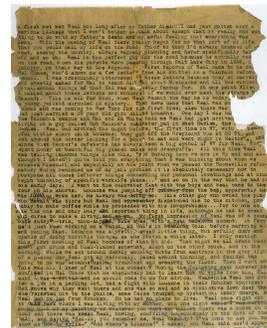
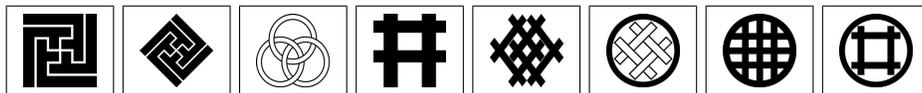


part v. game development

man is a playful animal
johan huizinga



11. game technology for serious applications
12. towards an aesthetics for interaction



2

reading directives In the final two chapters of this book, we will look at game development, with an emphasis on both implementation and design. In particular, we will discuss the motivation for using game technology to develop serious application, which in summary may be characterized as the requirement to allow for *immersion*, understood as experiential involvement of the user.

Essential sections are 11.2, in which we describe the development of VU-Life using the Source Half-Life 2 SDK, and 12.1, which presents a semi-formal game model, that may serve as a reference for designing more complex games.

perspectives Game development is essentially teamwork, and generally involves both artists as well as more technical developers. In addition, with to the commercial impact of games, many factors influence the design and implementation of games. As a consequence, we may look at game development from (among others) the following perspectives:

- artistic – plot, narrative, style
- technical – choice of game engine (SDK)
- sociological – sharing within game communities
- tool selection – supporting the workflow
- commercial – success factors
- management – teamwork

It is only very recently that game development became a topic with academic credibility. From an academic perspective, game technology may be regarded as enabling technology, that is related to many areas of computer science, including graphics, computer organization, distributed systems and software engineering.

essay topics In accordance with the variety of perspectives, an essay may focus on the commercial aspects of games, or, for example, software engineering aspects, or the design of community games. Consider writing an essay about:

- the success of games – criteria for comparison
- game engine architecture – options for extensibility
- community games – models for sharing information

When writing, make sure that you provide enough information about the actual history of games. And, remind that games require real-time performance, whereas the movies that may have triggered your phantasy may get away with effects that require many hours of processing. Afterall, games are about interaction!



the artwork

1. manuscript – used as a desktop by my favorite student.
2. signs – abstract symbols, Signs, p. 214, 215.
3. photographs – Jaap Stahlie¹, commissioned work.

¹www.jaapstahlie.com

11. game technology for serious applications

immersion does not require illusion but involvement

learning objectives

After reading this chapter you should have an idea how to approach the development of a moderately complex game, and you should also be able to discuss the notion of immersion and argue why using game technology is relevant for serious applications.

Game playing is fundamental to human life. Not only for entertainment, but also to acquire the necessary skills for survival. Game playing can take a variety of forms, but nowadays the dominant game paradigm is undoubtedly the interactive video game, to be played on a multimedia-enhanced PC or game console. Currently, games are being (re) discovered in the academic field, another serious areas of society, as excellent means for both the transfer of knowledge and, perhaps more importantly, for attitude change.

In this chapter we will look at the various issues in developing a game, and more specifically, in section 11.2 at requirements for a promotional game for our faculty and the issues that came up when giving a masterclass game development for high school students using this game. Finally, we will sketch the history of immersive systems, in particular panoramas, in section 11.3, and we will discuss how immersion is to be realized in a game context.



11.1 constructing a game

Since ancient times, games have been an essential part of culture. According to Huizinga, game playing is not merely meant for entertainment, but is (one way or another) fundamental for our survival:

... in the game we confront a function of the living creature which cannot be determined either biologically or logically ...

As a terminological aside, in the english language there is a distinction between *play* and *game*. The difference seems to be primarily that a game is subject to additional rules, which determine the success in the game, whereas play seems to be less constrained and more phantasy-driven. In addition, games seem to have a competitive element, a challenge, where you may either win or lose.

Anyhow, as observed in Kress and van Leeuwen (1996):

visual culture

games are an increasingly important element in our visual culture.

Nowadays, with rapid advances in technology, the game industry is said to be overtaking both the film industry as well as the software industry, in terms of total budget. This situation has a somewhat paradoxical effect on game development, however. On the one hand, it is more easy to develop a game, considering the great variety of tools and technologies that are available. On the other hand, to make a successful game has become more difficult, since the competition is much more harsh and does not allow for amateurism. Nevertheless, game development is worthwhile in itself, even if it does not lead to economic success. As a computer science or multimedia student, you should at least be familiar with the process of game development, and gain experience with (a selection of) available game technology.

game engine component(s) Game development covers a wide range of activities, and although preferably done in a team, requires a correspondingly wide set of skills, artistic as well as technical. When speaking about *game programming* it is important to make a distinction between:

- game play programming
- game engine programming

Game play programming, usually, consists of scripting the behavior of characters or elements of a game scene, using a scripting language such as, for example, Lua². It may considered to be part of game design, and certainly requires an artistic approach.

In contrast, game engine programming is a much more technical activity and concerns the development of functional components of a *game engine*, which according to Sherrod (2006) encompass:

game engine component(s)

- rendering system – 2D/3D graphics

²www.lua.org

- input system – user interaction
- sound system – ambient and re-active
- physics system – for the blockbusters
- animation system – motion of objects and characters
- artificial intelligence system – for real challenge(s)

Although it is possible to build one's own game engine using OpenGL or DirectX, or the XNA³ framework built on top of (managed) DirectX, in most cases it is more profitable to use an existing game engine or 3D environment framework, since it provides the developer with a load of already built-in functionality. In section 4.4, a brief comparative overview of game engine(s), that may be used to built virtual worlds, has been given. This overview did not include the flex 2 SDK, nor related flash engines, that may be used for the development of online (flash) games.



2

elements of game design Game development projects are similar to multimedia projects, or for that matter software development projects, in that they may be sub-divided in phases covering the definition of requirements, the actual development, as well as testing and delivery. However, instead of looking at these phases, or trying to explicate the differences between software development and game development projects, it seems to be more worthwhile to look at what characterizes game development, and, as a consequence, what must be the focus of game design.

Eventhough the question *what is a good game?* is rather elusive, it is evident that a game must be fun to play! When creating a game, we may according to Schuytema (2007) capture fun in two areas:

fun

- in the general flow of the game experience and
- in the individual moments during a playing session.

which, together, determine the player's unique experience in playing the game.

As a first working definition, Schuytema (2007) states:

³msdn.microsoft.com/directx/XNA

a game is a series of processes that takes a player to a result.

which covers both the skill aspect of game playing, as well as the fact that a player generally must make a series of decisions. Refining this initial definition, Schuytema (2007) proposes to characterize a game as follows:

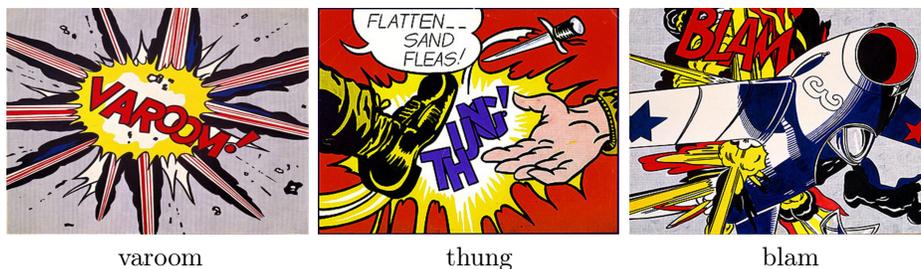
interactive electronic game

A game is a play activity comprised of a series of actions and decisions, constrained by rules and the game world, moving towards an end condition. The rules and the game world are delivered by electronic media and controlled by a digital program.

The rules and game world exist to create interesting situations to challenge and oppose the player. The player's actions, his decisions, excitement, and chances, really, his journey, all comprise the "soul of play".

It is the richness of context, the challenge, excitement, and fun of a player's journey, and not simply the attainment of the end condition that determines the success of the game.

Although this definition could certainly be improved in terms of conciseness and clarity, it does cover the main characteristics of game playing, in particular *context* and *challenge(s)*.



varoom

thung

blam

3

With respect to challenge(s), we may observe that these may take the form of *occasional battle(s)*, as we have called them in the PANORAMA application, discussed in section 5.4. A battle may be characterized by the following conditions:

battle condition(s)

- confrontation on well-established area
- delimited in space/time
- audience/participants who judge victory/loss

It is in this context interesting to note that being mentioned in the *hall of fame*, that is a list of players with the highest scores, seems to be an intrinsic motivation for players to frequently return to the game, either to acquire or maintain a position on that list.

The actual development of a game is a complex process, and, in our experience, for each game unique, since there are many forces influencing a project.

Nevertheless, whether you work on your own or in a team, inevitably the following aspects or roles have to be taken in consideration:

design team role(s)

- manager(s) – keep everything together
- producer(s) – maintaining focus
- programmer(s) – solve problem(s)
- tester(s) – control quality
- designer(s) – elaborate idea(s)

In our experience, for example in developing VU Life, that we will discuss in section 11.2, one person may take up several roles, but at some point it becomes clear what the strength(s), and for that matter weaknesses, of each individual participating in the project are.

history of game(s) There are many overviews of the history of (video) games, for example at wikipedia⁴. One overview that takes an interesting technological perspective is worth mentioning. Sanchez-Crespo Dalmau (2004) distinguishes between eight phases, where each phase is characterized by one or more unique technical development(s):

history

1. phase i: before space war – hardwired
2. phase ii: spacewar on atari – console with game
3. phase iii: game console and PC – separate game development
4. phase iv: shakedown and consolidation – player code in data files
5. phase v: advent of the game engine – user level design
6. phase vi: the handheld revolution – the GameBoy
7. phase vii: the cellular phenomenon – larger installed user base
8. phase viii: multiplayer games – from MUD to Everquest

For those interested in more details, Sanchez-Crespo Dalmau (2004) provides as characteristic examples for each phase the following (additional) data: 1) tennis for two William Higinbotham Brookhaven National Labs New York, 1950' 2) Steve Russell, 1961, MIT, spacewar, two player game on Digital PDP-1 3) Atari VCS, Apple II, IBM PC (Dos) 4) Donkeykong, Pacman -> Nintendo 5) Doom -> Valve Halflife 6) Gameboy with well-established collection of game 7) NTT Docomo I-Mode, Samurai Romanesque 8) MUD (1979), MULE (1983), Ultima/Everquest 1600 hours/year.

⁴en.wikipedia.org/wiki/History_of_video_games



4

Technical progress does not stop here. Two developments worth mentioning are the rise of Second Life as a 3D immersive interface to the web, and the recent availability of a new 3D engine for flex 2, PaperVision3D⁵, both of which may influence the choice of (online) game platform(s) for the near future. Another development that we may expect for the near future is according to Sanchez-Crespo Dalmau (2004): *a truly cinematic gaming experience*.



Screens from Samurai Romanesque.

5

example(s) – *samurai romanisque*

Samurai Romanesque, available on Japan's NIT DoCoMo packet-switched i-mode network, is an example of a mobile game with a large following. This massive multi-player game is developed by the Japanese game developer Dwango. It runs

⁵papervision3d.org

on the Java 2 platform Micro Edition (J2ME). Players take, as we read in Krikke (2003) a virtual journey through 15-th century Japan, engage other players in real-time battles, visit historical towns and villages, practice the art of Zen, engage in romances and even can have children. This massive multiplayer role-playing game can accomodate up to half a million players, and is accounted to be a huge success in Japan. *Samurai Romanesque* is an example of a mobile game incorporating features such as position awareness, player history, chatting, and effective graphics. In Krikke (2003), it is further explained how the technology with which the game is implemented positions itself in the *battle for mobile cyberspace*.

research direction(s)– *serious games*

Serious games are here to stay. Currently there is for example already a great offer of business management games. When googling on *game*, *business*, and *management*, we find, among many other offerings games to train leadership⁶ (which provides urgent problem situations in a variety of areas, including military and health care applications), and entrepreneurship⁷ (which provides a eight round cycle of sessions instruction how to start a business, get clients, etc., with extensive feedback in the form of reports and comments after each round). A general observation we may make here is, however, that the games we have seen so far primarily focus on functionality and offer at best an efficient interface, which we do not find very appealing from a more artistic perspective.

There are many (more) resources on serious games⁸. To indicate what it is all about, we present a quote from virtual heroes⁹:

Serious games and simulations are poised for a second revolution. Today's children, our workforce and scientists are increasingly playing, learning, and inventing in visually intensive "virtual" environments. In our increasingly experiential economy, immersive educational and training solutions are needed to advance the workforce of tomorrow. Game-based learning and technologies meet this challenge.

However, regardless of the fuss being made, apart from the euphorics their is little attention to determine in a more scientific way what the actual value of the game is in the learning process, and what elements or aspects of the game contribute to the learning experience. To provide such a foundation, we will propose a game reference model in section 12.1, that we have applied to formulate criteria for effective service management games in Eliens & Chang (2007).

There is a wide choice of technology available for the realization of serious games. For example, in the *climate game* project, we did explore various technologies, including interactive video with flash, as well as the use of the HalfLife2 game engine, with which we gained experience in developing a promotional game

⁶www.experiencepoint.com

⁷www.marketplace-simulation.com

⁸www.cs.vu.nl/~eliens/media/resource-serious.html

⁹www.virtualheroes.com

for our faculty, Eliens and Bhikharie (2006). With regard to the use of 3D we may remark that since ancient times a walk in space has served as a mnemonic device, and as such spatial memory may aid in retention and understanding, which might also provide a decisive argument for the use of 3D in a serious game, such as a service management game!

As explained in section 3.4, we found great inspiration for *Clima Futura*, our climate game, in *Peacemaker*¹⁰, that provided us with an example of how to translate a serious issue into a turn-based game

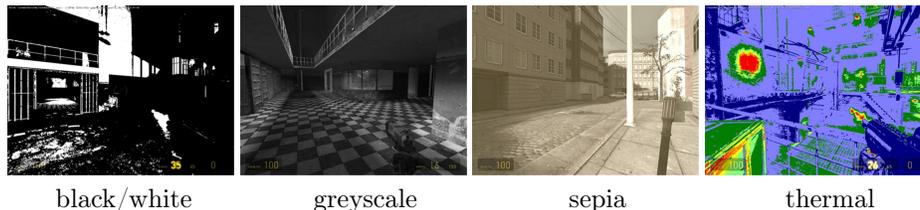
From an interview with the makers:

peace maker(s)¹¹

Q: With the lion's share of strategy games on the market being devoted to ending a conflict through violence, why was it important to you to emphasize the need for a peaceful solution?

A: When we started to work on the project and looked around at other video games, we encountered the notion that war is much more challenging and conflict is essential to engage players. Many people we talked to perceived peacemaking as mere negotiations, where a group of diplomats sit at a table for lengthy discussions and sign agreements. We tried to shed light on what we see as the other side of peacemaking how challenging it is for a leader to gain trust and understanding in the face of constant violence. How difficult it is to execute concessions, while your own population is under stress or feeling despair. In a sense, peacemaking can be more complicated, sophisticated and rewarding than war making, and it is a message that we would like to convey to young adults, the future generation of leaders.

In summary, *Peacemaker* covers both political and social issues, with appealing visuals, not sacrificing the seriousness of the topic. By presenting real-time events using video and (short) text, awareness is created by allowing a choice between the points of view of the various parties involved. Such awareness may lead to political action and will no doubt influence choices, also when it comes to issues of climate change. Essentially, serious games aim at attitude change, the rest follows automatically ...



black/white

greyscale

sepia

thermal

¹⁰www.peacemakergame.com

¹¹seriousgamessource.com/features/feature_071806_peacemaker.php

11.2 game @ VU

In June 2005 we started with the development of a game, nicknamed VU-Life 2, using the Half-Life 2 SDK. We acquired a Cybercafe license for Half-Life 2, with 15 seats, because we would like to gain experience with using a state-of-the-art game engine, and we were impressed by the graphic capabilities of the Half-Life 2 Source game engine. After some first explorations, we set ourselves the goal:

- to develop a game that could be used for promoting our institute, and
- to prepare a masterclass game development for high-school students.

Our first ideas concerning a game included a game in which the subject chases a target, a game where the subject has to escape, and an adventure game. In the end we decided for a less ambitious target, namely to develop a game which gives the subject information about our institute, by exploring a realistic game environment, representing part of our faculty. As an incentive, a simple puzzle was included which gives the subject information on how to obtain a 'hidden treasure', to be found in a specific location in the game environment.



7

With only about eight months time, we decided to do a feasibility study first, to gain experience with the Half-Life 2 SDK technology, and to determine whether our requirements for the game and the masterclass could be met. For the VU-Life 2 game, we can summarize our requirements as follows:

- the game must provide information about the faculty of sciences of the VU,
- the game environment must be realistic and sufficiently complex, and
- the interaction must be of a non-aggressive, non-violent, nature.

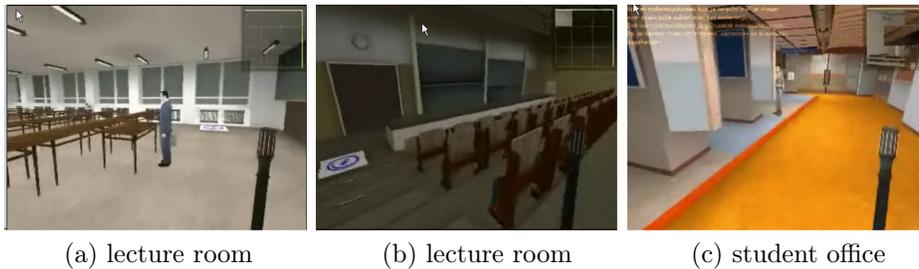
The last requirement has to do with the fact that the VU is by its origin a Christian university, so that any aggressive or violent interaction could hardly be considered to be an appropriate theme for a promotional game. For the masterclass, we stated the following requirements:

- it must be suitable for beginners, in particular high school students,
- it must explain basic texture manipulation, and
- offer templates for modifying a game level, and finally
- there must be a simple (easy to understand) manual.

The format for a masterclass for high-school students at our institute is three times two hours of instruction. The goal is to attract (more) students for the exact sciences. However, if the masterclass would be too complex, we would run the risk to chase potential students away, which would be highly counter-productive.

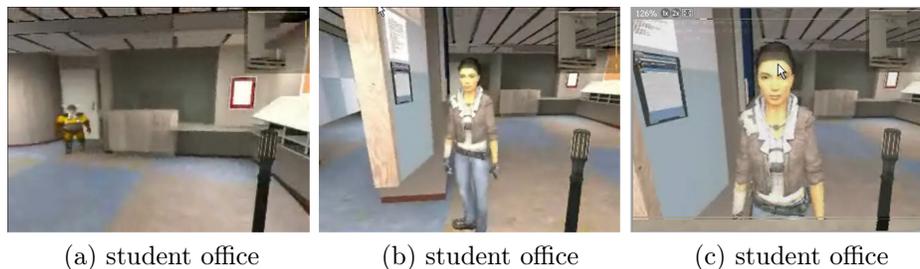
VU-Life 2 – the game

To give an impression of the game and how we used the Source game engine and the associated Half-Life 2 SDK, let's start with a typical game scenario, illustrated with a walkthrough.



8

When starting VU-Life 2, the player is positioned somewhere in the game environment, such as a lecture room.. In the front left corner of the lecture room, middle right of left screenshot in the figure above, there is a place marked as an information spot. The information spot corresponds with one of the nine in the top right of the screen. The player is expected to detect this correspondence by exploring the game environment. The nine squares together form a puzzle, indicating, when all squares are filled, where the hidden treasure can be found. In other words, when the player visits all the nine information spots contained in the game environment, the player has solved the puzzle and may proceed to obtain the hidden treasure.



9

To visit all the information spots, the player has to explore the game environment, including another lecture room, the student administration office, and the student dining room. While exploring the game environment, the player may read information about the curriculum, meet other students, and encounter potentially dangerous individuals.



10

As illustrated in the figure above, the puzzle squares will gradually become filled, and when complete, the combined puzzle squares will indicate the location of the hidden treasure, which is the 7th row of chairs of the lecture room depicted previously.

Despite the fact that we intended to create a non-violent game, we must admit that the hidden treasure actually consists of obtaining the power to use weapons. From our observations, and this was exactly what motivated us to include this feature, the use of weapons proved to be a most enjoyable aspect for the high school students playing the VU-Life 2 game, in particular when allowed to play in multi-user mode.

using the Half-Life 2 SDK – technical issues

The VU-Life 2 team had no prior experience with the Half-Life 2 Source SDK. Therefore we started by exploring three aspects of the Source SDK: level design with the Hammer editor, making game modifications, and importing (custom) models into Half-Life 2. During the exploration of these aspects we came across various technical issues, which we will discuss below.

level design First, we made various smaller levels. Each level was compiled and tested separately so that it worked fine as a standalone level. The idea was to combine them, that is to create one large world containing the smaller levels. However, the initial coupling caused several compiling errors. After analyzing the errors, some important restrictions for building (large) levels became clear.

In the second part of the level compilation process called VVIS, a visibility tree of the level is made. This tree is used to tell the renderer what to draw from a given (player) viewpoint in the level. The amount of used brushes (the default shapes for creating a level) determine the size of the visibility tree. The

bigger the tree, the longer VVIS will take to build the visibility tree at compile time and the more work the renderer has to determine what to draw at runtime. Therefore, the standard brushes should only be used for basic level structure. All other brushes that do not contribute to defining the basic level structure should be tied to so-called *func_detail* entities. This makes VVIS ignore them so that they do not contribute to the visibility tree, thus saving compiling and rendering time.

In addition, there is a (hardcoded) maximum to the number of vertices/faces you can use for a level. Each brush-based entity contributes to the number of vertices used. It is possible, however, to reduce the number of vertices used by converting brush-based objects to entities. This is done outside of the Hammer level editor with the use of 3D modelling software and the appropriate conversion tools.

With the above mentioned restrictions in mind we were able to create a relatively large level that more or less realistically represents the faculty of exact sciences of the VU campus. The key locations, as partially illustrated in the figures above, are the restaurant, lecture room S111, lecture room KC159, student office(s), and the multimedia room S353.

To give an impression of the overall size of the *VU.vmf* game level, as map information we obtained 6464 solids, 41725 faces, 849 point entities, 1363 solid entities, and 129 unique textures, requiring in total a texture memory of 67918851 bytes (66.33 MB).

game modifications Since a multi-user environment was required. we chose to modify the Half-Life 2 Deathmatch source code, The biggest challenge for modifying the code was finding out how to implement the features for VU-Life 2. To this end, relevant code fragments were carefully studied in order to find out how the code is structured and works. Furthermore, by experimenting, it was possible to get the features working. Below is a list of features for the VU-Life 2 Mod.

- *player properties* – players start out immortal, meaning that they cannot "die" while exploring the world. Furthermore, continuous sprinting is enabled, which allows the player to walk around faster.
- *puzzle HUD* – when the player starts out, the puzzle HUD is the only HUD element displayed.
- *puzzle setter* – allows puzzle parts to be displayed on the puzzle HUD.
- *weapon enabler* – allows weapons to be enabled/disabled for the player. Enabling the weapons also enables damage, and swithes from the puzzle HUD to the default Half-Life 2 HUD, which displays weapon and damage information along with a crosshair.

importing models Getting a model into the Half-Life 2 environment requires two steps:

- the model must be exported to the custom Valve format *smd*

- the model must be compiled from *smd* to *mdl* format

The first step required finding the correct plugin that allowed a conversion to the *smd* format. The second step required using Valve tool *studiomdl* and defining a *qc* file, which is used to specify properties for the compiled model. The default Valve tool *studiomdl.exe* proved to be difficult to work with, because it requires a lot of parameters have to be set. By using the StudioMDL 2.0 GUI, compiling the *smd* file was very easy. It sets the appropriate parameters, allowing the user to focus on the compiling of the model.

the masterclass – instruction and assignments

The masterclass consisted of three sessions, two hours each. In the first session, the (high school) students were given an overview and general instructions on how to accomplish the assignments, and were then set to play the VU-Life 2 game.

The assignments, as already indicated previously, were:

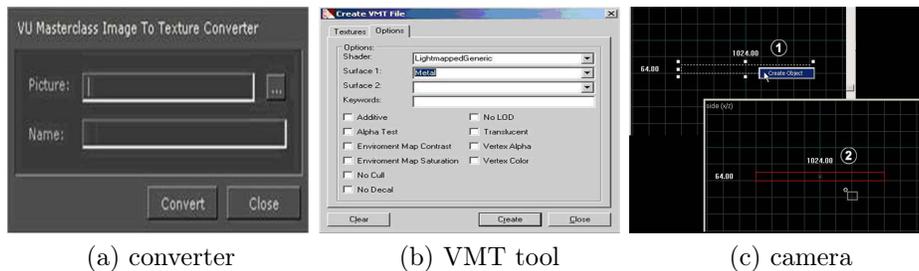
1. to modify an existing game level by applying different textures,
2. to create objects within an existing game level, and
3. (for advanced students only) to create a new level.

More complex assignments, such as creating a Mod, were considered to be outside of the scope of this masterclass.

The overview and instructions given in the first session included:

- an overview of the history of games,
- a general introduction on modelling characters and objects,
- the use of the Hammer editor, and finally,
- an explanation of the assignments.

The history of games encompassed historic landmarks such as Pong, Tetris and The Sims, as well as a brief discussion of current games like Worlds of Warcraft, and Half-Life 2.



(a) converter

(b) VMT tool

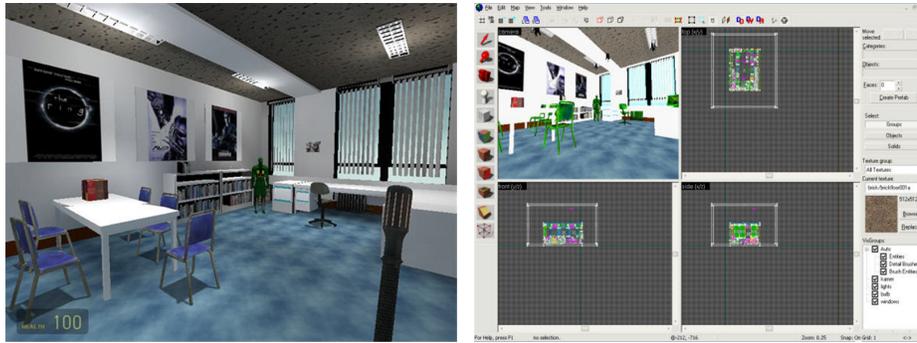
(c) camera

In the introduction on modelling an overview was given of the major tools, like Maya and 3DSMax, as well as a brief explanation of notions such as vectors, polygons, textures, lights, and skeleton-based animation.

Both the explanation of the use of the Hammer and the assignments were explicitly meant as a preparation for session two, in which the students started working on their assignments.

In addition to the oral overview and instructions, the students were given a manual, that was made available in paper as well as online, to prepare themselves for the assignments. The homework for the second session was to make pictures suitable for the application as textures in the *masterclass room*, which is depicted below.

To allow the students to easily apply their textures, a texture conversion tool, was offered, that converts an image file into a texture for a particular location in the game level based on keywords, e.g. *mc_floor* for the texture on the floor of the *multimedia room*. Alternatively the students could use the VMT-Edit tool, and apply the texture using the Hammer editor.



(a) masterclass room

(b) room in Hammer editor

12

The introduction on how to use the Hammer editor covered the basic tools, including the

- *block tool* – for creating simple object,
- *selection tool* – to select objects for texturing,
- *entity tool* – to select dynamic or interactive objects, and the
- *texture tool* – to apply textures to an object;

as well as how to compile a level into a map ready for play, including an explanation of the BSP (world), VIS (visibility), and RAD (radiosity) components.

The students were explicitly told that the assignments did not involve any programming, creating game AI, or modelling. (To learn these aspects of game development, they were simply advised to sign up for our curriculum.) Instead, we told them, use your phantasy and be creative!

lessons learned

In the second session, the high school students started working with great fervour.

Somewhat surprisingly, all students worked directly from the (paper) manual, rather than consulting the online documentation, or the help function with the tool.



masterclass at work

13

In retrospect, what appeared to be the main difficulty in developing the masterclass was to create challenging assignments for every skill level. In our case, the basic skill level (modifying textures of a template level) allowed the high school students to start immediately. By having optional advanced assignments like creating your own objects, you can keep all students interested, since there are assignments to match the various skill levels.

competition To stimulate the participants in their creativity, we awarded the best result, according to our judgement, with a VU-Life 2 T-shirt and a CD with Half-Life 2. The results varied from a music chamber, a space environment, a *Matrix* inspired room, and a messy study room. We awarded the *Matrix* room with the first prize, since it looked, although not very original, the most coherent.

example(s) – *dead media*

In Zielinski (2006), the *dead media* project is described, in a way that deserves to be presented without any transliteration. The following quotes characterize both the *dead media* project, as well as its context and implications for our (notions) of culture:

civilisation

Media are special cases within the history of civilisation. They have contributed there share to the gigantic rubbish heaps that cover the face of our planet or to the mobile junk that zips through outer space.

dead media project

Together with like-minded people, in 1995, Bruce Sterling started a mailinglist (at that time still an attractive option) to collect *obsolete software*. This list was soon expanded to collect *dead ideas*, or *dead artifacts*, and systems from the *history of technical media*: inventions that appeared suddenly and disappeared just as quickly, which dead-ended and were never developed further; models that never left the drawing board; or actual products that were bought and used and subsequently vanished into thin air.

machines can die

Sterling's project confronted burgeoning phantasies about the immortality of machines with the simple facticity of a continuously growing list of things that have become defunct.

technology and death

Once again, romantic notions of technology and of death were closely intertwined in the *Dead Media* Project.

How romantic we are, may be felt most intensely when our favorite machine breaks down, or threatens to be destroyed. This occurred to me recently, tripping over an electricity wire, connected to a thinkpad notebook. A small domestic drama occurred, and not even the promise of an improved (tablet) version of the same notebook could drive away the atmosphere of sadness and loss. Fortunately, after some fiddling with a screw driver, the damage seemed to have been reduced to an occasional blue screen. Yet, the incident illustrates how deeply involved we are with our machines, even if by profession we should know better.

research direction(s) – *service oriented computing*

Currently, one of the leading open source game engines is Delta3D¹², which consists of a collection of (open source) software components, well-maintained by a team at the Naval Postgraduate School in Monterey (CA). This section, which was previously called *open source game development*, will look at the way existing game engines may be enhanced by using services, for example web services that may be invoked by a REST-protocol (using urls), SOAP (Simple Object Access protocol) or XML-RPC.

In Obrenovic & Eliens (2007), we present the following scenarion, or problem statement:

scenario(s)

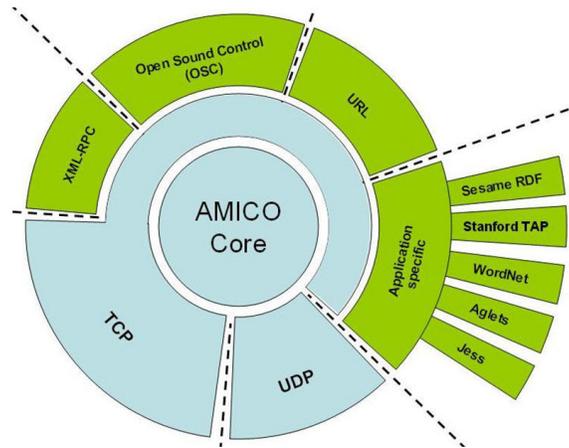
Michelle is a writer, and she writes a book about Dutch paintings. To collect necessary information, she analyses different sources about Dutch culture, many of them in Dutch language. However, being a beginner in Dutch, she often has to translate phrases from and to English. She also needs to find additional information about particular concepts and facts. Instead of using several tools, such as online dictionaries, definition books and search engines, she decides to compose a simple service that aggregates all the services she needs.

It should be not to difficult to think of similar scenarios in the context of games, for example language or culture training games. A generic solution to this type of scenario(s) is provided by AMICO¹³ (Adaptable Multi-Interface COmmunicator), which is, according to its developer Zeljko Obrenovic, a generic platform, used to support rapid prototyping with heterogeneous software services, Obrenovic & Gasevic (2007). AMICO is based on the publish-subscribe design pattern, which

¹²www.delta.org

¹³amico.sourceforge.net

is well suited for integration of loosely-coupled components, and often used in context-aware and collaborative computing. A publisher updates a shared data repository without being concerned with whether any subscribers are listening for updates. In the loosely coupled model, components can run on different machines in a distributed environment. An architectural overview of AMICO is given in the figure below.



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Our example scenario illustrates the integrated usage of various software components and services. Service-oriented computing (SoC) has a relatively long history, and may be regarded to have its roots in object-oriented software development, to the extent that services can be considered as components which offer their functionality at a sufficiently high level of abstraction. [Eliens2000]. Services provide higher-level abstractions facilitating implementation and configuration of software applications in a manner that improves productivity and application quality. Most of the existing work in SoC is concentrated on Web services, which is often seen as a main way to bring business to the Web [Blevec07]. Service-oriented computing is, however, not limited to Web services, but embodies key principles such as loose coupling, implementation neutrality, flexible configurability, persistence, granularity, and teams. Services provide higher-level abstractions for organizing applications for large scale, open environments. Adding service abstraction on top of heterogeneous open-source components, for example, enables their easier integration with other systems [Obrenovic07b]. In the category of service-oriented computing solutions, we distinguish between 4+1 dimensions:

dimension(s)

- scope – individual vs. corporate
- platform – local vs. web-based
- functionality – data aggregation vs. interaction
- developers – end-user vs. professionals

Additionally we address the issue of

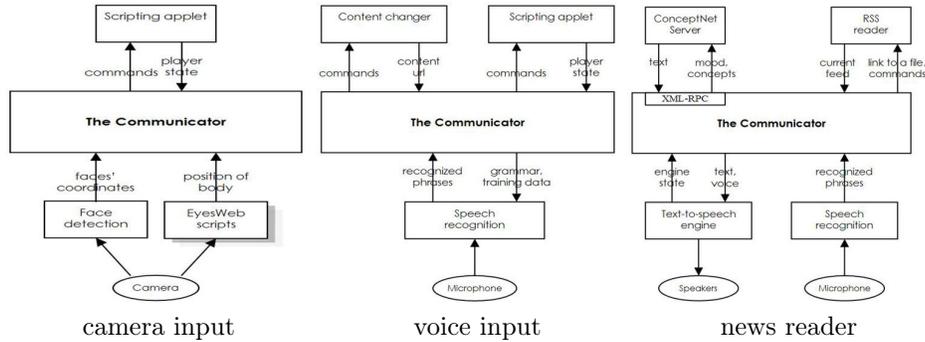
- licensing – OS vs. proprietary

Dependent on how a particular application is positioned in the category of service-oriented computing solutions, different issues play a role. For example, for corporate applications, security is of vital importance. In our approach, which is more targeted to the individual end-users, security plays as consequently less important role. However, other issues, such as time-management, are crucial. We introduce the licensing dimension to emphasis that only a very limited number of the solutions available for the construction of (primarily web-based) services and mashups is available as an open-source projects [Mashups]. In a general fashion, service-oriented computing requires three mechanisms, or layers of functionality;

service-oriented computing

- service brokering – to connect services,
- service adapters – to transform data, and
- integration mechanisms – to deploy services.

Traditionally, due to their complexity, these layers of functionality necessitated the help of professional developers with expertise in CORBA, COM or more recently SOAP, to construct suitable end-user applications. However, with the recent surge of web-based services, exemplified in the increasingly growing number of mashups, service-oriented computing seems to have come closer to end-users. That is end-users with non-trivial programming or scripting skills. For example, some of the existing end-user environments support extension of functionality by providing an access to Web services. Excel's Web Services [ExcelWS], enable end-users to create a code wrapper for Web services, and use functions from this wrapper within the spreadsheets. Limited forms of combinations of EUD and SoC can be found in Web based spreadsheets, such as Google spreadsheets [GoogleSS]. These environments enable receiving updates from remote sources for small number of predefined data types, such as stock prices and currency exchange rates. As a relatively new phenomenon, mashups introduce end-user service integration to create composed website or application that combines content from more than one source into an integrated experience, usually with a end-user interface. Content used in mashups is typically sourced from a third party via a public interface. Other methods of sourcing content for mashups include Web feeds (e.g. RSS or Atom), web services and Screen scraping. Many people are experimenting with mashups from Google, eBay, Amazon, Flickr, Yahoo [YahooPipes]. Although the dividing line between end-users and professional developers seems to become blurred, for example where end-users learn how to use scripting languages, we wish to emphasize that our notion of end-users is quite strict. An end-user should not be assumed to be able to do any scripting beyond simple formulas and an occasional conditional expression using the IF-THEN construct.



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In comparison with the existing solutions, AMICO has a wider scope than most web-based mashups or EUD integration platforms, since it supports not only data-aggregation but, as illustrated in the figure above, provides support also for additional services, including interaction facilities involving speech recognition and TTS output. Yet, it is primarily aimed at individual users, supporting the integration of services for which both a service connection as well as data transformation functionality is available.

End-user development, as we will argue in section 11.4 becomes even more urgent, where much of the content and functionality is actually provided by (a community of) users. How to provide a generic solution for user-added game content is however still an open problem, for which the service-oriented computing paradigm, however, seems to provide promising solutions.

11.3 immersion is not illusion

We live in a media-rich culture, full of images and audio-visual stimuli. Somehow, we never seem to get enough of that, and after a day of work, sitting in front of a computer screen, we still explore youtube.com for more exciting clips. The need for such audio-visual stimuli is not surprising, when you consider the high visual complexity of our daily (urban) life. The ability to process (visual) data quickly, seems to be a vital condition for our survival in the information society, where reality becomes an ephemeral phenomenon, as it is increasingly represented by images.

Images have a special status in our (western) culture. As Roland Barthes said, cited from Kress and van Leeuwen (1996):

analogon of reality

Certainly, the image is not the reality but at least it is its perfect *analogon* and it is exactly this analogical perfection which, to our common sense, photography. This can be seen as the special status of the photographic image, it is a message without a code.

In the light of our observation(s) on *re-mediation*, in section 2.3, it is no surprise that early computer graphics took photo-realism as a benchmark. In an

extremely well readable discussion (with examples) on *video game aesthetics*¹⁴, David Hayward observes that *depending on your point of view, photo-realism is either a scourge or a grail*. The main tendency seems to be towards ultra-realistic cinematographic visuals. However, fortunately, there are many examples where an aesthetically more viable approach is taken, either by introducing cartoon-style elements, or by abstractions surpassing photorealism.

As member of the *creative industry*, that is multimedia or game developer, you will contribute to our visual culture, and hence it is worthwhile to reflect on what underlies the construction of images and (visual) narrative(s): such as *perspective, modality* and *composition*.

Perspective is fundamental in our understanding of images. Interestingly, it is a relatively new discovery, Alberti, dominating our visual culture from the days of the *enlightment* until now, despite artistic revolts of the 20th century. As we observed in section 9.4, the notion of perspective describes both

perspective(s)

- the organisation of the image, as well as
- the (optimal) point of view of the viewer.

The intricate relation between viewer and image, dependent on perspective, implies that when looked at from the 'wrong point of view', there will be a distortion of the image. The 'normal' perspective, as we know it, is the 'central' perspective. Variants of perspective, such as the anamorphism depicted below, force the viewer into an abnormal point of view, Anamorphisms. Better viewed online, watch it from the right, with you head close to the paper/screen.



16

In a multi-dimesnional space often a change of perspective, that is another point of view, brings to light many new aspects, not previously seen, or, in some cases, the correction of a reducing or distorting projection. Instruction in drawing perspective, by constructing a horizon with so-called *dis-appearance* points, used to be a standard element of art-school curricula, until recently.

Another interesting aspect of images is *modality*. The notion of modality may be implicitly characterized by using a quote from Kress and van Leeuwen (1996), where they discuss the *realism* of documentary film:

realism

... documentary modality of black and white realism ...

¹⁴modetwo.net/users/nachimir/vga

In a similar way, cartoons may be said to represent a particular *modality*, although not so much as a kind of realism, but rather as commenting on a situation, in a comic, or perhaps sarcastic or ironic way.



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More in general, (visual) modality may be considered to be part of a visual grammar, that, one way or another, defines the meaning of the image(s) of our culture: According to Kress and van Leeuwen (1996):

visual grammar

grammar goes beyond formal rules of correctness. It is a means of representing *patterns of experience*. It enables human beings to build a mental picture of reality, to make sense of their experience of what goes on around them and inside them.

In section 9.3, we have discussed features of PANORAMA that were inspired by compositional elements of the visual grammar proposed in Kress and van Leeuwen (1996). There we observed that, however helpful these notions were, some cultural relativism is necessary, because the meaning associated with visual elements and their composition does not adhere to universal truth(s), but is rather the result of social processes involved in the construction of meaning.

Interestingly, panorama displays, from which we took inspiration for our system supporting social awareness (PANORAMA), were wide-spread popular art-form of the 19th century. In a discussion of the origins of virtual reality, Grau (2003) observes

virtual reality

the idea of *virtual reality* only appears to be without a history: in fact, it rests firmly on historic art traditions, which belongs to a discontinuous movement of seeking illusionary image spaces.

Linear perspective, as well as (perspective-related) atmospheric painting techniques (think of fog in CG terms), contributed significantly to the success of the immersive image spaces of the panorama displays of the 19th century. Often the panorama displays were not realistic in a social or political sense, though. For example, the Mesdag Panorama depicted a rustic image of the Netherlands, that in that time already had been destroyed by industrialization and urbanisation.

More in general, we may ask: were these panorama displays art? Grau (2003) unambiguously states:

immersion

the concept of immersion when implemented as an artwork surrenders most of the essential properties of an artwork.

Although a discussion of what constitutes the essential properties of artworks is far beyond the scope of this manuscript, it is interesting to look at what properties an artwork may have, which according to Grau (2003) encompass:

properties of artwork(s)

- *form* – aesthetic whole
- *structure* – organisation of elements
- *function* – context of display
- *processuality* – (implicit) narrative structure
- *statement* – existential/political implication(s)

Both multimedia applications and games, one way or another, share these functions with art. Where art is probably most distinct is in the existential implications, that is the way it makes a statement about our condition of being. Nevertheless, in a somewhat different way, als games, whether serious or not, do have implications with respect to our existence, and may be taken as a comment on our existence or an appeal to change our attitude towards it. From a more educational perspective, we may observe, following Grau (2003), that

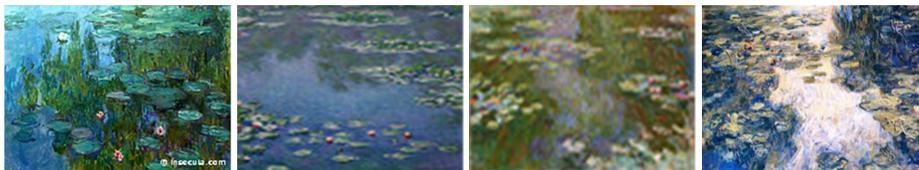
collective memory

it is an apparent feature of the concept of immersion that it engages with the spatial and pictorial concentration of the awareness of one's own people, the formation of collective identity through powerful images that occupy the function of memory.

In other words, the media have a strong impact on what we consider to be part of our domain of living. However, evidently in our current visual culture, and as anyone famaliar with for example the VJ-culture can testify to, representation of meaning is not the primary target. As eloquently expressed in Grau (2003):

ecstatic transport

using contemporary image techniques, immersive art very often visualizes elements that can best be described as Dionysian: ecstatic transport and exhilaration.



From a more epistemological perspective, reflecting on how we gain knowledge of the world around us, we may ask (ourselves) what role the media play in defining our reality. And as a consequence of the observations above, what is the meaning

of this *ecstatic transport*, induced by the variety of audio-visual effects enabled by our new technologies?

With respect to the notion of *realism* Kress and van Leeuwen (1996) observe:

realism

a *realism* is produced by a particular group as an effect of the complex of practices which define and constitute that group.

Basically that means that *realism* is a neutral term, that is anything may be considered to be *realistic*, as long as it is supported by a group or community. This as a remark, should make us careful in denouncing particular styles as *naive*, as for example has been done with african art. Extrapolating this relativistic notion of *realism* to the commonly used notion of *naturalism*, Kress and van Leeuwen (1996) state:

naturalism

each realism has its *naturalism*, that is a realism that is a definition of what counts as real, a set of criteria for the real, and it will find its expression in the *right*, the best, the most *natural* form of representing that kind of reality, be it a photograph or a diagram.

Indeed, for a scientist a diagram may be more natural than a colorful depiction of atmospheric pollution!



19

Let's return to the observation with which we started this section:

dominant paradigm(s)

the dominant standard by which we judge visual realism (and hence *visual modality*) remains for the moment, naturalism as conventionally understood, *photorealism*.

To make things slightly more complex, we may add that the *visual modality* is the dominant modality of our culture, which means that we pay more attention to what we see than what we hear. According to feminist criticism, this may be de-constructed as expressing male dominance, which puts higher value on the ability of sight, than of touch and the perception of sound. Whether this is true, and if so why, I leave to your own research. Apparently, this might have a cause in our need(s) for survival, where hunting was (once) more important than anything else. Think about how our need to be partially aware of everything, as discussed in section 9.4, might be related to that.

To conclude this section, let's briefly consider what is involved in creating an immersive application such as PANORAMA, or slightly more general, what

is involved in what Sidney Fels in a UIU04 keynote called *designing intimate experience(s)*. A key observation here is that *people form relationships with objects external to their own self*.

relation(s)

- *response* – object disembodied from self
- *control* – self embodies object
- *reflection* – self disembodied from object
- *belonging* – object embodies self

These relationships, or notions of belonging, are essential in developing an *aesthetics of interaction*, a topic that will approach in the next chapter.



20

example(s) – *Monet's Nymphs*

One of the recommendations I make to everyone who is planning to go to Paris is to visit Monet's Waterlilies¹⁵ which are exhibited in a small gallery near the Louvre. Monet, at that time at the at of his career, living in Giverny, was well aware of the paradoxical nature of his Herculean effort. As stated in Grau (2003):

mass medium

thus, one year after Monet's death and fifty years after his *Impression soleil levant*, a late example of modern art reached the changed artistic landscape of the 1920's, transported in a derivative of *the* mass medium for images in the 19th century.

Being one of the innovators of painting in the early twentieth century, Monet nevertheless endeavored in painting panorama-wide paintings, with an aesthetics of illusionistic immersiveness, however with a painterly touch so refined that this series of works easily transcends the ordinary illusionism of its predecessors. Monet himself might have seen it as an exercise to improve his painterly craft to the limits of perfection.

research directions– *information art*

Given the rise of the *creative industry* it is not suprising that initiatives have been taken to provide academic curricula in *creative technology*. The Institute

¹⁵www.kahlil.org/monet10.html

of Creative Technology (LA), which developed the Mission Rehearsal Exercise discussed in chapter 9, may be taken as an example of an institute combining both technological and creative expertise in its staff.

The *new media* or *creative technology* play an important role in our society, in that they contribute in envisaging our dreams and (through advertisement) selling our reality. Wilson (2002), which provides an in any sense exhaustive investigation in the relation between technology and art, observes:

new media

a consequence of the constitutive function of artistic-illusionary utopias for the inception of new media of illusion is that the media are both a part of the history of culture and of technology.

Although the research agenda's of scientists may easily conflict with the artistic agenda's of artists, Wilson (2002), describes numerous projects where projects where artists and scientists cooperate, with mutual benefit. Wilson (2002) is together with Zielinski (2006), Grau (2003) and many others, part of series of books from MIT Press, dealing with the cross section between technology, art and culture We repeat the quote, already given in section 1.1, that accompanies this series of books:

cultural convergence

the cultural convergence of art, science, and technology provides ample opportunity for artists to challenge the very notion of how art is produced and to call into question its subject matter and its meaning in society.

Examples of projects with both relevance science and art, may for example be found in the area of *tele-presence*, to thematize, following Grau (2003):

tele-presence

- notions of artificial life
- fusion with (infinite) virtual image worlds
- transformation of self into digital data

Such themes, apart from all technical problems involved, deeply affect human aspirations, as expressed in our myths and movies:

human aspiration(s)

telepresence also combines the contents of three archetypal areas of human aspirations: automation, virtual illusion and metaphysical views of the self.

In particular, such notions may be used to analyse, or de-construct, our behavior(s) on the web and our adoption of, for example, Second Life:

cybergnosis

what is being preached is the phantasm of union in a global net community, cybergnosis, salvation through technology, disembodied as a post-biological scattering of data that lives forever.

This, evidently may lead to criticism(s), which after all is a function of art, to make us aware of our limits, and the intrinsic qualities of our existence:

zealot(s)

what we observe are hyperzealots of a new technoreligion running wild, zapping, excerpting and floating in cyberspace.

However, although we may encounter similar criticisms in popular culture, that is cartoons and games, it is interesting to reflect on the difference between art and the of new media applications that are somehow related to art. Again following Grau (2003):

aesthetics

since the eighteenth century, aesthetic theories have regarded *distance* as a constitutive element of reflection, self-discovery and the experience of art and nature.

Aesthetic distance, however, is a notion that is also subject to criticism from new developments within art itself, for example *performance art*, which aspire a more direct existential impact, as for example the works of Marina Abramovic, discussed in chapter ,a href=1.html>1.

What is meant with *creative technology* or *new media*, and what will constitute the tools of the *new culture* is not entirely clear. For example, Wilson (2002) observes that

tool(s)

aesthetic distance is no longer tenable when artist are engaging the same systems used in general communications and research

Does that mean that we must adopt *open source* to make an artistic statement, or shy away from the powerful visual effects enabled by for example shader technologies. Of course not. But it does indicate the need to critically reflect on the need and functions of these tools, and not adopt a technology, style or for that matter *realism* simply because everybody does so. Art, through its history, teaches us how to fight against both visions of dominance, and dominant vision(s)!

11.4 development(s) – game patterns

On youtube one can find many clips that somehow discuss the future of the web. One example of this is depicted below, a lecture that explains the differences between the various phases of the web, and the transition to a (3D) web in which the users *co-create*.



In summary, the following phases are mentioned:

webvolution(s)¹⁶

- access – *make available through url*
- find – *using search engine*
- share – *by storing online*
- participate – *by contributing content*
- collaborate – *to create meaningful sites*
- co-create – *to build a (new) world*

These visions are (partly) realized in a multitude of applications. More interestingly, however, is the question how can deploy these mechanisms in a game context. In other words, can we think of a way to make use of *co-creation* facilities, to develop our Clima Futura game?

In Eliens et al. (2007b) we wrote: having decided on the general structure and elements of the Clima Futura game, a turn-based game loop, a climate-model driven simulation, exploratory video, and mini-games, the problem is how to connect these elements in a meaningful way, and design a coherent collection of game events. This problem is further aggravated by the need to find a way to design in a collaborative fashion, necessitated by the sheer amount of disciplines and people involved.

To enable collaborative design we developed a game event description format, which standardizes the way game events are to be described, and for which we also developed an online form, structured as outlined below:

game event description format

- name of event – give a meaningful name
- event-id – for administrators only
- type – (generic/specific) game/model/video
- cause – game play/simulation/exploration
- feedback/information – give a logical description
- player actions – indicate all (logical) player options
- description of visuals – for feedback, information and player options
- additional information – give a url with reference(s) to information and visuals
- relates to event(s) – give id's or descriptions of related events

The *game description format* should not be confused with *game design patterns*, as introduced in Björk & Holopainen (2005), that we will discuss in section 12.1.

Before enforcing the game event description format, our ideas about the design of Clima Futura were gathered in a collection of narratives and brief descriptions, in what we called the *Clima Futura Design Bible*. Using the standardized game event description format, we hope to arrive at a more uniform way of describing the narratives, the perspectives from which these narratives can be experienced,

¹⁶www.youtube.com/watch?v=-cZTdFTZV5Q

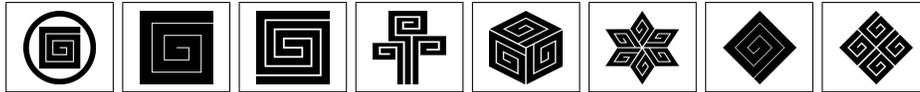
the challenges or problems a player must solve, the resources available to the player, such as capital, knowledge and political power, the rewards, possibly using bonus credits for successfully playing a mini-game, as well as the visuals, which will where possible be derived from the collection of videos we have available.

In addition to the game event description format, we also provided a minigame description form, containing a field to indicate the event that gave rise to the minigame, a field for a description of the minigame in words, as well as a field for the visual depiction of the minigame. Together, the game event and minigame description formats, provide a means to develop an online hyperlinked design document, that may serve as a reference for further design, development and coding. For the elaboration of the design, we are developing storyboards, which characterize in a visual way the major (dramatic) elements of narratives, structured using a subdivision in:

scenario(s)

- context – general setting, situation
- problem – event(s) to occur, problem to solve
- S-R situation(s) – stimulus/response (one or more)
- climax – action must be taken
- resolution – find solution or result

Although the actual workflow that we will deploy during development is at the moment of writing not clear, we will strive for developing templates that allow for a quick realization of the designs captured by the game event and minigame description format(s), along with the storyboards for visual design.



22

questions

game technology for serious applications

1. (*) What are the elementary steps in game development? Discuss the role technology plays in determining the game development project trajectory.

concepts

2. What phases can you distinguish in the actual development of a game?
3. Give arguments pro and con the use of a game engine.
4. Discuss the notion of immersion, and explain why immersion does not necessarily imply illusion.

technology

5. Characterize the built-in functionality that comes with a game engine.

6. Give a characterization of the tools that come with the Source Half Life 2 SDK.
7. Give a brief description of the history of immersive environments and application.
8. Discuss, on a suitable level of abstraction, the immersive features of games.

projects & further reading As a project, develop a non-violent game using the Source SDK. For example, you may develop an application that gives a community of users access their personal collections of photographs.

One interesting feature to explore is the use of narratives, that is a kind of guided tour that gives a user an overview of the collection of photographs by means of a story, taking (in other words) the user by the hand in navigating the game space.

For further reading I suggest, apart from the manuals and learning materials that come with the Source SDK, books on game development such as Luna (2003), Gee (2003) and Klabbers (2006).

the artwork

1. *digital beauties* – taken from Wiedermann (2002).
2. Masereel, social realist works
3. Roy Lichtenstein, 1962
4. Masereel, social realist works
5. images from *Samurai Romanesque*, see section 1.3
6. HalfLife 2 shader programming
7. VU-Life 2 – opening screen
8. VU-Life 2 – screenshots
9. VU-Life 2 – screenshots
10. VU-Life 2 – screenshots
11. VU-Life 2 – tools
12. VU-Life 2 – tools
13. VU-Life 2 – masterclass
14. diagram AMICO core
15. diagram AMICO applications
16. Roy Lichtenstein, 1962, Stillives
17. Monet, Nymphéas
18. Monet, Nymphéas
19. Monet, Nymphéas
20. Web 3Di – diagram for Webvolution¹⁷
21. signs – abstract, van Rooijen (2003), p. 146, 147.

¹⁷www.youtube.com/watch?v=-cZTdFTZV5Q

The visual theme of this chapter is *realism*, on the one hand expressed by a choice from the work of the belgium artist Masereel, as well as in the screenshots of VU Life, which present a more or less realistic, that is recognizable rendering of our faculty. In the mean time, though, the restaurant has been rebuilt, making our virtual restaurant outdated, within a year after creating it. Also the cartooneske style of Roy Lichtenstein may considered to be strongly *realistic*, although in a slightly different sense. Finally, the *nymphes* of Monet represent a realistic epos of his famous garden, and in some sense an almost tragic attempt to express this in an artwork, which only adds to the *realism* of art, that is its vital role in our lives.

12. towards an aesthetics for interaction

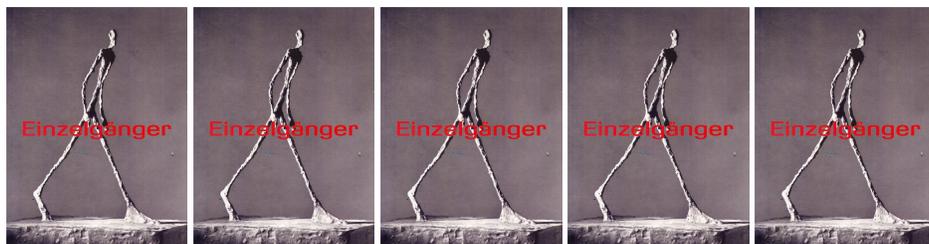
experience is determined by meaning

learning objectives

After reading this chapter you should have an understanding of the model underlying game playing, and the role of narratives in interaction. Furthermore, you might have an idea of how to define aesthetic meaning in a cultural context, and apply your understanding to the creative development of meaningful interactive systems.

As in music, the meaning of interactive applications is determined, not only by its sensory appearance, but to a high extent by the structure and functionality of the application. This observation may, also, explain, why narratives become more and more important in current video games, namely in providing a meaningful context for possible user actions.

In this chapter, we take an interactive game-model extended with narrative functionality as a starting point to explore the aesthetics of interactive applications. In section 12.1, we will introduce a model for interactive video games, and in section 12.2 we will present a variety of rules for the construction of narratives in a game context. Finally, in section 12.3, we will characterize the notion of meaning from a traditional semiotics perspective, which we will then apply in the context of games and interactive multimedia applications.



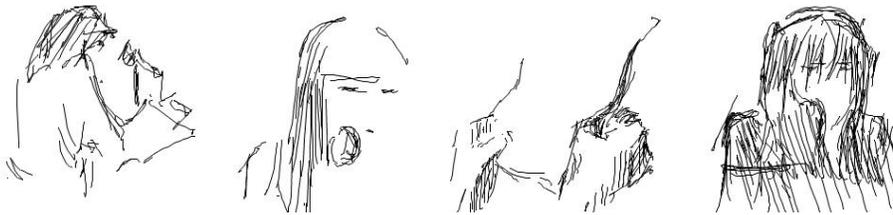
12.1 a game model

Games present challenges, invoke involvement, and are essentially interactive. Although it might seem far-fetched to regard game playing as a paradigm for interaction, it is definitely worthwhile to have a closer look at *game theory* for inspiration. According to Juul (2005), from a theoretical perspective games may be said to have the following properties:

game theory¹⁸

- system – (formal) set of rules
- relation – between player and game (affectionate)
- context – negotiable relation with 'real world'

In particular, *relation(s)* and *context* determine the meaning of the game for the player, both on an individual/existential level and in relation to a societal context.



2

To characterize the defining characteristics of games in a more precise way, Juul (2005) presents a classic game model that may act as a reference for the description and evaluation of games:

classic game (reference) model

- *rules* – formal system
- *outcome* – variable and quantifiable
- *value* – different valorisation assignments
- *effort* – in order to influence the outcome
- *attachment* – emotionally attached to outcome (hooked)
- *consequences* – optional and negotiable (profit?)

For current day video games, Juul (2005) observes that there is a tension between rules and the fictional or narrative component of the game:

rules vs fiction

game fiction is ambiguous, optional and imagined by the player in uncontrollable and unpredictable ways, but the emphasis on fictional worlds may be the strongest innovation of the video game.

¹⁸www.half-real.net

In some cases it might even not be clear what the *rules of the game* are, as for example in Second Life, where *presence* and *expeience* seem to be prevalent. In general, role playing games seem to be less constrained than skill-based games. Nevertheless, in both cases does the visual environment augment the experience, adding to the narrative context.



3

So, returning to our original question:

theory of interaction

are *games* relevant for a theory of interaction?

our tentative answer is yes!

In an attempt to formulate criteria for effective service management games, developed in cooperation with Getronics-PinkRoccade, Eliens & Chang (2007), we gave a characterization in terms of the reference game model, as outlined below:

effective service management game(s)

- *rules* – service management protocols
- *outcome* – learning process
- *value* – intellectual satisfaction
- *effort* – study procedures
- *attachment* – corporate identity
- *consequences* – job qualification

There is no need to emphasize that this is only a first approximation, and for that matter a rough one. What we must keep in mind, however, is that the model is not only applicable on a macro-level, to characterize an entire game, but more importantly may also be applied on a micro-level, to establish the criteria for each (relevant) step in the game play. To emphasize the relevance particular aspects of service management games, we added two more criteria to the model:

- *scenario(s)* - problem solving in service management
- *reward(s)* - service level agreements

After all, the goal of playing a service management game is to be trained in, as stated above, problem solving in service management situations, and reaching acceptable service level agreement(s)!

game (interaction) design pattern(s)

Game play is an experience that requires active involvement of the player and may stand as a model for interaction, that is interaction with high emotional load. Types or patterns of interaction that may occur in game playing are analysed in Björk & Holopainen (2005), which characterizes *game play* as:

game play

... structure of interaction with game system and other player(s)

Björk & Holopainen (2005) explicitly avoid giving a definition of either game(s) or game play, but instead focus on *interaction patterns*, that is how players interact with the game system (and other players) to effect a change in the state of the game.

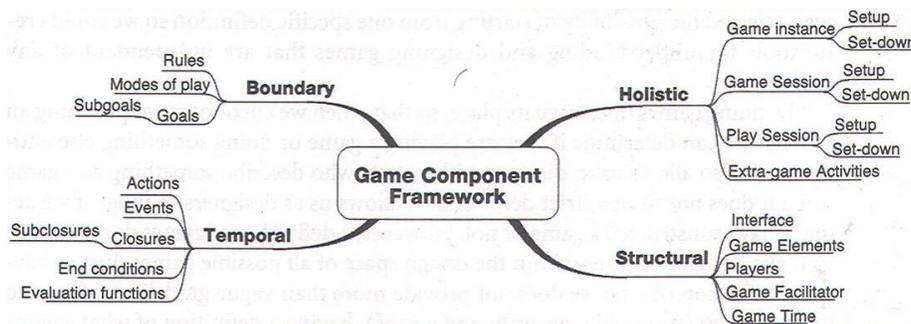
For the description of interaction patterns, Björk & Holopainen (2005) introduce a component framework, that distinguishes between the following types of components:

component framework¹⁹

- holistic – *playing games as an undividable activity*
- boundary – *limit the activities of people playing games*
- temporal – *describe the flow of the game (interaction)*
- structural – *physical and logical elements of the game system*

The various components, each affect game playing in a particular manner, either by the way the game presents itself through an interface (structural component), or by the rules that determine the game (boundary component).

An overview of the aspects or elements that belong to each component is given in the figure, taken from Björk & Holopainen (2005), below.



4

For narrative structure(s), that we will discuss in the next section, obviously the *temporal component* is most important, containing elements such as *closures* as well as *actions* and *events* that may occur during game play.

¹⁹www.gamedesignpatterns.org

Referring to Björk & Holopainen (2005) for details, an impression of what (types of) interaction patterns may exist is given in the following list:

pattern(s)

- *resource management* – resource types, control, progress
- *communication and presentation* – information, indicators
- *actions and events* – control, rewards and penalties
- *narrative structures and immersion* – evaluation, control, characters
- *social interaction* – competition, collaboration, activities
- *mastery and balancing* – planning, tradeoffs
- *meta games and learning* – replayability, learning curve(s)

For example, with respect to actions and events that may occur during game play, there are various ways rewards and punishments may be dealt with. Also, as we mentioned in section 10.4 when discussing *interaction markers*, there exists a variety of patterns by which to present information and indicate (opportunities for) interaction.



example(s) – *intimate media*

From the company that used the slogan "let's make things better", and now advertises its products with "sense and simplicity", there is the MIME²⁰ project,

²⁰www.design.philips.com/about/design/section-13484

not to be confused with the multipart internet mail standard, which focusses on *Multiple Intimate Media Environments*.

As concepts embodying their ideas they propose, among other:

intimate media object(s)

1. *glow tags* – a subtle way to trigger the person who has placed it or who sees it
2. *living scrap book* – to capture and collect information and media digitally
3. *picture ball* – as an object of decoration and a focus for storytelling
4. *lonely planet listener* – enabling people to listen to a real time connection to another place

On a more abstract level, seven core qualities are identified which *capture the essence of the intimate media experience*:

intimate media experience(s)

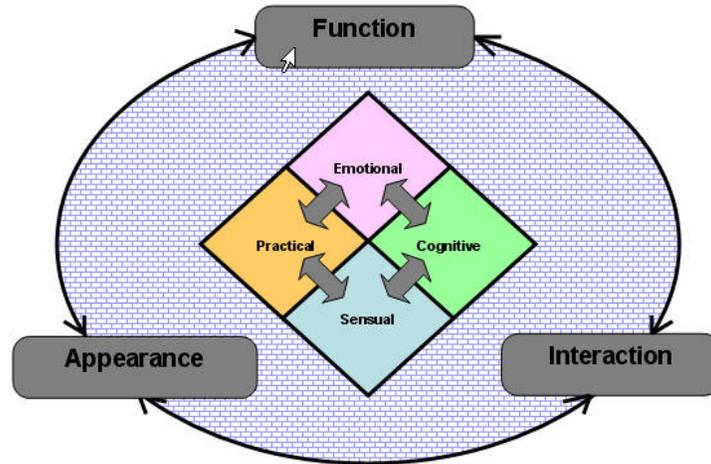
- sensorial – *experience is visual, audible, tactile, olfactic*
- personalized – *objects embody meaning and memories*
- analogue – *people relate to physical objects*
- enhancement – *people already have extensive intimate media collections*
- serendipity – *it supports unstructured and flexible usage*
- longevity – *objects may exist over generations*

As can be read on their website: *intimate media describes the things that people create and collect to store and share their personal memories, interests and loves. And: intimate media is central to how people make sense of their world by representing roots, heritage and a sense of belonging, achievement and connection.*

research directions– *experience as meaning*

For the design and appreciation of the new category of digital systems, including games, we may, with (forward) reference to our discussion of the history of thought in section 12.4, well take *pragmatist aesthetics* as a common ground, since it does justice to the existential dimension of aesthetic awareness, and allows for a process of aesthetic literacy, that is becoming sensible to aesthetic awareness and reflection. You may wonder though, how we get to this conclusion.

In Hallnäss and Redström (2002) it is observed that *the aesthetic potential of the narrative space centered on the consumer product has received surprisingly little attention*. The authors then argue that, motivated by insights from phenomenology, there should be a shift of attention from *use* to *presence*, where presence does not merely mean appearance but a more complex dialectic process of appearance and gradual disappearance dependent on the role the object plays in the life of the user/subject. The notion of *expressional* is then introduced, to convey the expressive meaning of objects, and in particular interactive objects, in our surroundings. For the *design of presence, aesthetics* is then considered as a *logic of expressions*, in which *expressions* act as *the presentation of a structure in a given space of design variables*.



6

So far, this makes perfect sense. We may further mention here the framework set up by Dhaval Vyas, Vyas and van der Veer (2006), which characterizes the user's experience as the result of the process of constructing meaning. In diagrammatic form, the process of constructing meaning may be depicted as above.

In more detail, the validity of the *experience as meaning* framework may be substantiated by the following observations:

experience as meaning

- experience occurs during the interaction between the user(s) and the interactive system(s) in the lived environment
- designers convey meaning (consciously or unconsciously) through the appearance, interaction and function of the system
- user(s) construct a coherent whole that is a combination of sensual, cognitive, emotional and practical forms of experience

In other words, an *interactive system* is determined by *function*, *interaction* and *appearance*. As such the framework may be called *pragmatist*, and has indeed been influenced by Dewey (1931).

Returning to our argumentation, for objects that are not designed for usability in the functional sense the notion of *use* is too strict and is, using a dialectic argument, subject to the dialectics of *presence*, as argued in Hallnäss and Redström (2002). Conversely, using a similar dialectic argument, for new categories of objects, *presence* requires *use*, or getting used to, in other words a process in which the user becomes interested and familiar with the object. We may even speak of *aesthetic affordance*, with the realization that the notion of *affordance*, explaining an ecology of behavior, originally stems from the late-idealist phenomenology expounded in Heidegger (1927).

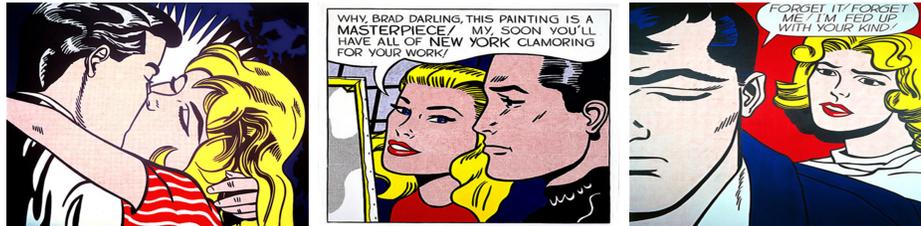
But, however appealing the notion of *expressional*, in the light of our discussion in section 12.4, where we distinguish between aesthetic awareness as a given, or a priori, sensibility and aesthetic judgement as being of a more empirical nature, we would prefer to consider *aesthetics* as a *logic of sensibility*, which includes a dimension of self-reflection in the sense of its being aware of its own history. Put differently, to characterize the contextual aspect of aesthetics, as it certainly applies to art, we may speak of *aesthetic literacy*, that is aesthetic awareness that is self-reflective by nature.

12.2 guidelines for narrative construction(s)

Storytelling is vital to human existence. Whether to fall asleep during childhood, to dream about heroism in adolescence, to escape from the daily routine of work as an adult, ..., storytelling is ubiquitous, be it in books, movies, or (even) games. To think about storytelling, I have taken Arnheim (1957) as a guideline, since:

film as art

by still being read, the little treatise seems to prove that in spite of all the changes that have taken place in their *form*, *content* and *function*, films are still most genuinely effective when they rely on the basic properties of the *visual medium*.



With reference to our discussion in section 11.3, entitled *immersion is not illusion*, we may remark that we actually do not need *visual realism* to be taken in by a story:

illusion

... in film or theatre, so long as the essentials of any event are shown, the illusion takes place

As to the question of why film may be regarded as art, Arnheim (1957) observes:

patterns of light

... we can perceive objects and events as living and at the same time imaginary, as *real objects* and as simple *patterns of light* on the projection screen, and it is this fact that makes film art possible.

This, by extrapolation, also holds for video games, which may be regarded as a first-person variant/successor of films. As a consequence, both film and games

may play with the relation between two distinct frames of reference. We repeat the characterization given in section 11.3:

frames of reference

it is one of the most important formal qualities of film that every object that is reproduced appears simultaneously in two entirely different frames of reference, namely the two-dimensional and the three-dimensional, and that as one identical object it fulfills two different functions in the two contexts.

Taking film as an example on which to model storytelling in games, we may distinguish between the following principles of montage:

principles of montage

- cutting – unit length, whole scenes, cuts within scenes
- time relations – synchronized, before/after, neutral
- space relations – same place (different time), different place
- subject matter – similarity and/or contrast

Technology plays an essential role in the production of movies. In particular, montage is enabled by technical properties of film, including:

film technique

- camera – position, focus, movement
- transitions – fading in/out, dissolving, stills
- arrangement – light/shade, color, sound

Film, or movies, being a dynamic medium, essentially involve *motion*. Following Arnheim (1957), we may characterize *motion* by making a distinction between:

cinematographic motion

- movement of objects
- effect of perspective
- motion of camera
- montage of scenes

Nowadays, with the rise of digital technology, editing film has changed significantly, and is within the reach of (almost) everybody. However, the basic principles of what was previously called *motion pictures* still seem to apply, even for CG movies or video games.

the meaning of composition

Where montage employs dynamic characteristics of the (moving) image, the static image itself may be said, following Kress and van Leeuwen (1996), to have *narrative implications* as well:

narrative implication(s)

- objects – the items in the image
- vectors – (imaginary) lines suggesting interaction

- gaze – inward (offer) / outward (demand)

In other words, images may suggest a story, and the persona within an image may express a relation to us, either transactional, directly approaching us, or non-transactional, without the on-looker being involved directly.

Image composition plays an essential role in storytelling, since, as Kress and van Leeuwen (1996) observe:

composition

composition, ..., relates the *representational* and *interactive* meanings of the picture to each other, through three interrelated systems.

Composition results in visual effects, since representational elements may be put together according to particular mechanisms or systems as they are called in Kress and van Leeuwen (1996):

representation(s)

- information value – left/right, top/bottom, centre/margin
- salience – foreground/background, relative size, contrast
- framing – connecting or dissolving lines

The effects of compositional mechanisms are partly due to physiological properties of the image and partly due to a codified interpretation in a particular social context. For example, *information value* is clearly determined by social context:

- left/right – given versus new
- top/bottom – ideal versus real
- centre/margin – important versus marginal

In section 5.4, we discussed how we applied these interpretations in the design of information flows in PANORAMA, with, we must admit, with surprising effect!



7

example(s) – *edgecodes*

The *edgecodes*²¹ documentary film by Phillip Daniels gives an inside account of film editing, a history of the evolution of editing conventions, as well as an account of the technological innovations of the late 20th century and their impact on film editing. It was shown at the documentary film festival IDFA²² 2004, in

²¹www.edgecodes.com

²²www.idfa.nl

Amsterdam. Movies were, as Daniels states, the new artform of the 20th century, which distinguishes itself from other artforms by ... *editing!*

The film begins with the statement such as *the concept that a film is shot is entirely false, a film is not shot, it is built*, continuing with the statements that *the message of the movie medium is that of transition*, and that *a movie must have a beginning, middle and ending, but not necessarily in that order*.

The documentary is highly visual, after all it is an editor's movie, and contains many fragments from wellknown movies and interviews with famous directors, among which George Lucas, who introduced the *editoroid* in the eighties, an editing machine built with at the time modern computing technology. George Lucas, image left above, explained the introduction of his editing machine by saying that he wanted to have *a system, ... that is intuitive, obvious, ... and highly malleable, ... visual* He wanted a machine that allowed him to use his moterskills, without the intervention of an engineer. But in the interview he admitted that they were *on the bleeding edge* in those days. Nowadays, real-time editing, with computer graphics (CG) support is (finally) feasible. See chapter 4.

research directions – *multimedia in context*

In 1998, I organized a multimedia course for PhD. students, together with Lynda Hardman (CWI), entitled: *multimedia in context*²³. When defending the position of *multimedia & game development* in the computer science curriculum, it became once more necessary to reflect on the relation of multimedia to its (various) context(s).

First and for all, we may identify the scientific context of multimedia, which includes many seemingly unrelated areas of science:

scientific context

- mathematics – matrix algebra, transforms
- physics – game physics, particle systems
- computer science – technological infra-structure
- information theory – compression and delivery
- media theory – history of communication
- semiotics – theory of meaning

Secondly, we have the societal context. Given the (explosive) rise of the *creative industry* the list given here is rather poor, and should include at least the various communities that are coming into existence.

societal context

- cultural heritage – digital dissemination of art
- education & communication – presentation of concepts and examples

Obviously, there is a strong technological context of multimedia. Without the technology, multimedia and game development would not qualify to be seen as an academic discipline.

technological context

²³www.cs.vu.nl/~eliens/online/courses/siks98

- modelling – objects, characters
- interaction – game programming
- architecture – game engine design
- rendering – programming the graphics hardware

Finally, there is a creative context. However, from my perspective this is intimately tied to a technological context, since at this stage there is still a great need for explorative development, to discover new applications and the aesthetics governing these applications.

creative context

- visual design – style, models and attributes
- story telling – narrative structure

There should be no need to emphasize that all these contexts are itself one way or another strongly related. In other words, *multimedia & game development* is intrinsically a multi-disciplinary affair, which even cannot be so easily taken out of a societal context, in that the value of new media applications is ultimately determined by its adoption in the new digital culture.

12.3 the definition of meaning

As indicated in section 1.1 meaning, or for that matter learning, takes place, according to Bruner (1972), at various levels:

learning/meaning

- actionary level – action and movements
- sensory/iconic – images and impressions
- symbolic – language and mathematics

Learning by doing, or learning by games may be effective, precisely because all these levels are involved.



A cognitive approach, however, may not be adequate to explain the meaning of multimedia or visual art. As observed in Kress and van Leeuwen (1996):

basic geometrical shapes

... basic geometrical shapes have always been a source of fascination, even of religious awe. And our scientific age is no exception.

Artistic speculation may lead to an absolutist interpretation of geometric shapes, or as stated in Kress and van Leeuwen (1996):

nervous system

(basic geometrical shapes) have been thought to have the power to directly affect our nervous system, for instance by the constructivist artist Gabo: the emotional force of an absolute shape is unique and not replaceable by any other means ...



A well-established theory of meaning is provided by *semiotics*, which distinguishes between *signifier(s)* and *signified(s)*:

semiotics – a theory of meaning

- signifier – sign/symbol
- signified – what is referred to

According to Kress and van Leeuwen (1996), *meaning* is the *relation between signifier and signified*. Semiotic theory may be applied to the domain of language and speech, which is its original domain of application, as well as to the visual domain. However, for the visual domain there seem to some obstacles. One question is whether semiotic theory applies to the visual domain. But another issue is, according to Kress and van Leeuwen (1996), that in our culture the visual domain seems to be inferior to the linguistic domain. Kress and van Leeuwen (1996) raise the question:

semiotic modes

... is the move from the verbal to the visual a loss, or a gain?

Yet, in a brilliant turnover, where they establish the viability of semiotics for the visual domain, they invert the possible inferiority of the visual domain into a position where it may potentially be superior to language, asking whether

complexity

... it has to be handled visually, because the verbal is no longer adequate?

To strengthen their argument, they even point to the hidden multi-modality of written texts, that is the use of images and sensorial impressions hidden in the written word(s):

multimedia

the multi-modality of written texts has, by and large, been ignored, whether in educational contexts, in linguistic theorizing, or in popular common sense. Today, in the age of *multimedia*, it can suddenly be perceived again.

In this way the not only establish a firm position for *visual semiotics*, but at the same time raise the issue of literacy, *visual literacy* that is, as an essential skill related to the place of visual communication in the semiotic landscape:

the place of visual communication in a given society can only be understood in the context of, on the one hand, the range of forms or modes of public communication available in that society, and, on the other hand, their uses and valuations.

As recognized by politicians and educators, visual literacy or media literacy is to be regarded an essential skill in our media-driven (information) society, not only to be able to cope with information, but also to determine what is right or wrong, to be able to distinguish between being manipulated and being informed!



10

Even in art expressions, for which there is no clear notion of *signified(s)*, we may given an answer to the question of meaning.

*sonic act(s)*²⁴

what is the meaning of meaning in apparently meaningless expressions

The meaning of such expressions is goverend by the relation between the *signifiers*, or in other words, the formal properties of the artefact.

Such formal properties also play a role in what has been called *modality* in section 11.3 . According to Kress and van Leeuwen (1996), modality is strongly related to the reliability of (visual) messages:

modality

²⁴www.sonicacts.com/

one of the crucial issues in communication is the question of the *reliability of messages*. Is what we see or hear true, factual, real, or is it a lie, a fiction, something outside reality? To some extent the form of the message itself suggests the answer.

In other words, *modality* may be taken as a *veracity marker*, that is an indication of how a message is meant, as serious, ironic, sarcastic, or *realistic* ...

Modality may also be expressed by a choice of what Kress and van Leeuwen (1996) call a *coding orientation*, which determines, as we have discussed in section 11.3, what counts as *real*:

coding orientation

- *technical/scientific* – effectiveness, blueprint
- *sensory* – pleasure principle is dominant
- *abstract* – used by socio-cultural elite
- *naturalistic* – dominant common sense paradigm of realism

Coding orientation, in other words, subtly implies a judgement on what is considered *real*, that is relevant!

the politic(s) of meaning With the introduction of *new media*, including film, television, and more recently computer games, concern will be expressed with the loss of traditional values. As an example, film, as well as its successor television may be criticised:

aesthetics of shock

it is within the realm of probability that the *shock*, which Walter Benjamin diagnosed as being film's aesthetic innovation, will undergo renewal and intensification with far more sophisticated means.

A fortiori, television, and the habit of recording everything, making our private lives public is subject to criticism:

voyeurism

the most obvious symptom of this loss of distance will be a voyeuristic, dissecting penetration of representations of objects and bodies.

Arnheim (1957), for example, comments on television as a great achievement, and yet seems to experience it as a loss:

TV

for the first time in the history of man's striving for understanding, *simultaneity* can be experienced as such, not merely translated as a succession in time.

sensory stimulation

although the new victory over time and space represents an impressive enrichment of the perceptual world, it also favors a *cult of sensory stimulation* which is characteristic of the cultural attitude of our time.

What the loss entails becomes clear, when *convenience* and *accessibility* is compared with the effort required by more traditional ways of thinking:

direct experience

proud of our inventions – photography, film, radio, ... – we praise the educational virtues of *direct experience*.

communication

when communication can be achieved by pointing with the finger, however, the mouth grows silent, the writing hand stops and the mind shrinks.

In other words, Arnheim (1957) fears that our traditional intellectual values, and perhaps even skills, will be lost. Although written more than half a century ago, these precautions are reminiscent to the concerns expressed by parents and educators nowadays.



11

It is not easy to either do away with these concerns, nor to fully agree with them. However, given the developments in the *new media*, the community web sites, the availability of online games, the potential danger of addiction to games, and perhaps even the use of wikipedia to do schoolwork, there seems to be some reason for concern.

From a slightly more political perspective, we may ask ourselves, following Grau (2003):

channels

... the decisive questions remain: who controls the channels, who distributes right of access, and who exercises economic and political authority over the networks?

Not to be led astray by false media dreams, but having confidence in our autonomy and the autonomy of our children. As observed in Grau (2003) our vision(s) may be wrong:

visions

... the history of technological visions is the history of our dreams, our vagaries and our errors. Media utopias fluctuate, often occurring in a magical or occult ambience.

Yet, our visions represent our dreams, and the *new media* do provide us with a new creative realm of reality. Principally, multimedia and game technologies are enabling technologies, enabling the development of the (digital) culture of the 21th century. Not only in our western world, for our own children, but also in developing countries, which should not fall victim to a *digital divide*.

example(s) – *multimedia in africa*

End of 2006, we were asked to participate in a joint project with ethiopian universities to develop a *multimedia* curriculum for these universities. In developing such a curriculum we should stick to the principles outlined below:

synopsis

... the curriculum should emphasise basic principles, and to the extent possible employ open standards and open source. Practical assignments must be centered on local culture, and stimulate the young talent to explore innovative applications for cultural heritage, serious games and artistic expression.

where, what & why

- where – Ethiopia & VU
- what – introduction multimedia
- why – to develop curriculum

environment

- low end computers – windows, linux
- elementary skills – programming, design

assumptions

- open source – flex 2 sdk, Delta3D
- open standards – XML, X3D
- basic principles – exploratory development

targets

- local – present local cultural heritage
- serious – develop serious game(s)
- benefits – promote local culture and commerce

These statements express thye situation beforehand. At the time of writing the project has not been started, due to a delay caused by one of the candidate tutors from the ethiopian dropping out.

research directions – *humour in games*

For presenting Clima Futura to the jury of the scientific communication contest, we decided to have three central presenters (anchors) and an expert-panel (choir), that may comment on detailed scientific or technical issues. The presentation, stressed the multi-disciplinary approach, covers the following topics, in the order of listing:

presentation

1. philosophy – pathos, ethos, logos
2. trailer – drama, apocalyptic, appeal to player
3. climate star – scientific issues & game play
4. game development – architecture and project plan

Although it too early to look back, we may on reflection ask attention for another potential pitfall, that endangers any educational game, once aptly expressed by Sartre in his criticism of *l'esprit de serieux*. Indeed, we may become too serious! As a potential line of research that may support the design and development of Clima Futura, we refer to an *ontology of humour*, Dormann et al. (2007), that may be taken as a guideline to avoid the common pitfall of *serious games*. In brief, Dormann et al. (2007) distinguishes between three theories of humour, that each denote a particular function of humour: *relief theory*, which explains humour as a reduction of stress, *superiority theory*, which asserts that humour has a social function, as a means to enforce the norm of a group or culture, and *incongruity theory*, which relates humour to the discovery of hidden meanings. We leave it to the imagination of the reader to establish in what way the various types of humour may be put to effect in the *climate issue*, or for that matter in any *serious game*.



12

12.4 development(s) – philosophy and beyond

In teaching *multimedia & game development* I sometimes point out to my students what the difference is between an artist, an engineer and a (real) scientist. In a nutshell:

phrase(s)

- art – rhetorics of the material
- technology – solving problem(s)
- science – establish a theory

Leaving aside whether computer science is a science, or for that matter what role the computer plays in it, such a comparison is worthwhile, to make clear the mixture of abilities and skills that a multimedia student must develop.

Not an essential skill, or even required background, some knowledge of the history of thought is recommended. However, philosophy is not a very popular subject, and many seem to easily do away with philosophical abstractions and apparently tedious theory, even though these same philosophical abstractions may provide better understanding of the *forces* that are at work.

Concluding our manuscript, we will in this section briefly trace the evolution of the notion of aesthetics to our current day understanding, starting with the idealist transcendental conception of aesthetics as the abstract a priori form of experience, ending with semiotic theory that emphasizes the social determinants

of aesthetic experience. Our discussion, is based on our studies in the past, Eliens (1979), almost forgotten. The outline given below includes the references to the material we originally studied. However, for reference, links to relevant online material are also included.

perspective(s)

1. transcendental – abstract form of experience²⁵, Kant (1781)
2. speculative – criteria for beauty²⁶, Kant (1781)
3. phenomenological – self-conscious subjectivity²⁷, Hegel (1807)
4. psychoanalytical – sub-conscious meaning²⁸, Freud (1958)
5. pragmatical – art as experience²⁹, Dewey (1931)
6. hermeneutical – understanding of the senses³⁰, Hermeneutics
7. semiotics – social construction of meaning³¹, Kress and van Leeuwen (1996)

To my mind, the epistemological understanding of aesthetics as the *pure form of sensuousness*, as expressed in Kant (1781), is most fundamental in understanding the notion of aesthetics in the context of interactive systems, since it allows us to characterize the dimensions of sensuous awareness delimiting our experience of art, architecture and interactive systems. The epistemological or transcendental characterization of aesthetics describes, in other words, the a priori principles of sensuousness, that determine our perception of reality, by imposing organisation and form on the chaotic multitude of appearances. As phrased in Kant (1781), appearances consist of *material*, which is a posteriori given, and *form*, determined by the a priori nature of our mind.

As dimensions of pure sensuousness, or aesthetic awareness, Kant distinguishes between *space* and *time*. In Kant (1781), the notion of aesthetic judgement is introduced. Our ability for aesthetic awareness allows us to recognize and appreciate beauty, however Kant emphasizes that any attempt to conceptualize the judgement of beauty is doomed to fail, or may at best be determined empirically, in an ad hoc manner.

Later thinkers in the idealist school took over Kants conception of aesthetic awareness as the receptive side of our mind, in search for knowledge, and emphasized the relation between truth and beauty, Schiller (1977). In particular Hegel (1807) characterized *beauty* as the *sensuous presence of Idea*, and he identifies our need for truth and beauty with the intrinsic *movement of self-consciousness*. In other words, aesthetic awareness is not a dis-interested a priori ability that allows us to organise our perceptions and to recognize and appreciate pure form, rather it is intentional and through self-reflection subject to recurrent improvement and change, continuously looking for truth and beauty, that is meaning. We may note

²⁵philosophy.eserver.org/aesthetic-excellence.txt

²⁶www.iep.utm.edu/k/kantaest.htm

²⁷www.rowan.edu/philosop/clowney/Aesthetics

²⁸human-nature.com/free-associations/glover

²⁹www.iep.utm.edu/d/dewey.htm

³⁰plato.stanford.edu/entries/gadamer

³¹ucf.edu/~janzb/aesthetics

here that psychoanalytic theory has contributed to understanding the hidden dimensions of meaning, Freud (1958).

Hegels conception of aesthetic awareness is surprisingly close to the idea of pragmatic aesthetics as expressed by Dewey (1931), a representative of the anglo-saxon school of empiricist philosophy which is in many ways irreconcilable with the German idealist/phenomenologist school of thinking. Essential in Dewey's thinking is the notion of *qualitative immediacy* and the unification of awareness and judgement in the experience of art, where Dewey stresses the re-creating role of the subject/recipient in experiencing art. In this way, the experience of art is instrumental, according to Dewey, to reconcile the individual with his environment.

A similar concern with the existential role of the experience of art, and consequently aesthetic awareness, may be found in hermeneutic thinking of the 20th century, where for example Hermeneutics speaks of *beauty bridging the gap between the ideal and reality*. However, by that time art is no longer pure but must as *aesthetic art* be appreciated with a certain degree of *distance*, that is its judgement is no longer direct, governed by pure sensuousness, but regulated by reflection and to a certain extent disciplined appreciation. This position may, however, be attributed to the role of the arts in the 19th and 20th century, and even, as argued by Grau (2003), be seen as an opposition to the mass media of the 19th century, which strived for direct sensuous immersion, for example in life-like panoramas.

The influence of convention and social context has been studied in semiotic theory, Kress and van Leeuwen (1996), and in our time, where we are concerned with the influence of the old and new media, and *media literacy* is (again) one of the urgent topics on our political agenda, the relation between sensuousness and reflection is again of interest. We believe that the semiotic perspective is of particular importance for the design of interactive systems. Nevertheless, to summarize this section, for our epistemological understanding of aesthetics the original notion of sensuousness as the *receptive side of our faculty of knowledge* still seems to provide a good starting point. However, both an analytic view of *aesthetic awareness*, which for example forces us to think about the difference between aesthetic experience and a drug-induced state of mind, Saw (1971), and a recognition of the *moral dimension of beauty*, Meditations, may serve us in establishing the value of aesthetics for the design and appreciation of interactive systems.

Assuming a notion of aesthetics as a *logic of sensibility*, we may, in summary, distinguish between three dimensions of *form*, extending Kant's original proposal, as indicated below:

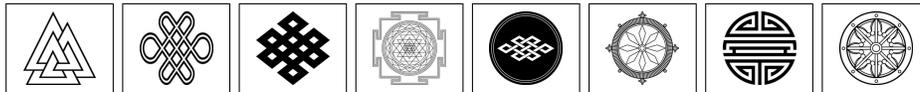
dimensions of aesthetic awareness

- spatial – topological relations, layout of image
- temporal – order, rhythm, structure
- dynamic – interaction, reflection, involvement

The dimension of *dynamics* clearly is the great unknown, and more in particular it is the dimension we have to explore in the context of interactive systems, not

in isolation but in relation to the other dimensions, not so much to establish definite criteria, but to understand the forces at work, or in other words the relevant parameters of design. Sartre (1936) gives an existential foundation for the dimension of *dynamics*, by observing that the human body is instrumental in gaining awareness, as the *centre of both obscurity and reflection from which consciousness emerges*, through selection and action.

It is in the existential dimension of aesthetic awareness that we come most close to the experience of the new digital artefacts, since it concerns both involvement and human action. Interestingly, and in apparent contradiction with Hallnäss and Redström (2002), cited previously, to establish a foundation for the aesthetics of interactive systems Interaction seek refuge with *pragmatist aesthetics* as it *promotes aesthetics of use rather than aesthetics of appearance*. Again, although we agree with the gist of Interaction, we wish to emphasize that the contribution of pragmatist aesthetics is not its focus on *use*, but the role of *experience* in understanding and appreciating aesthetic artefacts, that is the active role of the subject in becoming aware of its meaning.



13

questions

towards an aesthetics for interaction

1. (*) Discuss the factors affect interactive game playing, and indicate how they may contribute to the success of a game.

concepts

2. Describe the model underlying game playing.
3. Discuss how narrative(s) affect interaction in game playing.
4. Characterize the notion of meaning from a semiotics point of view. Explain why meaning is dependent on cultural context.

technology

5. How would you characterize the role of interaction in game playing?
6. Give at least two construction rules for cinematographic narrative, and explain their use by an example.
7. What is the difference between a signifier and a signified?
8. Explain the role signifiers play in the aesthetic appreciation of an application.

projects & further reading As a project, explore the ways narratives may be constructed from a collection of images. Deploy the various editing facilities

for providing flashbacks, flashforwards, and other (temporal) relations within storytelling.

You may implement this using flash, VRML, or even try to embed such a narration facility in a game level developed with the Delta3D or the Source SDK.

For further reading I suggest you to take a look at more theoretical material from media theory, such as Bolter and Grusin (2000). Also there is a large collection of books from MIT Media Press that is of relevance for our new visual culture.

the artwork

1. einzelganger – *walking man* of Alberto Giacometti, taken from an announcement of the Ives Ensemble, Amsterdam.
2. game component framework, from Björk & Holopainen (2005).
3. diagram MIME
4. diagram *experience as meaning*
5. Roy Lichtenstein, 1962, (a) Kiss II, (b) Masterpiece, (c) Forget it, forget me.
6. edgcodes – showing George Lucas and his *editoroid*.
7. El Lissitzky, suprematist works
8. El Lissitzky, suprematist works
9. Roy Lichtenstein, 1999, Still lifes with brushstrokes
10. Les Demoiselles d'Avignon, Picasso, 1908, regarded as the start of Cubism, and Le Goutier, Jean Metzinger, 1911, often referred to as the Mona Lisa of Cubism.
11. poster for exhibition of dutch china work.
12. signs – abstract, van Rooijen (2003), p. 228, 229.

The *walking man* is one of my favorite sculptures, for over a long time. It is also associated to the motto of part iv: *a journey of a thousand miles begins with the first step*. As an autobiographical note, the *walking man*, with *einzelganger* superposed (in translation *loner*), reflects the writing of *topical media*. In particular, the image put in sequence, reminds me of the repetitive complaints of my (former) superior at the faculty, who over and over again told me that I was always *alone in my room, isolated, on an island*. I must admit there is a truth in this, as I felt that the disciplines of software engineering and multimedia are widely divergent, and in that sense I was on my own. This book has undergone many rewritings, due partly to a clash between the expectations of others and my own vision on multimedia. And with a superior who emphasizes that he is "the boss", but has no intellectual authority nor any inspirational leadership whatsoever, at least not in the area of multimedia and game development, there is really no other way than to go your own way. So I did it my way, indeed, quoting Paul Anka's song, made 'unforgettable' by Frank Sinatra.

In other words, after this brief autobiographical digression, the visual theme of this chapter on the aesthetics of interactive systems is on individual judgement, as exemplified among others by the suprematist works of El Lissitzky, the amplification of cartoons as art by Roy Lichtenstein, and the pioneers of Cubism.

After all, individual judgement is what you need, when you wish to be involved in multimedia and/or game development.