historical context and are still influential until nowadays, although some misunderstandings have to be dealt with to grasp the uniqueness of digital gaming. Mathias Fuchs sets “Foul Play in Context”. Thus he explores practices, which are at first glance not playful at all. But they may be still conceived as a way of creating a particular form of the ludic experience. Spoilsports and cardsharps are switching constantly the systems of reference in a playful manner. This seems to increase complexity and variety, so Tobias Scholz questions the assumption, whether context matters at all. With “Conceptualizing Relational Contextualization” he proposes an adjustment based on the “auteur theory”. In combination with the complexity theory, he claims the possibility to derive a relational context that focus on the connections between the various context-factors rather than the context-factor itself. Jonathan Church watches spreadable media and video games at work while “Constructing a Neoliberal Archive” that forms a certain culture of history. Games gain a greater paratextual sense of temporal persistence by being turned into cultural artefacts as a focus of user interest, reference, critique, and memory.

## User-generated context

The third subsection presents articles that show how the line blurs between producers and consumers in digital contexts. Users are not only producing in preset ways, but they are as well establishing infrastructures and communities and appropriating tools and platforms to exchange knowledge and content. David Myers is questioning the possibilities of transmitting certain messages through interactive media in general. His paper “Authorial Intent and Video Games” is looking for ways of conceding author and designer contexts to discuss how authorial intent might affect video game meanings, with focused reference to the interactive qualities of digital media. Pilar Lacasa, María Ruth García-Perñía and Sara Cortés Gómez are looking for new adolescent literacies and declare it to be an educational program to switch “From Gamers to Game Designers”. Their main goal is to analyze the experiences of adolescents when designing video games in an innovative learning environment based on the concept of partici-

patory culture. User generated content is not easily classified, neither as information, nor as expression as Héctor Puente Bienvenido together with Marta Fernández Ruiz can show in their analysis “Situated Production of Video Walkthroughs on YouTube”. It addresses how these instrumental videos are becoming more and more expressive media and subsequently cultural manifestations where different texts and media converge. But with chances come risks: Last but not least Gerhild Bauer, Daniel Martinek, Simone Kriglstein, Günter Wallner and Rebecca Wölfle try to convey these new requirements that come with digital contexts to minors. They designed “Internet Hero. A game about the Internet for children aged 9-12 years”, that aims at increasing the digital literacy of children and preparing them to safely navigate the internet. It teaches in a child-friendly way to be consciously aware of the potential dangers of hyperlinks, online forms and phishing-mails to protect them from exploitation.

### **Playful environments in context**

The fourth section assembles research that explores design-related, location-based and environmental challenges of playing and creating games. Thereby questions related to co-located, multiplayer, mobile and urban gaming are tackled. The first paper in the section “Playful Environments in Context” focuses on the game *Limelight* that was developed for co-located play in an exhibition space with a very large display. Under the title “Another Brick in the (Fifth) Wall: Reflections on Creating a Co-located Multiplayer Game for a Large Display” the authors Jeremiah Diephuis, Michael Lankes and Wolfgang Hochleitner utilize the concept of the fifth wall to designate the game design dependencies that separate the experience of individual players. In the following chapter *Lizzy Bleumers* explores the phenomena of participatory sensing, in which people participate in data gathering and analysis of their surroundings through the use of mobile devices and web services. In her analysis “Capturing Context: Mobile and Pervasive Game-Play in Participatory Sensing” she examines 10 games and considers their mutual alignment and their relationship with participatory sensing. *Martin Knöll, Tim Dutz, Sandro Hardy and Stefan Göbel* follow the question “How the built environment matters to mobile games for health” in their chapter “Active Design”. Their article points to the limited research that focuses on the complex relationship between mobile games, a players’ health and wellbeing, and the (urban) environment in which many of these games are being played. In the fourth paper of this subsection *Eszter Tóth and Alenka Poplin* introduce in the field of urban design. Their chapter “Cooperative Learning Games – a Successful Tool for Promoting Children’s Participation in Urban Planning?” highlights a case study and explores the questions whether cooperative games are appropriate tools to raise the interest and motivation of children and youth in participating in

urban planning. Nina Grünberger and Clemens Fessler close the section with their chapter “Play Between Cable Car and Couch. Reflections on the Importance of the Environments of Gameplay Through Böhme’s Atmosphere Concept.” The authors examine on a theoretical level how the atmosphere surrounding the game impacts the gameplay experience.

### **Meaningful context**

The subsection “Meaningful Context” connects chapters that explore meaningful play, gender and emancipation of players and designers. The first paper by Maresa Bertolo and Ilaria Mariani focuses on question related to “Meaningful Play” and how “Learning, Best Practices and Reflections Through Games” can be facilitated in game design projects. Thereby five design projects dealing with social innovation, socio-cultural and cross-cultural issues are outlined. How crucial an open discourse about gender stereotypes and new forms of meaningful play can be, is highlighted by Maïke Groen. In her paper she explores the phenomena of “Exclusion and Inclusion of Women in E-Sport and the Example of StarCraft: Wings of Liberty”. A similar gender-related aspect, but from a different perspective is outlined by Sébastien Hock-Koon and Iris Rukshin in their chapter on “Princesses and Princes in Video Games”. The authors provide insight into a “preliminary survey on audience reception” of the princes’ presentation in video games.

### **Applied play in context**

The sixth subsection “Applied Play in Context” focuses on how different theoretical concepts can be applied to play and how vice versa play and game theory can be applied to educational, cultural and theoretical models. In the first chapter Judith Ackermann investigates different spheres, in which “Appropriating Game Rules” take place and how rules are being negotiated and performed depending on the individual appropriation state. A different question in regards to “Learning with Video Games” is the topic of Sébastien Hock-Koon’s chapter. He identifies “Sources of Uncertainty” in the theoretical understanding of learning with games and highlights the video games’ properties that are creating uncertainty. The phenomena of “Mentalization and the Reflective Functioning of Playing” are explored in Katharina Mittlböck’s contribution. Her aim is to outline why and in which way Digital Role-Playing Games provide an advantageous possibility space for Mentalization and in which way high level Mentalization abilities contribute to personality development. In the final paper of this section Enrico Gandolfi proposes his concept of “The playing diorama”. In his process-oriented

framework he intends to connect the micro and the macro context of the ludic experience on a theoretical, philosophical and empirical level.

### **Play in artistic context**

The final subsection assembles four chapters that connect the context of art, design, technology and play. The chapter “Game Design and Artistic Expression” by Fares Kayali, Naemi Luckner, Ruth Mateus-Berr and Peter Purgathofer opens the section “Play in Artistic Context”. The authors follow the question what the role of constraints and freedom in designing art games might be. In the following chapter Veli-Matti Karhulahti “Videogame as Avant-garde” proposes that single player videogames are in conflict with the institution of art. He argues that by the players “Secluded Rhythmic Expression” the players’ expressive activity cannot avoid becoming art itself. In the third chapter Jens M Stober, Steffen P Walz and Jussi Holopainen introduce “Hacking as a Playful Strategy for Designing Artistic Games”. The authors trace the history of hacking as a design strategy for artistic games and look for creative strategies contained within the act of hacking itself. The final chapter by Ilaria De Lorenzo explores the artistic and playful language of dance. In her paper “The Game of Dancing a Fairy Tale” the author examines how the context of playing, with its language, rules and meanings, approaches the context of dance.

### **Acknowledgement**

The exploration of the context of gaming would not have been possible without the help of many passionate colleagues and friends that helped organizing the Vienna Games Conference in FROG13. We want to thank the other members of the FROG Program Committee: Jason Begy (Concordia University); Jennifer Berger (University of Vienna); Mia Consalvo (Concordia University); Clara Fernández-Vara (The Trope Tank, Massachusetts Institute of Technology); Henrik Schønau Fog (Aalborg University Copenhagen); Fares Kayali (University of Applied Arts Vienna); Christoph Klimmt (Hanover University of Music, Drama, and Media); Nikolaus König; Jonas Linderöth (University of Gothenburg); Konstantin Mitgutsch (MIT Game Lab; Massachusetts Institute of Technology); Scot Osterweil (Education Arcade); Alexander Pfeiffer (Danube University Krems); Alenka Poplin (HafenCity University Hamburg); Doris Rush (DePaul University); Steve Schirra (MIT Game Lab, Massachusetts Institute of Technology); Abe Stein (MIT Game Lab, Massachusetts Institute of Technology) and Jaroslav Švelch (University in Prague). Furthermore we express thanks to Organisational Team of the FROG13 for their kind support. Finally, we want to thank all

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## **Active design – how the built environment matters to mobile games for health**

### **Abstract**

Mobile games for health aim to provide both for an attractive gaming experience and for a positive effect on their users' wellbeing. Most of these games are context-sensitive, as they take note of the state of the player's environment and use this information to adapt the game experience. This article points to the limited research available that validates either the physiological effects of playing context-sensitive games for health regularly, or research that focuses on the complex relationship between mobile games, a players' health and wellbeing, and the (urban) environment in which many of these games are being played. It reviews aspects of health-oriented urban design that has been shown to influence people's everyday activity patterns including running and cycling. It speculates how "active design" context can also have an impact on how we play mobile games for health and explains how this knowledge can be used to improve such games.

### **Introduction**

More than half of the world's population now lives in cities, which has placed research and development of health-promoting urban environments at the core of policy making (Dye, 2008). Gameful and playful experiences have shown signs of success in addressing health-related behaviors and their close relation to the context of people's everyday activities - situations, agendas and specific built environments. For example, designers turned the steps of a Stockholm underground station into a large piano keypad with every step of the stairs causing a corresponding sound. It was observed that two-thirds more people took the stairs that day compared to the adjacent escalator (Volkswagen, 2009). Knöll et al. describe such approaches as "spontaneous interventions for health", which creatively combine serious gaming technologies and new urban interfaces in order to stimulate health-related behavior changes. Next to the obvious potentials of such interventions to urban environments, they indicate the need for more in-

depth studies in order to evaluate their long-term health-related effects. To this end, Knöll et al. suggest an increased interdisciplinary cooperation between urban designers and serious gaming researchers and highlight new curricula that would make students more aware of the existing potential to initiate and implement joint projects (Knöll, Moar, Boyd Davis, & Saunders, 2013). In this article, we focus on the design and evaluation of mobile games for promoting physical activity, so-called exergames, as a further approach to playful experience that is highly sensitive to urban context. The game *Zombies, Run!* by British software developer *Six to Start* has been one of the most successful fitness apps on the *Apple App Store* in 2012 (SixToStart, 2012). As we have argued before, the concept of mobile, context-sensitive exergames has great potential to engage users, as these games can blend interactive, virtual storylines into the user's real life environment, thus adding a new aspect to the challenge of motivating players for physical activity (Knöll, Dutz, Hardy, & Göbel, 2013). In this article, we argue that a great potential exists for mobile and context-sensitive exergames to make more out of the urban context they are played in. By urban context, we understand all social, cultural, and behavioral aspects of living in a city that are directly or indirectly influenced by the shape and content of the built environment. Related work in this field has pointed to the possibility to identify real world locations that would augment the atmosphere and storytelling that is stimulated in pervasive gaming experience (Walther, 2007). Many designers and researchers in the field of mobile and context-sensitive gaming have highlighted the need to make sure that users are safe while moving around the city with their attention focused on the displays of smartphone screens (Boyd Davis, et al., 2007). There is an emerging research on how the urban environment influences our daily (traditional) movement patterns such as walking, cycling, or running. However, to our knowledge, there is no scholarship that elaborates how this body of research can contribute to the design challenges mentioned above. Specifically, there seems to be no research available that looks into the mechanisms involved in stimulating the amount, intensity, and quality of moving in the real world while playing mobile exergames.

In this article, we thus seek to provide a theoretical model that helps game designers and serious gaming researchers to better understand the role of the built environments in exergames. This model is meant to provide a better insight into the broad spectrum from which to choose locations for exergames and for which to develop context-sensitive playful activities. First, we will identify relevant research from the field of urban design and planning. We will present relevant literature on *Active Design* guidelines and illustrate them with best practices. Second, we will address the question of how to integrate insights from other disciplines with more established research on locations in pervasive gaming. Third, we will develop and present a model that makes this knowledge accessible to mobile exergaming design and research processes. And finally, we will discuss

these models by presenting early prototypes that have been developed in the first months of our integrative and interdisciplinary design seminar *Developing Urban Health Games* at the *TU Darmstadt*, Germany, where students of architecture, psychology and computer science jointly develop and research context-sensitive games in small project teams.

### **Activity patterns: Walking, cycling, running, mobile exergaming?**

For the last twenty years, researchers have collected a considerable body of knowledge that shows how different aspects of the built environment shape its inhabitants' daily activity patterns. Frank and colleagues have provided a comprehensive overview of aspects of urban planning from the scale of regional to neighborhood planning (Frank, Engelke, & Schmid, 2003). They have focused on walking, cycling, and running – both as utilitarian activities (e.g., to commute from home to work) and as non-utilitarian activities (with foremost recreational purposes). Specifically, they have highlighted the importance of walking for health and wellbeing, as it is highly accessible and also the most cost-efficient mode of transportation, as it does not require any additional equipment or accessories. Walking could therefore be well integrated into almost any routine and agenda. This observation is important for us, as for our purposes we have to estimate if playing mobile exergames and / or using mobile fitness apps in general can be compared to those more traditional activity patterns. Using fitness apps has been described as moderately accessible, with mobile devices and access to mobile internet is becoming more and more widespread among users of all age groups and as almost every new mobile phone sold today in western countries is a smartphone (Bitkom, 2013). With the average cost of an iOS-based app being about 0.19 US dollars (Gordon, 2013), the overall accessibility of applications for smartphones is extremely high, including apps for health and wellbeing and especially exergames. In terms of exercise, exergames may well be compared to walking and running, depending on the degree of physical exhaustion their gameplay activity seeks to stimulate. Based on this observation, we assume that mobile exergaming can be compared to walking and running in terms of accessibility for a wide range of users and the possibility to integrate exergaming into daily routines and agendas. Figure 1 gives an overview of the relationship between the built environment, people's activity patterns and public health outcomes, as observed by Frank et al. in 2003.



Figure 1

Future research will have to address the distinctive differences and similarities between traditional activity patterns shown in Figure 1, and new emerging patterns of digitally enhanced ways of moving through the city. To this date and for the purpose of this article, we feel it is safe to assume that knowledge on how the built environment shapes movement patterns will also be relevant for analyzing how people move within an urban environment while using exergames. In the following sections, we will outline some of these guidelines.

### Which context matters when playing exergames in the city?

In order to guide our investigation of the large body of research on *Active Design*, we identify the following key aspects that have been shown as being crucial for playing digital games in real world locations. In one of the few more comprehensive works on the topic, Walz has put forward a framework of “locative dimensions” as a set of questions to be asked about space when designing and analyzing digital games (Walz, 2010):

- **Player:** Where in the game is the player and where is the game for the player?
- **Modality:** In what modalities of location, when, and for how long does the game take place?
- **Kinesis:** How does the location affect kinesis and rhythms between player and play-other?
- **Enjoyment:** What is the play pleasure set of the game’s locale? What emotions does the site inspire?
- **Context and Culture:** How do the context and culture of the play site affect the play site?

Even though Walz excludes the field of serious and persuasive games from his discussion and does not distinguish between mobile games and traditional console and PC video games, his set of questions may well help to orient our own analysis. In other research, Knöll et al. have found Walz' five "locative dimensions" helpful to organize the variety of locations that they have observed where mobile exergames are played. Their typology of "locations in mobile exergames" includes parks, conduits, modern agoras such as shopping malls, places to socialize and to rest, and street furniture. Their observation confirms aspects such as a users' agenda, sense of safety, social interaction, and practical matters such as GPS signal reception as being crucial for mobile exergaming (Knöll & Moar, *The Space of Digital Health Games*, 2012). Walz' "player-dimension" points to a site's topographic dimensions such as widths, heights, shapes, and borders. These dimensions enable designers and researchers to locate the player within a specific area of the built environment and to develop playful activities based on access and movement patterns. Zooming in on a more detailed view of objects, street furniture such as benches, fountains or stairs, architects would extend their observation to other "morphological qualities" including textures, colors, haptic and olfactory sensation (Janson & Tigges, 2013). This morphology of urban context will influence how people engage in physical activity in interaction with the urban space, comparable to free running as observed by Feireiss (Feireiss, 2007). In our view, the aspect of movement and play rhythm indicates the need for designers to consider in how far the shape of a site delivers restrictions or potentials for safety, but also for playful activities that require GPS reception and mobile internet access. As introduced above, Walz furthermore points to "modality" as the question of when and for how long a game takes place at a given site. In our view, modality is a further relevant aspect to exergames, as it allows putting the game sessions in the context of their users' agendas, e.g. their existing activity patterns. Designers may ask what a players' place of origin is, and what their destination will be after playing a mobile exergame. The sense of enjoyment, as well as social and cultural context, are crucial for making people engage in location-based games as much as for moving in between everyday locations. Urban designer Jan Gehl points to the potential of "lively" public spaces for city development including public health agendas (Gehl, 2012). Debra Liebermann has pointed to immersion as the grade to which players feel invited to enter a new world while the surroundings seem to vanish, focusing their attention and becoming "the character we play" (Lieberman, 2010). She highlights that immersion and engagement in games for health are being closely related to many intended outcomes such as learning and behavior change. We suggest summarizing factors as enjoyment, cultural aspects, and atmospheres of urban context as the capability to contribute to player's immersion and engagement to mobile exergames.

As a result, we will summarize the aspects discussed above in the following three topics and questions to ask when analyzing urban design guidelines and mobile exergaming:

- **Safety:** In how far do morphological dimensions provide a safe environment for becoming physically active?
- **Agenda:** How does the built environment influence or indicate a user's agenda before and after the game?
- **Immersion:** How does the atmospheric, social, and cultural context of the location or a series of locations provide activities that influence the activities in the game?

### **Active design guidelines**

In this section, we present key aspects of the built environment that have been shown to shape physical activity patterns on various scales of urban planning. Recently, research has started to investigate how the layout of buildings influences people's choices to become active, for instance by climbing the stairs as opposed to taking elevators (City of New York, 2010). And even though we assume that this field will become relevant to the design of future context-sensitive exergames that are designed to be played indoors, for instance the iOS-based stair-climbing game *Monumental* (Me You Health, 2011), we exclude active building design from our investigation and refer it to future work. Here, we rather focus on findings on a neighborhood scale, which we consider as more relevant for current mobile exergames design practice. Games such as *Zombies, Run!*, *Geochacking*, or Google's popular *Ingress* cover an area within walking distance for the player and consist of play sessions between a few minutes and a couple of hours. As pointed out before, the way in which different layouts of neighborhood areas influence activity patterns has attracted a lot of research interest over the last couple of years with a considerate body of studies and evidence and as shown above, Frank et al. have indicated "land use mix, transportation systems, and urban design aspects" as crucial factors on this scale of urban planning and design (Frank, Engelke, & Schmid, 2003). In the following, we will present research and specify its potential influences on exergaming through our three dimensions of morphology, agenda, and immersion:

#### **1) Land use mix**

A great variety of different usages within a neighborhood such as resident, work, recreation, shopping, and transport facilities results in a great amount and density of destinations to walk both from and to in a city area. In such areas,

which can be found in inner city centers, people are more likely to undertake non-optional daily tasks such as shopping on foot. Many studies have shown the close relationship between neighborhoods with a diverse use mix and an increased amount of pedestrian traffic (Robertson-Wilson & Giles-Corti, 2010). In the design of a context-sensitive exergame such areas, as opposed to purely residential areas, will allow for a gameplay that extends and addresses existing walking patterns. For mixed-use areas, designers can assume those walking patterns to be considerably higher in a majority of inhabitants than in suburban areas with residential use only. A variety of usages will also allow for more possibilities to respond to with the exergame gameplay. It would therefore cater to a greater amount of use case scenarios and people's agendas.

## 2) Transportation systems

The layout and shape of the street networks and the sizes of blocks also have been shown to have great influence on walking patterns. A "well-connected" street network is one in which pedestrians can walk the most direct way between two destinations. This can be seen in grids with short block lengths, which also provide more than one option to choose from while allowing to walk close to the shortest (Frank, Engelke, & Schmid, 2003). In our view, choosing a well-connected street layout as a context for a mobile exergame will allow for gameplay activities that require players to change directions and to navigate through the city. On the other hand, exergames which seek to augment an otherwise "less interesting" task - such as going for a run - with a story seem to be less dependent on choosing well-connected areas. Our own observation of playing the game *Zombies, Run!* suggests that getting immersed in an audio content requires not having to focus on navigation too much. We speculate that less well connected areas may have a positive influence on immersion to comparable kinds of games, as less pedestrian traffic and possible routes to choose from also reduce distraction through navigating in real world locations. Yet, such a hypothesis would have to be investigated in future research.

## 3) Urban design features

More recently, the influence of design characters of urban spaces such as squares, public gardens, and sidewalks has received increasing attention from research projects. Gehl has pointed to the effect that well-designed urban space sparkles on the livelihood of cities and has directed our attention to its various positive effects on activity patterns. Gehl explains how seeing and hearing other people makes us want to stay in a public space, makes us feel safe and as a result

affects the likelihood of us choosing one possible path through the city over another. He also points out that children prefer to play in populated places and especially in those where there are adults to play with and show off their skills to (Gehl, 2012). What we have framed above as the capability of a site to stimulate immersion extends to the potential to divert from gameplay activities. Both potentials being stimulated by a more populated place will influence gameplay. Knöll and Moar have shown that many exergames are played in parks, as they provide for an enclosed space, which is indicated by walls and entrances. Their boundaries suggest and to some extent provide for a safe environment which is protected from car traffic (Knöll & Moar, *The Space of Digital Health Games*, 2012). Burden et al. have gathered and commissioned research on how different qualities of sidewalks – building heights, sidewalk widths, and the design of the sidewalk “room”, influence the usage of sidewalks (Burden, Burney, Farley, & Sadiq-Khan, 2013). We suggest that studying comparable work and looking into sections of sidewalks and places will help game designers decide, if a certain site provides a safe context for an exergame.

## Evaluation

As pointed out before, in 2013 we initiated and led a novel and ongoing course at the *TU Darmstadt* which brings together students from the fields of architecture, psychology, and computer science with the goal of establishing a cooperative environment that promotes the creation of urban mobile exergames. The students enlisted in the course are assigned to small project teams of five to ten members, each team consisting of at least one student of each of the three fields of science. The basic idea is that this kind of arrangement guarantees an expertise in each of the three steps required to create successful serious game prototypes, namely design, implementation, and testing and evaluation (Goebel, Hardy, Wendel, Mehm, & Steinmetz, 2010), with the game design being mainly the task of the prospective architects, the implementation of the Android-based prototypes being within the responsibility of the computer scientists, and finally, the psychological and physiological effects of these games being investigated by the students of psychology. The necessity of this type of interdisciplinary approach was supported by our experiences gained from a course *Games for Active Design*, which was limited to students of architecture and led by Knöll (Knöll, Lehre, 2013). The students of this course were also assigned the task of creating urban mobile exergames, but while some of the designs presented here were exceptionally creative, almost all of the participants failed to implement a working prototype, leaving alone an evaluation of the effects that their game has on its players. This confirmed our assumption that an interdisciplinary team of students might actually be necessary to produce much more comprehensive results and that stu-



dents from a single scientific field might not bring all the skills required for creating such games. But while the interdisciplinary student teams indeed provided working game prototypes and were able to conduct evaluations of their effects, we found that the coordination of, and the collaboration within, these teams was not without difficulty.

During the summer course of 2013, one of the student teams produced an Android-based game named *GoGreen*. The game is centered on a specific park in Darmstadt and features a set of small location-based games to be played in this park. Among them is a game named Gate Run, which requires players to pass a series of random “Gates” (GPS coordinates) within a given amount of time. The game also features a virtual player avatar dubbed *Mee*, which changes its appearances over the course of days, depending on whether the player mainly selects running activities or games that promote an upper body workout, meant to motivate the player to ensure a balanced full-body workout. Figure 2 shows a screenshot of the app’s main screen in which the player selects an available activity and a design draft of the *Mee*.



Figure 2

While the group technically produced a very good result considering the time they had available to do so, the project also illustrated the need to ensure that such teams work together from the very beginning. Through the final project documentation, we found that the architecture students had precisely analyzed forty different places within the city of Darmstadt that might be suitable as locations for urban health gaming. As a first step, the group preselected spots that were in walking distance of the central university campus in order to comply

with daily routines of their target group and the modality of playing during their lunchtime break. As second step, the team analyzed the sites using *Active Design* guidelines and additionally using guidelines provided by the German *Federal Ministry of Transport, Building and Urban Development* to evaluate the sites' potential value to rest in public spaces (Bundesministerium für Verkehr, Bau und Stadtentwicklung, 2011). Figure 3 shows two exemplary location breakdowns of the *GoGreen* student team, illustrating the sites' potential to rest or to become active, which in turn would influence the game character *Mee*. They had ultimately failed to make their knowledge accessible to their team members in a way that it would influence the game mechanics, partly because the computer scientists did not realize the necessity of waiting for their colleagues to present the results and simply began implementing the game once the general concept was concluded. Consequently, the final game is playable at only a single location. This vividly demonstrates the necessity to foster knowledge transfer in interdisciplinary teams from the very beginning and to especially stress the fact that urban health games will benefit from carefully selected locations, as pointed out in the previous sections of this article.

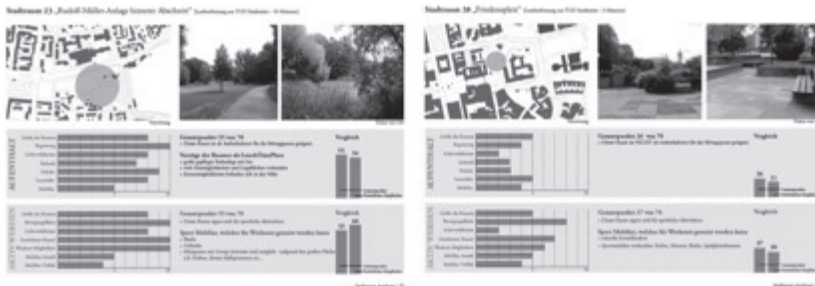


Figure 3

The second student team designed and implemented a game named *PacStudent*. The game is basically a location-based version of the well-known arcade game *Pac-Man*. In this group, the collaboration between the team members went much smoother and the places that the architecture students identified as optimal for playing the game actually made it to the final game version. Figure 4 shows three screenshots of the game, the location selection screen on the left and two actual in-game screens on the right. Next to being in walking distance and providing a space safe from car traffic, the *PacStudent* team focused on how morphological aspects such as floor finishing, guiding plants along the path, or topographic differences would influence the ease with which people navigate a given site. The two in-game screens on Figure 4 show how the *PacStudent* team adopted the original *Pac-Man* game mechanic to different game sites by altering the rules how the virtual coins are distributed and how the player and her virtual en-

emies (the “ghosts”) would move. More information on *PacStudent* is available at <http://pacstudent.de.im/>.

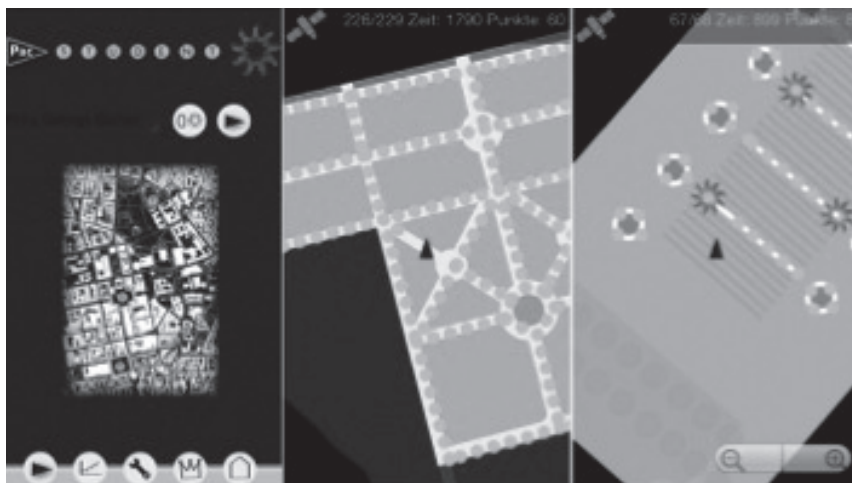


Figure 4

## Discussion

The first results of our new interdisciplinary student course have provided a useful framework to experiment with form and content of our cooperation between architects and serious games researchers. Specifically, the projects have confirmed and pointed to further work needed in our theoretical framework that we have discussed above. Whereas *PacStudent* provides the possibility to point to safe environments by analyzing the morphological features of a site, it was also experimented how urban design features such as fences, sculptures, and floor finishing can stimulate different ways of playing the exergame. Both projects used data from land usage and walking distances to estimate if the game would fit into a players' daily agenda, e.g., into a student's day on campus. The question to what extent the environment effected players' immersion has only been marginally targeted by the student groups. The group *GoGreen* was analyzing to what extent different atmospheres would be suitable to get active or to relax. Both groups have found the *Active Design Guidelines* a useful tool to analyze urban context with respects to how different layouts and shapes of the built environment stimulate activity patterns. They have also pointed to its possible restrictions when they combined active design to other urban design guidelines - for instance, guidelines dealing with a site's potential quality to relax the player. We therefore conclude that our model can be applied to other use cases by choosing research on context according to the intended purpose. For example, designing a mobile

game for health that seeks to support activity in players with restricted motoric skills would have to analyze the urban context from the perspective of *Inclusive Design* (Burton & Mitchell, 2006) rather than *Active Design*. The three dimensions of urban context that we introduced in this article - safety, agenda, and immersion – act as a mediator between an in-depth analysis of urban context and the actual game design.

## Outlook

In the upcoming next seasons of our interdisciplinary seminar *Developing Urban Health Games*, we will focus on methods that allow game designer to better access location-based information. One possible route is to combine analysis with more established categories of location-based services such as *Foursquare* or *Google Maps*. As part of the design curricula, we will ask architecture students to combine their own analysis of potential game sites with the use of existing data bases such as data on sound and pollution emissions. At the same time, students with a background in computer sciences will be asked to combine their analysis of location specific health aspects with openly accessible APIs of location-based services.

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**Jussi Holopainen** is the co-director of RMIT's Games and Experimental Entertainment Laboratory. His main research interests are pervasive games, conceptual frameworks for game and interaction design as well as cognitive and affective dimensions of gameplay experience. His favourite computer game still is Nethack.

**Katharina Mittlböck** (aka Stephenson) is a PhD candidate, who formerly graduated in Educational Science & Special Education at University of Vienna and Educational Technology at Danube University Krems. She now holds there Lectureships and is involved in the conception and management of the Master's program "EduGaming4Prevention" at the University College of Teacher Education Vienna/Krems & Danube University Krems and works also as a freelancer in the field of Online Didactics. She wrote already several publications in the fields of Game Studies & Personality Development.

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**Marco Agosta** is a graphic and game designer, but before everything he is a board games lover. In 2010, he attained a Bachelor Degree in Graphic Design at Academy of Fine Arts in Catania with a thesis about the relation of graphic and board games mechanics. In 2013, he obtained a Master Degree in Communication Design at the School of Design in Politecnico di Milano with a thesis about rules in games and society. Currently, he is developing some board games as an independent game designer.

**Maresa Bertolo** is Assistant professor at Design Department, Politecnico di Milano, teacher of the Game Design Course at the School of Design. Her research deals with Communication Design, Games Studies and Game Design, focusing on ludic activity as vehicle for communication, learning and best practices. Her favorite game this month is Merchants of Venus.

**María Ruth García-Pernía** is a Post-Doctoral Researcher at the University of Alcalá. Her main research projects focus on the use of new media in the young people everyday live, especially on such themes as innovative educational practices inside and outside the classrooms. She has being involved in the research adopting an ethnographical and action research perspective.

**Marta Fernández** is Research Assistant at Carlos III University, Journalism and Audiovisual Communication Department. She holds a Bachelor Degree in Audiovisual Communication. Since 2008 she carries out research on digital aesthetics and interactive media. She has recently presented her Ph.D. thesis "Lighting as a Visual Expressive Resource to Guide Interactions in 3D Game Worlds". Favorite game: Bioshock (2K games, 2007).

**Marta Razzetti** is a freelance art director and designer. Graduated in Communication Design (2012), she developed the interest in Game Design and narrative schemes of communication while writing her thesis- Playing with common senses - develop creative thinking though design, games and social interaction - with prof. Maresa Bertolo (Politecnico di Milano).

**Martin Knöll** is architect and head of the UNICO research group "Urban Health Games" at Technische Universität Darmstadt. His research focusses on health-promoting effects of the built environment in its various social, cultural and topographic aspects and how they can be augmented with location-based games.

**Martin Reiche**, B.Sc. computer science, audiovisual artist, exhibited in Karlsruhe, Heidelberg, Cologne, Madrid. Special interest on space perception and HCI immersion. Regularly presenting on professional computer science and digital art conferences. Co-founder of the Subformat research group for spatial artificialization and digitization. Lives and works in Berlin.

**Mathias Fuchs** has pioneered in the field of artistic use of game engines in various game art installations. He started the first European Masters Programme in Creative Games at

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**Mikko Vinni** holds an MSc from University of Eastern Finland on computer science. His expertise includes the design and development of mobile applications, in particular on location-based games.

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**Nina Grünberger** is a research assistant at the Department of Interactive Media and Educational Technology at the Danube-University Krems. Her research interests are focused on game studies, learning theories, and learning with new media. She is rather a mind gamer than a computer gamer; especially while writing her doctoral thesis.

**Peter FÜRST** has been working for Sproing since three years and last year he started studying at Donau-university Krems.

**Peter Purgathofer** is Associate Professor at the Vienna University of Technology. He is coordinator for the Media Informatics Master Program and has a long experience researching, reflecting and teaching Interaction Design/User Experience in theory and practice, in a wide array of fields reaching from POS terminals to digital games. Favorite Game: Pro Evolution Soccer

**Pilar Lacasa** loves video games, movies and new media. She’s interested in how children and young people use old and new media in their everyday lives. Pilar is Audiovisual Communication Professor at the University of Alcalá (Spain). Her research work has been developed from a social-cultural approach. Considering commercial videogames as educational tools, she collaborates with Electronic Arts Spain to approach commercial videogames, considered as cultural tools, to families and schools.

**Rebecca Wölfle** has a B.Sc. in computer science (University of Vienna) and a certificate in media design with a special focus on graphic design. Her key research interests are on-line social interaction and bridging the gap between e-learning and entertainment. Favorite Games: Dragon Age, Bioshock Infinite

**Ruth Mateus-Berr** is artist, scientist and multi-sensual design researcher. She was born in Vienna in 1964. She received a doctorate from the University of Applied Arts Vienna in 2002. She is professor at the University of Applied Arts Vienna at the Department for Design, Architecture and Environment for Art & Design Education.

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**Sébastien Hock-Koon** has a Ph.D in Education Science from the University of Paris-Nord. He studies learning in video game. Former game designer, game design teacher and expert arcade player on Alien Vs. Predator (his favorite game), he uses his practical experience of the field to enrich his academic research.

**Simon Huber** (born 1987) studied History and Education at University of Vienna from 2007 until 2012. His thesis was an attempt to write the history of a commercial computer game from a media archaeological perspective. Now he is preparing his PhD about the (media-)cultures of schooling and its estimated origins in play.

**Simon Niedenthal** is Senior Lecturer at Malmö University, School of Arts and Communication. He conducts design-oriented game studies research in the areas of game aesthetics, the sensory experience of gaming, and playtesting processes for innovative game design. He holds a BFA in photography, an MA in Medieval English literature, and a Ph.D. in interaction design. In 2008 he defended his Ph.D. thesis "Complicated Shadows: the Aesthetic Significance of Simulated Illumination in Digital Games". Favorite game: Silent Hill 2

**Simone Kriglstein** holds a doctor degree in technical science. She is involved in several projects at the University of Vienna and the Vienna University of Technology. Since 2012 she also works as postdoctoral researcher at SBA Research. Her research interests are HCI, information visualization, and games. Favourite Games: Batman: Arkham City, Dewy's Adventure, Zelda

**Stefan Göbel** is heading the Serious Games group at the Multimedia Communications Lab at Technische Universität Kriglstein Kriglstein. He has published more than 100 scientific papers, is a member of various program committees in the areas of multimedia technologies, edutainment and serious games, and is the initiator and permanent host of the Game-Days, an international conference and science-meets-business workshop on serious games.

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**Thomas Traunwieser** studied Psychology at the University of Vienna. During his studies he worked with mentally handicapped patients. During his time at the Medical University of Vienna, he found out that there are rarely no neuropsychological trainings for children, who experience long-term memory deficits because of brain damage, which are actually fun to use. He developed the idea of combining a neuropsychological training with a video game approach.

**Tiago da Mota e Silva** is a Journalism student at the Faculdade Cásper Líbero, in São Paulo, Brazil, researching newsgames and journalistic narratives in digital media. Silva's studies are an effort to approximate gaming and communications, focusing on how the game language constructs meanings and how they become part of communicative environments.

**Tim Dutz** has studied Informatics at the Technische Universität München and is a research assistant at the Multimedia Communications Lab at Technische Universität Darmstadt. His main research interests lie in the fields of mobile gaming and ubiquitous computing.

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**Tomáš Bártek** is an PhD candidate at Department of Journalism and Media Studies, Masaryk University, Brno, Czech Republic. His main point of interest is subculture of gamers and their value system. Author is also a member of MU Game Studies, civic group, which aims to improve game studies discourse in Czech Republic.

**Valentina Rao** is a designer and researcher interested in using games and play to solve practical problems in everyday life. Through her company Playful Pandas she is exploring the limits of gamification for mental health and practicing app development. For the last three years she has been working on a PhD project about the different routes to behavior change in game-based persuasive systems.

**Valeria Proserpi** studied in Florence and attended a post-graduated course in Communication Design at Politecnico di Milano, graduated with honors in July 2011. She's currently living in Milan, working in multimedia production, advertising, visual communication. She works as graphic and communication designer for Roomor and is currently collaborating with the research activities on Game Studies of the Design Department of Politecnico di Milano.

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