"Eventually, everything connects."

(Charles Eames, Architect)

"It's all about connecting the dots."

(Ralph H. Baer, Videogame Inventor)

1. Ludic Architecture

This book is a theoretical exercise toward a ludic architecture – i.e., an analytical and designerly understanding of contemporary play and games through the lens of architectural paradigms. Note that this treatise is not concerned with programming or more technologically-inclined topics. Rather, it suggests a discourse of play and games as human practices in space, seeking to conceptually frame these pleasurable practices as architectural categories and places-to-play - playces, if you wish. Results from digital game studies are worked into these reflections, creating a basis for an analytical framework of games as architectures. This framework serves as the foundation for critically discussing exemplary spatial formats from which play and games grow. As an introduction – and for your inspiration – read through the following scenes that illuminate the topic.

1.1. Ready!

Unfamiliar with Alan M. Turing's work, Konrad Zuse, the solitary German computing machine pioneer, conceptualized and built the first mechanical component of his Rechenmaschine, the Z1, in 1945, nine years before the official inception of the Electronical Numerical Integrator and Computer (ENIAC) at the University of Pennsylvania. In the end, the Z1 was just a primitive electro-mechanical device, far less reliable than its successor, the Z3 – the first working Turing-complete computing machine. Both systems, however, consisted of a mechanical memory storage component, a calculating component, a command controller unit, a number input, and a number output – core elements of today's computing machinery. The Z1 was programmed using ticker tapes created from expensive 35mm film stock. For the ticker tape to be input into the Z1, a hand-driven - potentially engine-driven - crank had to perform one revolution. Zuse called the unit of ticker tape revolutions needed to process a Z1 command (such as carrying out an addition or a multiplication) Spiel, or, in English, game (Rojas 1997).

In 1947/48, Alan Turing developed a chess machine on paper and also conducted experiments with a chess machine prototype, as pointed to in one of his many seminal papers, Solvable and Unsolvable Problems (Turing 1954). In 1950, his American colleague Claude Shannon wrote a paper titled Programming a Computer For Playing Chess (Shannon 1950), in which he envisions possible use-cases for computing machines based on his game machine. Many of the machines outlined have since come into existence – machines for designing, for regulating, for translating, for music-making, for logical deduction.

Much earlier, in the 19th century, Charles Babbage had already been convinced that his Analytical Engine would be capable of processing a chess game; to demonstrate simpler mechanics, Babbage conceptualized a Tic-Tac-Toe game machine, cf. Pias (2002:198). The world's first computer game, however, may well be Alexander Sandy Douglas' OXO game – a single player Tic-Tac-Toe game also known as Noughts and Crosses. OXO is, without a doubt, the first game with a graphical user interface: gameplay was displayed on the 35x16 pixel cathode ray tube space of the Electronic Delay Storage Automatic Calculator (EDSAC) computer at the University of Cambridge. There, Douglas implemented OXO in 1952 as an illustration for his PhD thesis concerning human-computer interaction (Winter 1996). See Figure 1, which shows an OXO session running in Martin Campbell-Kelly's EDSAC emulator software.

It is no coincidence that Babbage, Zuse, Turing, Shannon, and Douglas spent time thinking about games and how they could be implemented in the computing of hardware, software, or both. As Claus Pias points out, games – the strategy game of chess in particular – assisted in envisioning the computer (Pias 2002). This historical argument is seconded conceptually by Juul, who concludes that games' "definiteness in the rules" (Juul 2005:38) suggests that there is a basic affinity between games and computers. Why? Mass-market computers are digital machines that use discrete, i.e. discontinuous values (such as binary data) to input, process, transmit, and store information according to formal instructions. Compare this short and certainly superficial definition against the notion that games are rule-bound systems in which conflictive, goal-oriented interaction takes place under seemingly safe conditions for

the player, whose "fundamental motivation (...) is to learn." (Crawford 1982/1997:15). That games and computers are similar in the way they manipulate information has led media philosopher McKenzie Wark to conclude that "All games are digital. Without exception. (...) From the start, games were proto-computers" (Wark 2007:79).

**Though it could be argued that "Interactiveness is not a binary quantity; it is a continuous quantity with a range of values" (Crawford 1982/1997:11), we can still assume that games are, formally speaking, superbly suited for computational processing and that computational hardware and software architecture represent best-practice instances of ludic application, having much increased the complexity of games and formalized games more precisely than ever before in history. As advanced problem-solving machines with which we can playfully interact, computers are the perfect match for games when we look at the latter as "a problem-solving activity, approached with a playful mind"
(Schell 2008:37).**

1.2. Steady!

In July of 2001, Electronic Arts (EA) published Majestic (EA 2001), a new kind of commercial game that blurred the lines between computer game and everyday life, between virtual space and physical space. A science-fiction conspiracy adventure that included elements of bio-warfare and global terror, Majestic integrated a great number of media and technologies with which the player could experience the game: in addition to an application featuring a Buddy List with bots and other players, indistinguishable from one another at first glance, the game also immersed the player through AOL Instant Messaging (AIM), e-mail and video messages, Websites, phone calls, SMS messages and faxes, cf. Taylor and Kolko (2003).

Majestic failed to become a commercial success due partly to technical reasons but also because of some design flaws and unfortunate timing – the game was released six weeks before the terrorist attacks of September 11, 2001, causing the publisher to pause the (downloadable) game service. Still, Majestic was a pioneering game – a software-hardware architecture that reached beyond the constraints of the classical videogame console-living room experience or the desktop PC-office mélange. In this, Majestic was one of the first games to feature "pervasive" or "ubiquitous" gameplay across diverse media.

1.3. Go!

In the summer of 2007, Anna and Peter, a young couple from Zurich, visit Regensburg, Germany. At the tourist information office, they notice the tourist game of REXplorer advertised as a "city-experience" and decide to try it out. At home in Zurich, in preparation for their trip, Peter had visited the Website of the Regensburg Experience Museum REX, watched the REXplorer trailer, and browsed the Websites of high-scoring REXplorer players, where images the tourists had taken were shown, as was their path through the city[1]. Anna and Peter rent the REXplorer detector and set out to investigate the "paranormal activities" in the city.

As they leave the office to start playing, Anna holds the game controller, which reminds her of a Geiger counter. When they turn the corner of the Altes Rathaus, Anna notices a heartbeat vibration indicating that the detector is excited and that the couple has reached a point of interest. Anna knows that there is a spirit here that she can awaken by casting a spell. She looks at Peter, who flips over the brochure map they have with them, looks at the different gestures, and points to "wind." After glancing at the legend to get an idea of the gesture shape, Anna holds down the gesture button and waves the device through the air accordingly.

A passer-by stops and stares, open-mouthed.

Once the spell gesture is complete, Anna releases the button, and a short "tornado" video with audio playback confirms that she has successfully completed the wind gesture. A figure is shown on the detector screen, and a spirit with a friendly but dark voice begins to speak to the players[2]:

REXplorer! It's nice to see you. I am a salt trader. People like me used horses to pull heavy ships full of expensive salt up the river Danube to Regensburg until around 1820 A.D. Usually, the excursions lasted four weeks at a time. Yep, my life is tough and dangerous. Thieves plague the salt trading routes, but I have a loving wife who constantly prays in a nearby church for my safe return. Only the fire of her love keeps me alive. Would you be willing to deliver a message to my woman? Then show me the

appropriate gesture.

After listening carefully to the puzzle, Anna understands that she must cast the "fire" spell to accept the quest. She looks at Peter and asks: "Which one was fire, again?" Peter shows her the gesture legend and Anna successfully completes the fire gesture to accept the quest. Then she hears:

I thank you from the bottom of my heart! It pleases me that you are willing to deliver my love letter to my wife at the St. Ulrich Church near the Cathedral. Oh! My colleagues are already waiting for me at the river. Good luck! Take care of yourselves.

Peter checks the brochure map and quickly finds the next location. He looks to Anna and asks: "Where are we now?" She presses the map button on the detector, which then shows them their current position and the destination of their open quest. After orienting themselves, they start walking towards the St. Ulrich Church to complete their mission. On their way, they stop over at the Regensburg Cathedral, which looks quite beautiful before the bright blue Bavarian sky. They take pictures of themselves and of the monument using the detector's photo function.

After an hour and half, Anna and Peter return the detector, which has told them, in its unforgettable, sardonic voice, that it is starting to grow tired and that walking back to the tourist office would be quite swell. Once back at the tourist office, Anna and Peter return the game controller and receive their refunded deposit. The friendly tourist office staff downloads the couple's gameplay session data from their detector, including their route, completed quests, and photos. From this data, Anna and Peter's personal, geo-referenced gameblog Website for the session is automatically created. The URL for the blog is sent to their e-mail addresses and printed onto a postcard they receive before leaving the tourist office. Walz et al. (2006), Ballagas and Walz (2007), and Walz and Ballagas (2007) discuss several aspects of REXplorer in-depth, such as the game's design, its player-centered iterative development including play-testing, and its inherently persuasive strategies that promote game-based learning. Figure 2 depicts two players enjoying REXplorer in front of Regensburg's city core ensemble.

The three scenes described above reveal that today, ludic architectures, which in and of themselves are structurally and representationally digital, have now extended into the realm of physicality, creating a hybrid gamespace in the process. In this age of hybrid, connectivist gamespaces such as that of REXplorer, learning(-by-playing) becomes all the more a "process of connecting specialized nodes or information sources" (Siemens 2005:7). Theorizing about ludic architectures, then, means connecting information sources concerned with architecture, play, and games, and examining how all three ultimately manifest as architectural formats

2. About Games, Play, and Architecture

The scenes presented above demonstrate that digital games have history and a future – when it comes to games, we all "face the development of new typologies of space" (Borries/Walz/Böttger 2007:11[3]): "To choose a game is to choose an architecture" (Wigley 2007:484). This comment has a more profound undertone if you consider that today, commercial games are "the emergent cultural form of our time" (Wark 2007:22) that will eventually surpass even the movie industry and other entertainment media. Games are, perhaps, "architecture's final frontier" (Wiltshire 2007).

We can be relatively sure that games are changing our notion of space and time. This is made clear by innovative urban games such as REXplorer that superimpose physical architectures with a digital layer[4] or by other recent games such as Majestic that involve different forms of media and sneak unexpectedly into our living rooms. Another example is the latest Nintendo console, the Wii, which allows for wireless gestural player input by means of a game controller with built-in accelerometers and a Bluetooth connection. In the tennis game shipped with the Wii Sports (2006) set, the player can swing the controller as if swinging a tennis racket to hit an oncoming ball in real time in a 3D representation of a tennis court rendered onto the TV screen to which the console connects (Kelley 2007b:24f.).

Yet the change is also generational. Today, games are not merely for children - they constitute a major adult business, and major architecture is created through them. In the 1970s and early 1980s, the first game generation grew up playing Space Invaders, Pac-Man, Frogger, and Donkey Kong. Indeed, the author of this book will admit that he himself spent quite some time playing games on the world's first video console with exchangeable game cartridges, the Atari VCS (Atari 1977); that as a pre-schooler, he

was the proud owner of a Philips G7000 (Philips 1978); and that later, while attending secondary school, he played and learned to program BASIC on the Z80 CPU-based budget home computer Amstrad CPC 6128[5] – the European alternative to 8-bit home computers such as Commodore's C64 (Commodore 1982). With the exception of university and high school labs and networks, PlayNET (1984), an online service for C64s in the US between 1984 and 1987, was the first computer-to-computer online communication network to utilize graphics and interactive menus and deliver computerized multiplayer gaming through a 300- or 1200-baud modem (Morabito 1985).

PlayNET licensed its networking soft- and hardware solutions to Quantum Link or Q-Link, a US and Canada-only online service provider for Commodore's C64 and C128 computers that changed its name to America Online (AOL) in October 1991 and went on to become one of the driving forces behind the evolution of the World Wide Web[6]. Thus it was the home computer-based PlayNET that helped kick start today's online gaming culture (focused on games such as World of Warcraft as well as on increasingly popular free-to-play browser games) that spans social spaces across the planet.

The soft- and hardware of digital games have gone through quite an evolution in the past decades, and scholarly reflection is having a tough time keeping up. But just because games are well suited for rule processing, does not mean all games encompass digital realms. Board games have been played for thousands of years across cultures like analogue rule-processing machines that we players crank, metaphorically speaking, turn-by-turn, movement-by-movement. At the same time, athletic competitions continue to constitute an important aspect of Western civilization. But whether sport competition, computer game, or board game, at the heart of all those formalized, rule-based ludic activities that we call games, is play – an anthropological constant and a phenomenon that is, mind, not exclusive to humans.

If games are indeed architecture's final frontier, then this book aims to contribute to an architectural understanding and appreciation of play and games. The following problem statement details how this will be achieved.

3. Problem Statement

In the past, scholarly discourse has examined games and play, including digitally processed games, from many perspectives in an effort to explain them as cultural artifacts. The so-called narratologists have interpreted games as novel forms of narrative (Murray 1997; Manovich 2001) or texts to read (Bolter and Grusin 2000). The ludologists have insisted that games should be analyzed sui generis (Aarseth 1997), being mainly systems of rules that govern play, regardless of whether they are digital or analogue (Salen and Zimmerman 2004). Others have suggested a middle ground, arguing that the dualism of narratology-ludology is quite artificial and asserting that a ludological perspective cannot exclude the narratological approach (Frasca 2003). Eventually, this approach was formulated into a model that analyzes videogames as a trans-medium that features both a set of rules and a fictional world (Juul 2005).

Thus digital games as cultural artifacts have been alternately understood as rule-bound ludic activities, interactive narratives, trans-medial combinations of the latter, or procedural environments composed of unit-operational software-based objects (Bogost 2006). Each of these attempts implicitly or explicitly assumes that games are, have, or take place in spaces. One could certainly agree that, for example, a rule-bound play activity must take place somewhere; that an interactive narrative immerses the player in a navigable story set in a certain place with certain spatial qualities; and that a unit-operational system creates an environment for the player to play in and with.

With the help of more than 140 authors, the book Space Time Play (Borries/Walz/Böttger 2007), co-edited by the author, has broken new ground and attempted to shed light on the relationship between computer games, architecture, and urbanism. So far, however, there is no in-depth treatise that aims to architecturally frame play and games as human practices in space and of space, examining the forms in which ludic activities take place. This book attempts to fill this gap in the academic discourse and to work towards a ludic architecture, i.e. a comprehensive and critical discussion of play and games through the lens of architectural paradigms. Such a contribution is needed to accommodate the development of ludic architectures, particularly when they extend into the physical world as in the REXplorer example.

The questions that can help guide us in framing such a ludic architecture include:

- What are the parameters of a conceptual space of play, and how can we consider play as an architectural category? How is play architected? How does it relate to

space, and how does it produce space?

- **What are the parameters of a conceptual space of digital games – what can we gain from locative, representational, programmatic, dramaturgical, typological, perspectivistic, form-functional, technological, and phenomenological approaches in research literature? Are these approaches adequate for our overall task?**
- **What does a sketched analytical framework for games-as-architectures sui generis look like?**
- **In what prototypical spatial types are play and games rooted – what could we learn from these types via critical and episodic inquiry informed by the parameters mentioned above?**

4. Methodology and Overview

This treatise on the nature of ludic architecture is structured as follows:

- **In the first section, PLAYSPACE, we examine the conceptual space of play, seeking to define dimensions that are relevant in looking at play as an architectural category. We differentiate this conceptual space into an ambiguity dimension, a player dimension, a modality dimension, a kinetic dimension (wherein we strive to define play as a relational human practice in space), an enjoyment dimension, and, eventually, a culture and context dimension.**
- **In the subsequent section, GAMESPACE, we first consider play as an essential part of games and vice versa. We then review and update existing notions of space and spatiality in digital game (design) research as well as notions and applications of games in architectural research with the goal of mapping a conceptual gamespace. Finally, we sketch out a preliminary analysis framework for investigating the spatiality of games, in which the playspace and gamespace dimensions are set into relation.**
- **In PLAY-GROUNDS: AN ARCHAEOLOGY OF LUDIC ARCHITECTURE, we apply this framework to critically and essayistically discuss "play-grounds", i.e. prototypical and historically persistent spaces of play and gameplay before and beyond the digital game. These play-grounds are connected by conceptual links that can be explored by users/readers and implicitly suggest ludic trajectories and a spatial discourse.**
- **We conclude this work with the GAME OVER! INSERT COIN section, which offers a summary of our findings and an outlook.**

5. Significance and Contribution

This book, which frames play and games architecturally, contributes to a number of fields:

- **The disciplines of Game Studies and Game Design, as well as related entertainment media and entertainment technology industries.**
- **The disciplines of Architecture & Computer Aided Architectural Design (CAAD), contemporary Urban Planning theory and practice, and related industries.**

It is hoped that this treatise will help bridge the fields of Architecture and Game Design to the extent that academia will be able to increasingly work at the intersection of both disciplines. Some rough guidelines for achieving joint progress in an academic context are offered below:

- **Throughout their university training, architectural students should be taught to consider games as dynamic, innovative, and challenging architectural outlets that can be design results or components of the design process. The field of CAAD in particular can benefit from games as tools and results; Walz and Schoch (2006) demonstrate how this can be achieved by examining a pervasive game class centered on a location-based learning and meeting game for students and faculty of the ETH Zurich that superimposed and accurately reflected pre-existing sites and usages. Other classes on games and architecture have been taught by the author at the Department of Architecture at the University of Stuttgart, resulting in a number of architectural theses that used game mechanics to create or even automate architectural space, cf. Walz (2006a). On the other hand, game design and development students as well as those students learning how to produce, sell or create art for games and other entertainment media should learn from the get-go to consider games in terms of spatial design.**
- **In the research context, academically-minded architects should take advantage of games and entertainment media beyond the visualization and performance power of game engines in order, for example, to investigate how a building or a location can become an interactive partner or a narrative to be explored over time – as in a**

biofeedback game prototype in which the player is connected to a physical space's functionalities (Walz et al. 2005). At the same time, research in entertainment media and game design can benefit from ludicly-inclined architects who conceptualize programs geared toward, for example, mobility, place-making, future learning, or problem simulation, regardless of whether the programs are executed virtually, physically, or in hybrid situations, using high or low technology.

PLAYSPACE

Playing is a special type of human activity – an anthropological constant. In order to think about the nature of play, we must clarify beforehand that there is, of course, a difference between the terms play and games, although languages such as French or German do not differentiate between the two. In German, there is only one noun, Spiel, which is used when speaking of both game and play, and one verb, spielen, meaning both to play and to play a game. Our discussion of play in this book is based on the assumption that play is the foundation of a game, and that neither can exist without the other.

We look at games and play as human practices in space, and in doing so, initially examine play in the context of architecture. What are the parameters of play? To what practices does play give rise? How do we design the space of play, and how does play relate to games? What are, in total, the dimensions of a conceptual playspace?

In this section, we outline the dimensions of this conceptual playspace in order to move closer towards answering these questions. The approaches applied vary and include theories and findings from a variety of fields so that throughout the course of the examination, we develop our own definition of play by way of the following subsections:

- **Play as ambiguous category: The ideologization of the term play is discussed, on the one hand following up on a prevalent academic discussion initiated by Sutton-Smith (1997), and on the other hand underlining that play is subject to contextual and rhetorical uses all across the sciences.**
- **Play as subjective experience: Without the player, there is no play in space, and when designing (game)play, participatory design methods are crucial to creating an enjoyable ludic activity (Fullerton 2008). This subsection elaborates on both these assertions.**
- **Play as modality: Beyond the subjective experience, play takes place either in a physical, imaginary, virtual, or hybrid setting. A model inspired by Bartle (2004) is introduced that organizes these aspects of playspace.**
- **Play as rhythmical kinesis: In this subsection, we develop an architecturally-framed definition of play. Towards this end, we briefly consider notions of movement and rhythm in architecture before examining dance as movement because it allows us to speak of both a spatial and a playful activity. Eventually, with the help of Game Studies pioneer Buytendijk (1933), we propose looking at play as a particular kind of rhythmic movement that can be physical or virtual and that connects the player with the play-environment and a play-other. This way of looking at play allows us to think and speak of it in terms of space and architecture.**
- **Play as enjoyment: Against the backdrop of our kineticist model of play, we reflect on and cross-compare pedagogical, anthropological, and game design taxonomies of play stimuli and player types (e.g. Fritz 2004), deriving an extended model of play pleasure. In addition, we review representative aspects of play enjoyment, including absorption and perceived difficulty.**
- **Play as designed phenomenon: We discuss, representatively, how given physical environments are perceived to be play-suitable and feature positive valence (Hendricks 2001).**
- **Play and games – games and play: We elaborate on the interrelation of play and games in order to bridge to the following section, in which we scrutinize both the formal nature and spatiality of games.**

Taken as a whole, this section prepares us to identify and review existing concepts of space and spatiality with regard to games. In this context, games are understood as formalized systems of play.

1. The Ambiguity Dimension

In the past, the phenomenon of play has been investigated by many scholars from a wide variety of fields. In Homo Ludens, cultural anthropologist Johan Huizinga argues that human culture itself bears the character of play, suggesting that play is not only of