University of Amsterdam

History of Digital Cultures

Avatars and De Digitale Stad

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Chapter 1

Introduction

Wednesday January 7th 2015 Tjarda de Haan presented the Re:DDS project of the Amsterdam Museum in the course History of Digital Cultures at the University of Amsterdam. Project Re:DDS aims to preserve De Digitale Stad (DDS), to map the history of DDS, internet and e-culture in Amsterdam, as well as to include DDS in the collections of the heritage institutions.

De Digitale Stad, The Digital City in English, was a Dutch Free-Net that existed between 1994 and 2001. It was set up to provide easy access to the internet and to improve communication between the government and citizens.

As we got enthusiastic about the project during the presentation, we offered to help the Amsterdam Museum with Re:DDS. For us, the focus remained at the course History of Digital Cultures. We tried to help the museum with parts which were useful for our course.

The goal of the course History of Digital Cultures is to perform historic research where the focus is on a single point of interest, during the history of the digital culture, for example since the first computer was proposed. Our goal for this course was a little different than the other research groups, since we are not only researching a single point in history, but also helping the Amsterdam Museum with finding significant historical information from De Digitale Stad. Our report will contain a large part about our progress description in excavating DDS, while the literature study of other groups is more extensive.

The report consists of two parts. The first part describes De Digitale Stad. At the start of the project, Tjarda mentioned that every user got a, seemingly, random avatar. These avatars, later discovered to be known as DoDo's, were used in DDS and really drew our interest. Therefore, we decided to focus ourselves on the avatar culture in DDS and the internet in general. This will be described in the second part.

Chapter 2 gives a general background on De Digitale Stad. After this, in chapter 3 Re:DDS and the field of web archeology will be described. Web archeology is a big part of this project and relatively new. We will discuss how we of the data and contribution to Re:DDS in chapter 4.

In the avatar part of the report, we will take a more historic approach to our subject. We will take a look at the origins and uses of the word avatar, and their different meanings. After that we will look at the role that avatars plays in our life nowadays. We close with our conclusion and some recommendations for future research.

Part I

De Digitale Stad; The Digital City

Chapter 2

Background on DDS

This chapter describes a concise history of De Digitale Stad (DDS). What is DDS? What lead up to it? And why did it disappear?[1]

De Digitale Stad, The Digital City in English, was a Dutch Free-Net that existed between 1994 and 2001. It used a city as a metaphor to reduce the learning curve and improve accessibility of the internet. De Digitale Stad was the first online Dutch community, it was initiated by cultural center 'De Balie' and Hack-Tic, a computer magazine which would later become XS4ALL. Before DDS, internet was only available to privileged groups and scientists. Thanks to DDS, internet became available for anyone. People could get a free account, with email internet access and a home page included. The only thing that you needed to connect was a modem, but there were also public terminals that allowed free public access. In this chapter we discuss some key events that lead to the founding of De Digitale Stad. We will talk about DDS itself as well as the reasons it went down.

2.1 Before the DDS

An important event in the history of Dutch internet happened on November 17^{th} 1988. At 2:28 PM, Piet Beertema, a system administrator at the CWI[2], received a mail from a man called Stephen Wolff, in which he confirms that the connection is working. To be more precise, the CWI was connected to the NSFnet in the United States, of which Wolff was the Division Director. The NSFnet (National Science Foundation Network) was a project that aimed at the support and promotion of research and educational networking in the United States. The NSFnet is also the name of the project's physical network backbone. With this mail, the first open transatlantic internet has been established: the Netherlands were connected to the internet (Bee).

[1] Inspiration for this chapter come mainly from Lovink [2002] and Rustema [2001], as well as Hinssen [1995]. Last but not least several sources from ReD have been used, but we will not list all of them. We try to be concise here. We do not focus on social impacts, managerial decisions or external factors that influenced the course of life of DDS

[2] Centrum voor Wiskunde en Informatica

Still, there was no place for internet usage by the public. Universities, corporations and research institutes were the main users. There were two internet providers at that time: NLnet for companies and SURFnet for educational institutes. Several developments caused the 'opening' of the internet to the public. First, there was cable broadcasting. The cable network was run as a public service, not as a governmental system. The were, for example, a few special television channels dedicated to cultural groups. These groups could experiment with broadcasting that way. Together with the limited budget these groups had, this lead to tv-shows that where more down-to-earth and people-based, as opposed to mainstream programs that were living on commercial and/or elitist base. Secondly, avant-garde cultural institutions like 'De Balie' and 'Paradiso' started to see the use of new technologies. They understood that these technologies were not only for research institutes, business companies and governments, but also for the normal citizen that likes to tinker with hardware. Ultimately this lead to their investment in DDS.

The aforementioned developments affected the media culture in Amsterdam. The focus on commercialism and highbrow culture in the media shifted to participants that had limited budget (and were therefore relying on volunteers) as well access to only basic technology instead of e.g. the supercomputers of research centers. One of the reasons of these cheap-looking practices is the way how projects got funded. It was possible to get subsidy for a project, but this shifted from recurring payments to a single one. This meant that large-scale, long-term productions were limited in their possibilities, and smaller projects had to be innovative and adopted a 'quick and dirty' attitude.

2.2 The inception of De Digitale Stad

DDS started 21 years ago on January 15th 1994. The founder of DDS was Marleen Stikker of cultural podium and debate center 'De Balie'. She was supported by Hack-Tic, the first Dutch magazine meant for hackers. It was specifically meant for people who had interest in so-called techno-anarchism. Techno-anarchism meant rejecting the current ways of using technology, mostly with respect to the government with their extremely expensive networks. Techno-anarchists do not only reject, they also seek alternatives. For example, they are looking for cheaper internet access for everyone. Techno-anarchism is for everyone who thinks that technology should be for everyone to use in their own way.

The city council elections from 1994 were the incentive for De Balie. They wanted to research how internet (and the World Wide Web) could influence local politics[3]. At that time the involvement of citizens with the local government was low. They saw that information technology was more than just working with data. People should be able to communicate and debate in a non-hierarchical space. Online fora and Bulletin Board System (BBS) were already successful at that time. De Digitale Stad was going to be a project of ten weeks

[3]More broadly the term 'electronic media' was used. This could be because the WWW was very new at the time.

that uses existing technology to open inform the people the local politics of Amsterdam.

Stikker decided to team up with Hack-Tic. In 1993, Hack-Tic had set up the first internet provider, XS4ALL, that was meant for normal people, whereas earlier providers (SURFnet and NLnet) only gave access to academies and businesses. However, the threshold to explore the internet was still high. There were no such things as computer cafés, and there were no possibilities to take free trials of internet service providers. That's why XS4ALL supported the idea of DDS.

De Digitale Stad was inspired by Free-Nets that were already existent in the United States and Canada. A Free-Net (sometimes called community network) is a network situated in a specific geographic area which provides communication between citizens of that area. The topics of communication are usually relates to the actual community itself. Information should be there to benefit the community. For example, in the first Free-Net, the Cleveland Free-Net founded by Dr. Tom Grundner in 1986, health information was delivered to the public. These Free-Nets were originally Bulletin Board System (BBS's). Some of them have died, others have continued to live on in the internet era.

De Digitale Stad used the metaphor of a real city. The reason for this was to make the, mysterious, concept of cyberspace comprehensible. For example, there was a part named Overheid (Government) which can be seen as a digital town hall. In this town hall it was possible to connect with council members, and to ask about any kind of issue. There was a post office where people could receive mail - currently known as e-mail. People could go to the Central Station and 'take a train' to other places on the internet. There were digital bike paths with bike routes and repair shops. There was a gallery with actual art. This metaphor made the technology of internet understandable. People who had no knowledge about Unix could now use the internet.

2.3 Welcome to the City

The first version of DDS was a black screen with a menu (2.1). It was based on Freeport software, which was also used in American Free-Nets. The protocol it ran on was the Gopher protocol (4.5.4). The early months were extremely busy. People had to buy modems, but they were hard to find in the Netherlands because they were constantly sold out. It is important to know that modems were unheard of at that time. An early citizen, Christine Karman, remembered that on the first day she tried to dial in to the number of the DDS (020-6225222) and failed. She later heard that all modems of DDS were occupied.

The second version, launched on October 15^{th} 1994, was a web version. Contrary to the first version of De Digitale Stad, this version ran on the HTTP protocol. At that time the World Wide Web with its hyperlinks was starting to revolutionize the world. This was a reason for DDS to try out The possibility to try WWW. A plus side of this new technology was the possibility to create a graphical user interface, which was more attractive than a text-based one. A

Figure 2.1: Screenshots of DDS 1.0 and 2.0

different reason to step back from the original Freeport software is that people did not like Freeport: it was too slow. Version 3.0, from 1995, introduced squares and residential areas, in which people could build their own homes (web pages).

One of the success stories of DDS was De Metro (The Subway) is a MOO [4], a text-based virtual reality system. De Metro was built by Michaël van Eeden, also known as Mieg. Mieg was the systems administrator of DDS. He named this MOO the metro because of his fascination for subterranean worlds. Or, to quote him: 'I always liked subways. They have a dark and sinister side to them. You don't have a clue what goes on in those deep-rooted, pitch-dark canals, or who lives in there.' Hinssen [1995] The Metro was a place were people lived their digital lives. People could build houses to live in, as well as meeting places like parks.

Immediately DDS was a great success. During the first week DDS had already gather more than 3500 residents, and over 2000 unique page-views each day. And its growth continued. A notable thing however, is the dispersion of males and females on the DDS. Only a mere 10% of the inhabitants of DDS, was female. So DDS was a predominantly male occupied city. Some argued that the male favoritism had to do with the overall design of DDS (Rommes et al. [1999]). Due to the nature of most of the technology at the time, most technologically gifted people were males. This was also seen in the design process of DDS, which consisted of a mostly male team. They might have (unintentionally) projected their own male interests unto the city. Which in turn, made it attract even more males.

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2.4 The fall of DDS

In August 2001, DDS as we knew it ended. Free access to De Digitale Stad ended and DDS went on as a commercial internet service provider. This decision had

[4]Mud Object-Oriented. A Mud is a so-called Multi-user dungeon

a big impact on its user base. How did it come so far?

DDS never met its original goal of connecting citizens with politicians, but grew out to a successful community. A reason for this is the public and free characteristics of De Digitale Stad. It was no project from the government, there was no real advertisement (or propaganda for that matter) for the local Government; nor were there any stimulants to get in a political discussion. The main problem was the absence of politicians. People were free to create and debate themselves about any kind of topic.

The freedom in the City meant that it quickly got an 'underground' image. Obscure cultural subgroups knew to find DDS. There was for example a café which was a meeting point for Harley-Davidson bikers. Not only was there a gay-bar, but also several houses aimed at homosexuals which contained pictures of men. There were houses dedicated to drugs. There were even so-called 'warez-houses', houses with (illegal) software. These houses were usually short-lived. It could be said that these different groups made the whole DDS-community, but Lovink [2002] states that there was never a single, large community but rather a facilitator for smaller communities.

When De Digitale Stad became a foundation and governmental funding stopped, the whole organization behind-the-scenes changed radically. DDS attracted young workers thanks to its reputation. Since there was no money coming in, these workers had to do jobs for clients of DDS in the public sector. The money they earned got pumped back into the city. There were no problems for the outside world, since these jobs were always in line with the goals of the foundation. Starting from 1996, DDS became less innovative and started to deteriorate.

What seemed like a hard hit for De Digitale Stad was the rise of Dutch internet service providers. 'Planet Internet' for example, started in 1996 and a year later 'Het Net', which was part of KPN, came to the scene. For a small fee people could access all of the internet across the nation, and stop using DDS as their main entry portal to the internet. Professional organizations left their offices in DDS and got their own domains. DDS became just a random place on the internet.

Still, the strength of DDS was always the community. Even that started to dismantle. The problem was that all the different communities we mentioned earlier were hardly attached to DDS. A possible reason could be that the new interface was not as suitable to communicate as the first one. The only thing they all had in common was their internet service provider: DDS.

Not only subgroups were dwindling, the residential areas deteriorated as well. At a point in time, there were not enough houses to live in. It became possible to 'squat' houses that were not active for a long time[5]. People eventually did not care anymore for the new residential areas and soon they became ghost towns.

Perhaps the only part of DDS that still remained successful was 'De Metro', a chat world. There were no restrictions (apart from imagination of course) and all creations lasted eternally. Objects created in De Metro were also connected

[5]There is a history of squatting associated with the DDS but we did not focus on that.

with every other object, in contrast to the houses, which were only connected in one way. Some people of the the WHOIS part of ReD mention 'De Metro' as their best memory. De Metro also continued to live on [6].

In the end, commercialization was the deathblow. On February 15th 2000 the foundation turned into a holding consisting of four companies: DDS Venture Ltd., DDS Service Ltd., DDS Projects Ltd. and DDS City Ltd. However, it was still difficult to get enough money to ensure survival of the holding. Parts of the city were sold. Some projects were sold and DDS Services was sold completely for example. Late 2000 the future of DDS was uncertain and especially the city. At this point the 'Vereniging Open Domein' came to the scene. It consisted of (former) employees who were concerned about the City and wanted to bring back the early days. Unfortunately, the negotiations with the owners of DDS Holding failed and the City died.

[6] See `http://www.demetro.nl/`

Chapter 3

Re:DDS and web archaeology

This chapter describes what web archeology means. We give two different cases that clarify the meaning of it. We also show what the goals of project Re:DDS from the Amsterdam Museum are.

3.1 What is web archeology?

Web archaeology is archeology performed on a relatively young phenomenon, the World Wide Web. Web archaeology aims to reconstruct an object (a website) by digital excavating, opposed to web-harvesting, which takes a snapshot of an object de Haan [2015]. It is also different from web archiving in the sense that archiving is usually nothing more than regaining the original pages, either by crawling or by finding archives.

Web archaeology is a subcategory of digital preservation. Digital preservation aims at making digital artifacts accessible and usable. Digital preservation combines strategies, policies and actions. The notable part of the information is that has the so-called 'born-digital' property. Born-digital content is content that originated from a digital source like a web site.

Another interesting aspect is that web archaeology is done on non-physical objects, namely data. This alone makes it radically different from normal archaeology. Retrieved data can, if found in good shape, be copied and experimented on freely. If the backup of the data was bad however, corruption can lead to data loss. Compression is also hurtful for this field, because compression can be done in different ways that are not always compatible with each other. On the other hand, presenting the object is easier than physical archaeology. A physical object can only be in one place, while a digital object can be viewed anywhere. dig

Performing archeology on data also raises certain questions: Who owns the data? Is it legal to gain it? What about privacy? These are questions which

are far from easy to answer. Some might not even have an answer at all.

3.1.1 The first website

The first website originated from CERN, the European Organization for Nuclear Research. In 1989 Tim Berners-Lee proposed a way to manage information about experiments at CERN. This idea later became the World Wide Web. The first URL was `http://info.cern.ch/hypertext/WWW/TheProject.html`. The URL was inactive for quite some time, but using an archive that resides on the website of W3C (World Wide Web Consortium), the page is now back online. This version, from 1992, was not the first one though. Back in the day Berners-Lee made a copy on a floppy disk so he was able to show his creation to other people, but there were earlier versions that were unable to be retrieved, because they were replaced and overwritten.

Recreating the URLs was a straightforward process. An archive containing the html-pages was hosted on a web page of the W3C [1]. It was simply a matter of putting the pages back online again. Still, it is the first step in recreating the first website, `http://info.cern.ch/`. Information about this section, as well is more information about the project, can be found at CERN

3.1.2 Hyves

Hyves was a very popular social network in the Netherlands, it was launched on October 10th 2004. In 2010, Hyves reached a peak with 10.6 million users, but Facebook was gaining world wide popularity fast. In September 2011 Facebook had more unique visitors than Hyves, so Hyves started redirecting the focus from a social network to a more wide spread network. In 2013 the Telegraaf Media Group changed Hyves from a social network to a gaming platform. Users who had used Hyves as a social network were able to download their profiles until December 1st 2013, after that the profiles were removed. The Hyves platform is probably archived somewhere, but the whereabouts are currently unknown. It can be very interesting for the next generation to be able to dig through the data in a similar manner as this project works through De Digitale Stad.

When the announcement hit that Hyves would be shut down, some people recognized that Hyves could be something that was worth preserving. One group of people who recognized this was the Archive Team. The Archive Team is a group of people that plead for the archival of parts of the internet. Their motto is: 'History is our future. And we've been thrashing our history'. They called out for help and tried to archive the public parts of Hyves into the Internet Archive (IA). They did this with the help of a project called Archive Warrior. Archive Warrior is a project that provides the ability to let users help the team to archive certain websites. It downloads the corresponding pages, and uploads them to the archive. That way, they can have a lot of people archiving at once.

[1] the World Wide Web Consortium

There were a lot of accounts on Hyves, 10.6 million at its peak, as mentioned above. That is a whole lot of accounts to archive. So the project Archive Warrior really came in handy, it made the process that much faster. At one point, the project managed to archive 24 accounts each second. But still it was a race against the clock, since there was not much time left for the project. They started archiving at around half-way November. So they had a little over two weeks to complete the task. In the end, they managed to archive a little over 9 million accounts, which are available for public download (archive).

3.2 Project Re:DDS

Project Re:DDS has started in 2011 by the Amsterdam Museum and the Waag Society. The goal of project Re:DDS is to give De Digitale Stad a place in the history of Amsterdam. It attempts to rebuild DDS so that it can be seen by the public. Furthermore, the project wants to create awareness of the need for archiving and conserving the internet. That means that by 'digging up' De Digitale Stad other people can learn from it and use the experiences from the project to dig up other historical digital sources.

De Digitale Stad was founded 21 years ago. After seven years, DDS had become completely obsolete by the rapid developments of the internet and the enormous impact of the internet on the society. DDS dates from the very start of the internet for the average Dutch citizen. The internet was new for (almost) everyone in DDS.

The material that is asked for is very diverse. One part is the technical objects: servers, modems, terminals, freezes, archives and storage media like tapes and floppies. Next is the city itself: screen shots, homepages or simply memories. Last up is the phenomenon DDS: newspaper articles, official documents and more.

First, the project started with the launch of Open Geschiedenis Lab. The project is divided into four stages:

1. Digging
2. Analysis and reconstruction
3. Delivery available for museums
4. Completion of the project

Currently, the project is in the second stage.

The first stage started on Friday May 13th 2011 at the Waag Society. Former staff members, citizens and web archaeologists of De Digitale Stad were invited to bring their memories of the city. These could be personal or digital in the form of disks (de Haan [2014]).

In 2011, tapes of the Alibaba, Aladdin and Shaman servers of the DDS were given to the museum by Joost Flint, former manager of DDS. These tapes contain a complete backup of the servers, made to mark the second birthday of

the DDS and to enable future web archaeologists to see what was going on at the beginning of the internet for the public.

Having a tape is one story, reading the tape is something different. In July 2013, Henk Peek of the computer museum at the University of Amsterdam finally were able to read the tapes. The second stage could begin... The freeze was given to two web archaeologists, but due to their limited availability, more help was needed.

Chapter 4

Our contribution to Re:DDS

In this chapter we will describe how we applied web archeology to the data from the freeze, that is investigated in the Re:DDS project. Web archeology is not an exact science; by documenting our progress, we hope to enable others to reproduce the steps, view the process and rationale behind our decisions and to understand the challenges we encountered. Because of these descriptions, the chapter will be less formal than the other parts of the report.

4.1 Visit to the museum

The day after Tjarda de Haan her presentation in our lecture we visited the Amsterdam Museum to see the current exposition about De Digitale Stad. Currently, this exposition only exists of an original chair from a public terminal, designed by the renowned industrial artist Stallinga, together with a nice wall of avatars which were used in De Digitale Stad.

At the museum, we discussed the project with Tjarda de Haan and Theun van den Doel who represented the Amsterdam Museum and our supervisor from the University of Amsterdam, Jurriaan Pots. This greatly helped us to get clear what the museum would like to see and what was expected from us in the History of Digital Cultures course.

A protected WordPress blog was set up after the meeting, where we regularly would describe our progress as complete as possible in layman's terms. A large part of the texts from the blog is used in the report for the course.

As we had not yet access to the data, we discussed what the data could possibly contain, in what format the data would be and which tools could be used to do research on the data. The meeting helped us get a clear view on the technical knowledge of each team member and provided ideas for what would be possible with the data. It also managed our expectations: it was not expected from us that we would come up with a working version of De Digitale Stad.

4.2 Obtaining the data

The day after the visit to the museum, the lecturer, Gerard Alberts, gave us access to the data. But not before we promised to respect the privacy of inhabitants of De Digitale Stad and to delete all data after the project. While in 1996 after privacy concerns of users it was promised that privacy sensitive data from the inhabitants would be excluded from the freeze, removing privacy related data is technically very challenging. It could be well possible that we would encounter privacy sensitive data.

4.2.1 Privacy

This became an interesting conversation topic within our group. We suspected that we would actually encounter some privacy sensitive data. We argued that even with modern day technology, it would be a very difficult job to remove all privacy sensitive data from a backup. Transpose the problem to 1996 and the difficulty increases even more. Not to mention that for the time the freeze was made, the amount of data that was saved was enormous.

We also suspected there might be difference in what was considered privacy sensitive data between 1996 and now. We have come a long way with the technology today and we have much more experience in the uses and abuses of privacy sensitive data. Nowadays it is possible to find out a whole lot about a person simply using Google, at least if the name is not all that common. It would be entirely possible that some pieces of data that we would now consider extremely privacy sensitive, would be considered harmless in the past, although we could not give a concrete example of this.

4.2.2 The tapes

The freeze was saved on a couple of DLT-III tapes. These tapes are a cheap, long-lasting and reliable storage method with, at the time, large capacity, but accessing data is slow. Tapes are therefore often used for backups. A DLT-III tape can hold at most 10 gigabytes of data. Using modern standards, this is not much at all, but during that day and age, this was a whole different story. We were told it took quite some time before actual readers were found, which could handle these tapes. After the data was read of the tapes, research on the data could start.

4.3 Accessing the data

After all the formalities were handled, we finally got our hands on the data. The data we got was presented to us on an ordinary USB thumb-drive. This drive contained an archive which we were told would contain the data. This turned out to be a 9 GB `.tgz`-archive. This extension means that it is a `.tar` file inside a `.gz` file.

The `.gz` file means that it is compressed by `gzip`. Basically, compression reduces the file size by combining sequences of data into one in a reversible way, in order to reduce file size. This shortens the time necessary to transfer data. `Gzip` can only compress one file, which makes it able to compress large folder structures better than the also commonly used `.zip` format; `zip` compresses every single file within the archive, `gzip` compresses a single file - often a `.tar`, which takes advantage of the redundancy between single files and folders. Nowadays, there are better compression methods available, but due to historical reasons `gzip` remains very popular, especially in Unix based settings.

Since `gzip` compresses large folder structures better than `zip`, the compression used on the data is `gzip`. For this to happen the data is put into a `.tar` file. Tar is a file format that is a de facto standard used to put complete directories in a single file. It is an abbreviation of tape archive, because it was initially developed to store data on tapes more efficiently. This `.tar` file was then compressed into a `gzip` file.

4.3.1 Extraction

We first tried to extract the file the normal way, on a windows system. We quickly ran into some problems. There turned out to be several files which had the exact same name, only different capitalization's. That prompted us to switch to a Linux distribution as operating system for our archeology. This operating systems supports case-sensitive file/folder naming, as well as extensive command line tools that allow efficient data analysis.

So we then tried using the `tar` command in Linux, which is used to extract archived files. However, we immediately ran into trouble. During the extraction, somehow a file was being created that became enormous. When we stopped the extraction, the size of that single file already had skyrocketed to about 80 gigabytes. When we went and inspected the file, we concluded, that file should not have been that big. It was a file, which logged some of the played chess games of a player.

After quite some trial-and-error work, with a small trip back to using Windows, we eventually ran some tests on the archive, to see if the end of the archive would even be found. This test took a while to finish. When it finally finished it indicated that the archive contained 2.3 terabytes of data. We knew this could not actually be really 2.3 terabytes of data though, since the compression ration of the archive would be $255.56 : 1$. This kind of compression rate is unimaginably good and would be widely used throughout the tech industry if it was possible.

Luckily, Marc had some free space lying around to just extract the files and see what happened. When the extraction started, it took about two and a half hours to finish unpacking. We could then identify which files where corrupted, so others could maybe skip these files while extracting. It turned out that 4 different files were corrupted, each being around 570 gigabytes in size. We decided we would inspect the files, to see if we could find out what was going on with those files. This started by running a Linux `head` command on the file. The head command displays the first x lines in a file, instead of showing the entire

file. It seemed that the file's first few lines contained the data it was supposed to and after that, the command froze. Our follow-up idea then, was to inspect the file with a hex editor. A hex editor allows for file inspection in hex format, a format that allows inspection of the binary numbers computers use under the hood more easily by using a hexadecimal system for the representation of numbers. We hoped we might be able to see what was wrong, and indeed we did. We saw that indeed the first few lines of the file were intact, but after that a whole bunch of zeroes filled the rest of the file. However, we don't know for sure, what caused this to happen.

4.3.2 FTP Access

Almost concurrently with the testing and extraction of the tar archive, we took another route to try and get access to the data. We knew that some other researchers were already working with the data. So they must have managed to extract this data somehow. After talking with Tjarda, we got a phone number of one of the researchers. After talking to the researcher, we found out that he also had the same big files as we found. His theory was that this had to do something with broken symbolic links. A symbolic link in a Unix environment is a mapping from one file/folder to another file/folder at a different location. It could be possible that an error in this file caused it to bloat when extracting. He then created a FTP-account so we finally had access.

So we got access to the data in two different ways. And the funny thing about it all, is that there was only 20 minutes in time difference between the two methods. That goes to show, there's more than one way to skin a cat. So, now we finally had the data and the digging could begin.

4.4 Digging through the data

We now had this massive amount of data, much more than we expected. We started by doing what most people would do. Namely, clicking random folders that sounded interesting and traverse the files that way.

We quickly discovered that the operating system was Solaris, a Unix variant for Sun Sparc processors. These processors are very different from modern processors; although Unix variants are still commonly used today, we had no hope to run programs from the servers on modern machines. Luckily, Unix is heavily text based. Due to their simplicity, text files are a real gold mine for data diggers.

We started by traversing the files randomly, but quickly realized that it was not the way to go. There were simply too many files. We had to find some sort of structure in this enormous pool of files.

4.4.1 Server partitions

Upon closer inspection of the folder names of the extract, we concluded there were basically three sets of folders: `alibaba[0-3]`, consisting of an c/d version, `dds[0-4]`, consisting of an a/b version, and `shaman[0-8]`, consisting of a g/h version. This structure first led us to believe that the two different versions of each folder, were duplicated folders. To test this theory, we ran some tools like the `diff` command. This showed us that for the most part we were correct. Only the pair `dds2a` and `dds2b` differed from each other. When we took a look at the differences, it turned out that dds2a was missing some folders, that `dds2b` did contain. At this point, we had halved the amount of data we had to dig through.

4.4.2 Combining the server partitions

The second method we used to structure the data, was combining certain folders. As described above, we basically had three different folder names: `alibaba`, `dds` and `shaman`. We argued that the reason for this folder split might be because the `alibaba`, `dds` and `shaman` were three different servers. The different folder numbers for each server were different hard drives inside the server. From an administrators point of view on the original DDS servers, these hard disks were merged to one, large disk. Therefore, we decided to combine these server folders to mimic this perspective.

After we did that, we already structured the data we had found quite a bit, but it still wasn't enough. We needed a method to make it easier to search through the data, or to notice interesting folders.

4.4.3 Visualization

It seemed to us that it could be really useful to visualize the folder structure in some way. That way, we would be able to look at multiple levels of folders at the same time. Our first try with this, was by using the `tree` command. This did produce a result, but unfortunately the output was completely unreadable. The `tree` command produces a line per file/folder it finds. And the number of files in total was just too much to get a clear read on the situation. We then started looking for another way to visualize the data.

We decided to visualize the data with a Unix program called FileLight. FileLight is a program which scans all files and folders, and creates a circular image of its findings. Each colored block inside the circle represents a folder, and its size in the circle corresponds with its respective size on disk. We ran this program on all three servers and took a look at the image that originated from that. Figure 4.1 shows the resulting picture from FileLight for the alibaba server.

Each picture gave some insight as to where certain parts of the digital city were located, but overall, it was only a broad perspective we gained. We learned that the shaman server contained all the home folders of the users. This means

that the houses of everyone were probably saved here. We also saw, that the newsgroup section was located in the alibaba server.

4.4.4 Data search

Another technique we used to traverse the data is basically just regular search. Using Unix commands such as `find`, `grep`, `fgrep`, etc. We compiled a list of all folders and file, but this compilation was very large (160 MB) and still took some time to look through, so we split this into smaller subsections, containing only `folders`, `.html`, `.gif`, `.bmp`, `.pl` or `.c` files. From there on, most of what remained was good old manual labor. Working through these lists and hopefully recognizing the interesting bits.

4.5 Findings

4.5.1 FICS

Using the above techniques we came across quite a few interesting things. One of the first things we ran into was FICS. FICS was a chess system that was used on the digital city. The system provided a platform to play matches against each other. It also seemed to save all the match data. Even replay-like files were found, which contained a notation that is very similar (if not completely) to the algebraic notation chess players use today. This folder was also the folder where two of the corrupted files originated. The corrupted files should have contained only a match history of a certain player, but obviously something went south.

4.5.2 Newsgroups

The next thing we ran into was a whole section related to newsgroups. Newsgroups are basically the predecessor of the modern forum. It was a place where people would come and "post" a message. This message could be anything, from a statement, poem, question or even an advertisement. These messages were compartmentalized by the structure these newsgroups had. Each large newsgroup had divided its server in different parts. For instance some of the newsgroups that the digital city had were:

- dds.agenda
- dds.banenmarkt
- dds.technopolis
- dds.drugs
- dds.kunst
- dds.stadsnieuws

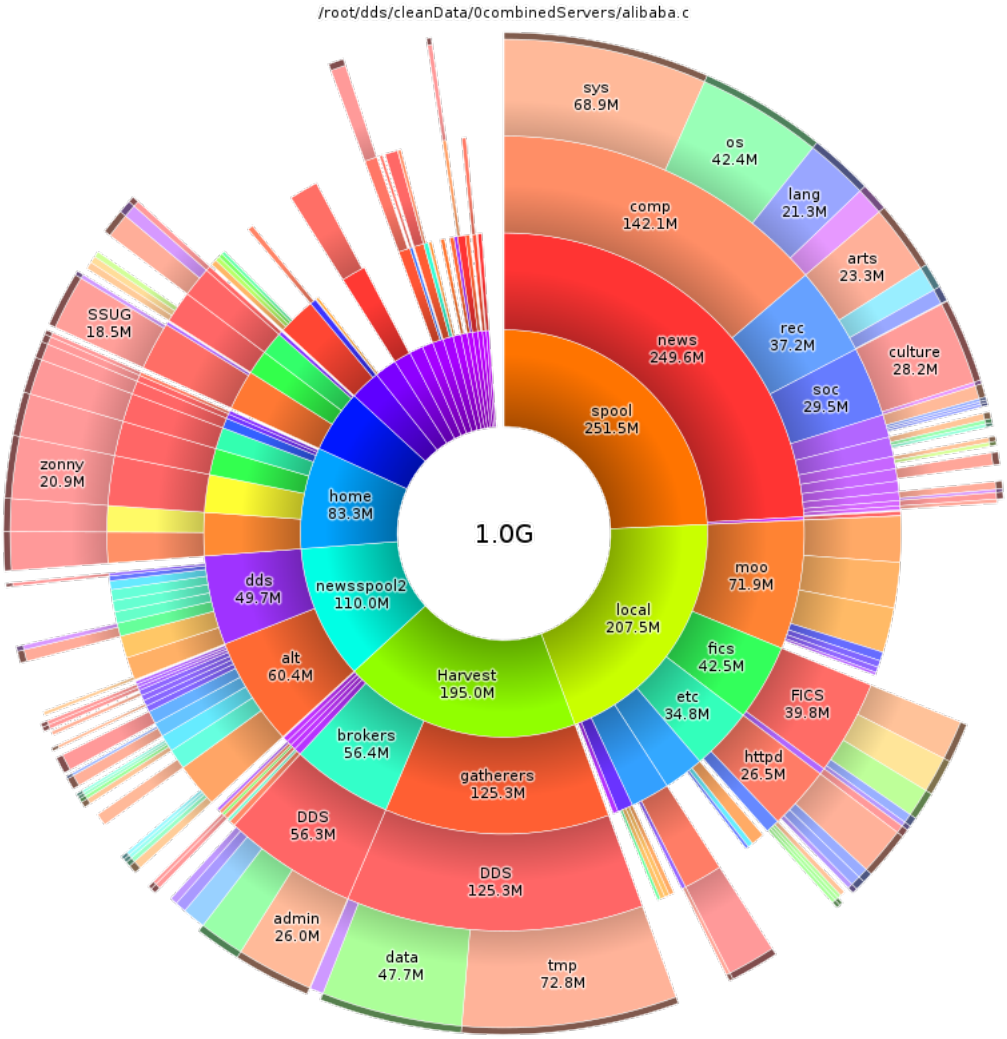

Figure 4.1: FileLight visualization of the alibaba server

In the data we uncovered, we found quite a few messages posted on these newsgroups, ranging over a broad spectrum of topics. From promoting a CD, to asking for help for a book-report.

4.5.3 Landing page

Next, the hunt for the digital city's doorstep, the index.html page or its equivalent, started. Our search for this page lead also to the discovery of the home folder for one of the programmers for the digital city, Erwin. This folder was completely separate from the other home-folders. There were a couple of interesting files in this folder, for instance there was an archive containing the work in progress for a book which would later be sold: 'Handboek Digitale Steden' (Handbook Digital Cities) (Schalken and Flint [1995]). Who could have known that Erwin would play an even greater role in our findings later on.

After the interesting Erwin sidetrack, the hunt continued. And eventually we actually found the digital cities doorstep. Using that as a starting point and looking around that, we found a lot of interesting material. The main page of the digital city contained a pointer to a 'tour' of some sorts. This tour turned out to be a virtual tour through the digital city. It explained what the digital city was, what you could do there and even how to become a member. We were really surprised to find this piece in such good condition. Apart from a couple of absolute hyperlinks, all hyperlinks actually worked and thus, the tour was (mostly) functional.

4.5.4 Gopher

The back end system of DDS 1.0 did not use HTTP, but an alternative protocol called Gopher. This protocol was strongly designed for menu based web pages. It was very effective for the terminals that were running during the time of DDS 1.0. Gopher did ultimately lose to HTTP due to the dependence of text-oriented computer terminals. The Gopher menu based protocol is best shown in figure 4.2. The only options the user could select were shown on the screen, the system would not respond to any other request sent by the user.

4.5.5 User generation

Next, we set a goal for ourselves. Since we had now found the main page of the digital city, there were a couple of roads we could have taken. We chose to focus on finding the avatar generator that De Digitale Stad used for its citizens. Partly because the wish to find this was expressed by the Amsterdam museum. So starting at the main page of DDS, we started looking for a sign-up form. Once we found this page, we dug into its code. The code seemed to post the information it got to a script called ACTNU (ACTivate New User). This script however, was not around any of the folders here. So it took us a little time to actually find this script. Luckily for us, most of the scripts used at DDS, had their source right next to the compiled version. This allowed us to inspect

Figure 4.2: Main page of DDS 1.0 was based on the Gopher protocol

this code. Inside the script file, the definition for the creation for a new user was located. It showed that several folders were created per user, like the ones described below. There was also one line of code that declared a variable, which turned out to be our next lead. This variable called `DODOPROG`, contained a path to another program.

4.5.6 Home folders

During sign-up every user had to provide a user-name and a password. Using this user-name a DDS e-mail address was generated as well as the home folders for the user. Each user got a home-folder, this home-folder was readable for everyone inside the system, but only the user was able to make changes inside the folder. Inside this home-folder three more folders were created, `work`, `mail` and `www`. The `work` folder is only accessible to the user himself and the system administrator. Private data could have been stored here and is definitely interesting for further research. The same goes for the `mail` folder. `www` is the folder where the houses of the users are located (the web root directory). This is therefore also executable by any other user inside De Digitale Stad. Inside the `www` folder, a fourth folder (`ident`)was created which would house the avatar generated for this user. The avatar generated in this folder was possible to be read by the whole system. The user was not only able to read the avatar image but write to it as well.

4.5.7 The DODO Program

At this point we tried to continue to find the avatar generator. We had an excellent lead inside the ACTNU script, namely the variable which should have pointed to the `DODOPROG`. However, just as with the ACTNU script, the actual folder it pointed to did not exist. We had to search all the data again to find the path within the `DODOPROG` variable. It took a while, but we finally found the file and as with the previous script, we were lucky enough that the source was

right beside the actual script. So we could, once again, examine the script and it was immediately apparent that this was in fact, the avatar generator.

Finding the generator was a great achievement for the group as well as the Amsterdam Museum, then the next step was to make it work again. This once again turned out to be not a task as easy as one might think. Because the code we were working with was really outdated, there was a big chance we could not get the script working. It was also no surprise that trying to compile the code did not succeed initially. The compiler complained that a certain library could not be found. And unfortunately we found out that this library was also nowhere to be found inside the data at all. After a whole lot of searching we finally came across this library, the only downside being that this was a much more recent version than that of the digital city. But we remained hopeful, included the recent library and tried to compile again. And again it failed, the compiled library was compiled to the older architecture. Therefore the next step was to find if the library was still available for download and install it from the source code. After installing this library on the server, we tried to compile the code again and the compilation of the code succeeded. Not only did the compilation succeed but the program actually worked. We learned from the source code that there were a couple of ways to invoke the program. One of the ways was without a parameter. This produces a random avatar, which the digital city people called a dodo, hence the name `DODOPROG`. The second way to invoke the program was with an user-name. The program would then use the user-name as a file-name to generate a random dodo.

It was understandable that we were very proud of this achievement. At this point we decided we would focus the remainder of our research on this avatar phenomenon.

Part II

Avatars

Chapter 5

A brief introduction to the brief history of avatars

5.1 Hindu avatar

The word avatar has a long history. The way we use the word now, is based on the Hindu word 'Avatar'. Avatar literally translates to 'appearance' or 'manifestation', although most of the times it simply translated as 'incarnation'. In Hinduism, an avatar is the bodily incarnation of a deity in the form of a human, an animal, or a combination of both, often to counteract some particular evil in the world. Avatar is, for most Hindustanis, most strongly connected to the incarnations of one aspect of the god Vishnu. This Vishnu could take on many forms, including a dwarf, tortoise and fish. It is said that when god feels the need for an incarnation, it is because of the freedom of will endowed upon people. Some sort of intervention is required. In the Hindu culture each person is responsible for his/her own karma, by the actions they take. But sometimes, karma alone is not enough and a big imbalance in the working worlds forms. If this is the case, an incarnation of god will appear in the world and rid the world of its evil.

5.2 The modern avatar

One of the first mentions of an avatar, other than in the sense of Hinduism, is in the book Songs of the Stars (Spinrad [1980]). The avatar there, describes a computer generated virtual experience. In the book, a group of people receives messages from an alien network that is trying to share knowledge through songs. To that end, a receiver is built to receive these messages and to send them. The machine also tries to send 'experiences' through the machine. They describe this as their mind being 'avatar-ed'.

Soon after this, the first mention of an avatar as an on screen character was coined by Richard Garriott. The term was used in the game 'Ultima IV: Quest

of the avatar', which was released in 1985. In this game, the creator intended the player to face a whole bunch of ethical decisions to complete the game. One would be judged by the decisions made. So Richard Garriott tried to entice players, to play their earthly selves, manifested in the virtual game he created. Because of the strong focus on ethical behavior, and you playing as a 'manifestation' of yourself, he opted for the use of the word Hindu 'avatar' for this behavior.

The term caught on and was used in other games such as the 1986 online RPG by LucasFilm, Habitat and the paper 1989 RPG Shadowrun. By that time, the digital world was all over avatars as an online persona. The first GIF avatars for instance, were already into play in 1990 and used at the Sierra-Network. The Sierra-Network was an online gaming platform that aimed to combine social interactions and games. To that end it consisted of a wide array of games and multiple chat-rooms and bulletin boards. Users were represented by an avatar through the use of what they called 'the face-maker'. This face-maker was detailed enough to produce 84 million different avatars.

These avatars quickly evolved and spread in not just online communities, but also games. In online communities the avatar became something people would recognize even more then an user-name. The use of avatars branched off in all kinds of directions. The main two directions it branched in, are 2d and 3d.

2d avatars are mainly used on things like forums, instant messaging and social networks. They mainly function as an identifier for someone. People recognize each other by these images, and they, often, know who that person is in real life. In some occasions, the 2d avatar is used to inspire trust. Some automated online chats also have an avatar. This gives the person they are helping, a sense that they are in fact chatting with a person, instead of a robot. However, off course there are websites that use these chat services, and actually use real people to chat with people. Here you will also often see that avatars are used to connect to, in this case, the customer.

Contrary to that, 3d avatars are generally more used in a gaming sense. The traditional 3d avatar is your in-game character which you can control. Some gaming platforms realized a more social oriented 3d avatar system. Like for instance Playstation World. In PlayStation World you can walk around a virtual city as your 3d avatar and interact with the world and other people. The Nintendo Wii uses a 3d avatar to represent you in many of it's games and also inside the Wii social section.

In De Digitale Stad however, the avatars were not yet as far advanced as we know them now. Although it is quite interesting what the general consensus around avatars were in DDS.

Chapter 6

Avatars in the DDS

6.1 The beginnings

As elaborated in Section 4.5.7, the DODO Program was found near the ACTNU script. It was located in a folder we did not expect initially, namely `dodos` within the home folder of the administrator `erwin`. This folder contained pseudo code, compiled scripts as well as source codes. The most interesting files here were `dodo.c` and `dodo.c.old`. The latter file indicated to us that the avatar generator consisted of multiple working iterations. Therefore, we expected that older users would have slightly different avatars than newer users. It later turned out that this would not to be the case. It was simply still a work in progress of the normal generator. The biggest differences between the older code and the newer code was that the newer code got a more elaborated coding part which would generate the dodo's mouth.

6.2 The avatar creation

6.2.1 The name

Inside `erwin`'s folder, there was a folder which contained a file called `dodo.html`. Whilst checking the code of this file, it showed several interesting details about the avatar generator. First was stated that DoDo - the name of the avatars - was derived from DDS in the following way: DoDo's, there was a vote between this abbreviation and DilDo'S, but this option didn't make the cut.

6.2.2 The design

The `dodo.html` file also revealed that the DoDo'swere designed by Rob van der Haar and programmed by Erwin Bolwidt. Rob created a file called `dd`, which contained his design of the DoDo's written out in pseudo code. This pseudo code has many similarities to one of the first versions of BASIC, yet it was

Figure 6.1: Old and New Avatars

written too lazily to actually be able to compile and run this code. Erwin wrote at least two version of the `dodo.c` code, since there is a file called `dodo.c.old`. The new version was created on June 6th 1995.

6.2.3 The gender

We can only speculate what the gender of the generated DoDo is, but we think that the avatars are gender-less. Partly to preserve equality between users. Moreover the avatars generated were a mere 45 by 60 pixels, which is not a lot of room to design gender specific features. Some possible features could be lipstick, facial hair or earrings, but these features require a lot of programming work. Another factor besides the aforementioned items could be that avatars were not yet recognized as user specific images such as profile pictures are today, although some users did manage to change their avatar to either a picture of themselves, or an other picture.

6.2.4 The mouthpiece

As shown in figure 6.1, the new and old versions of the avatars differ only at their mouth. Until June 6th 1995 the avatars generated had a relatively small mouth compared to their heads, ears and eyes. Also random emotions are drawn in the first version. In the second version there are mostly three types of mouthpieces.

6.3 The avatars

We were discussing whether or not the avatar generator was manual labor, pseudo random or fully randomly generated. It turned out after looking into the creation script that is was mainly randomly generated, but had a small feature that would generated a random avatar based on the user-name. Therefore, the number of randomly generated avatars per user would be limited - yet still a large number. So we can safely say that the avatars generated are random in fact.

Figure 6.2: Beaker from The Muppet Show

6.4 Questions to the creators

As the motives behind the avatar generator were not very clear, we wrote down some questions that were sent to two former system administrators of De Digitale Stad: Erwin Bolwidt and Michaël van Eeden (nickname Mieg). Erwin is one of the two designer of the avatars. The other designer is Rob van der Haar and has given some comments on the answers of Erwin and Michaël.

The main reason Rob and Erwin included avatars in De Digitale Stad was that they wanted to make the connection to the internet more personal. During the time of the development of DDS 3.0 the internet was expanding and developing. Erwin explains that the personal touch users had with the first version of DDS, because of the Bulletin Board System (BBS) was lost with the migration from Gopher to the World Wide Web. Online identities weren't as developed as nowadays and only represented by names, not avatars. The avatars were mostly used in pubs and to compose house districts. Most users didn't visit houses of pubs, so wouldn't see any avatars.

Rob van der Haar designed the avatar generator because in that time only very few people were able to draw their own picture in a computer program, or take and edit a digital photo of themselves an. At the time, the authors were not aware of any other avatar generators available on the World Wide Web, but if there would have been any, an own version would have been developed to create a unique one. Rob designed the avatars on an old Atari ST in BASIC - BASIC is a general-purpose high level programming language. Erwin Bolwidt then converted the code to C. They were inspired by 'Beaker' from The Muppet Show, a British television comedy series (see Figure 6.2).

The website of DDS was one of the very first world wide web pages that had interactive avatars. These avatars could be changed and manipulated by the user himself. Michaël van Eeden recalls one of the very first encounters where a man imitated a woman. A 'woman' contacted Mieg with the question to meet up in a bar in real life. When he got there he did not see this woman but it turned out to be a man who wanted to know how people interact with women, since he wanted to do a gender transformation; this man could practice the interaction inside DDS.

Because DDS was one of the very first web pages to have users linked to a generated image, one could imagine not everyone was happy. However, Mieg does not recall any specific instances of angry users. Rob recalls that some users

thought they deliberately got a big fat Dodo with red hair because they had red hair too. This was an unlucky coincidence.

When we found the DDS landing page, it said that registration would take up to two days. This seemed puzzling to us, first we thought it might be that the avatars are generated by hand, but when we found the avatar generator we could dismiss that theory. Another thought of ours was that the hardware was not up to speed yet to be able to generate the avatars instantly. According to Mieg and Erwin this was not because of the avatar generation, it would only take a fraction of a second. Mieg recalls that people would abuse the user registration form, so the help desk had to validate the user before he could enter DDS.

6.5 The explanation of the workings of the avatar generator

6.5.1 Setup

Rob van der Haar designed the avatar generator in a pseudo code for Erwin to convert to C, the pseudo code gives us an insight how the generator was designed to work. First certain global variables are set up which we can map to the actual C code. For example the first line: `CLIP 0,0,45,60` shows that the image should be 45 pixels wide and 60 pixels high.

45 is not divisible by two, but a center needs to be specified to be able to draw the avatar with the available programming tools. The code contains two variables that set the middle of the image as a baseline for the whole avatar. The first baseline is the x-axis. The middle is pixel 22, since 22.5 is not possible it could be either 22 or 23. The second baseline is the y-axis. This could be exactly pixel 30, but for variety in avatars the baseline for the y-axis fluctuates between pixel 25 and 35.

6.5.2 Face

The face color is chosen between the values of 1 and 16. Also the face gets a width and a height. The width is between 12 and 18 pixels and the height is between 16 and 26 pixels. When both the width and the height are equal (so either 16, 17 or 18 pixels), a round face is created.

6.5.3 Ears

Next the ears are drawn. The ears can have a different color. An ellipse is drawn starting from the side of the head at a height between 4 and 10 from the middle point of the image. This ellipse is has a certain width set by the `Flap` variable. This is again between 4 and 10 pixels. The height of the ear can be a little bigger, namely between 6 and 12 pixels.

6.5.4 Neck

After drawing the face, the code will draw the neck. This is defined as at least 5 pixels wide and not more than half the width of the face. The neck will get the same color as the face. The body is drawn again by an ellipse that is relatively large and only the top of this ellipse is used.

6.5.5 Eyes and Nose

The eyes are a little harder to create, since they consists of the sclera and the pupil. The sclera is a white ellipse drawn twice - for each eye one. Each eye has a distance between the middle x-axis by 5 to 10 pixels and the middle y-axis between 4 and 9 pixels. The sclera can be between 4 and 8 pixels wide and between 2 and 7 pixels high. This method could result in eyes that are very wide, but also small or very round and big. The pupil is placed between on the x-axis in the sclera between the possible corners. The eyes will never look squinted since the pupils are placed in the same direction.

The nose is generated as an ellipse that could have a different color than the body. The nose could be either very wide or very small or round.

6.5.6 Mouth

The mouth can be generated with two different emotions. There is a 1 in 5 chance that the face will be a sad face, and a 4 in 5 chance that the face will smile. The mouth is generated as an ellipse that is centered on the x-axis middle line. On the y-axis there is an offset between 7 and 11 pixels. The angles of the edges of this ellipse are calculated by the variable `Grijns` which is between 1000 and 3000; 2700 is then either subtracted or added by this digit. In the first version of the avatar generator this resulted in very small mouthpieces - in our opinion more cute than the actual version.

6.5.7 Hair

Finally the hair is generated. Again, a new color is chosen. There will be at least three distinctive hairs drawn, each hair will have a different length between 2 and 12 pixels as well as a different angle from the head. The angle is defined by the variable `Spr` which is between 4 and 16, next the variable `Veel` indirectly defines how many hairs will be created; the value of `Veel` is between 1 and 5, this value sets how many steps between the negative `Spr` variable and the positive `Str` variable are done. Each step also defines the angle of each single hair.

Chapter 7

The influence of avatars

We have talked about avatars inside De Digitale Stad, but that is not the only place avatars are used. Avatars are presented in a much broader spectrum and a virtually found everywhere. In this chapter, we try to gain insight in the effects of the general concept of an avatar on people and how they interact with one another. Theories described here might, in a way, also apply to avatars in DDS but is certainly not limited to that scope. The goal here is to get a broader perspective of the phenomenon 'avatar'.

7.1 The importance of avatars

For a long period of time, there were basically two ways to communicate with a person. One of them is the personal face to face communication, while the other is a written, impersonal type of communication. In the past when you wrote a letter to someone, you would almost always use your real name, since you knew who you would be addressing and most likely, the addressee would know you. However, when the internet started growing there came an increase in the need for anonymity. People came up with screen names, just to use online. This way they could talk to other people without explicitly exposing themselves to the outside world. It became a very easy way to communicate with other people. You could share all your thoughts and remain (relatively) unknown.

This however, also had a downside. Since everybody was using screen names on the internet it can be hard to figure out when you can trust someone, and when not. An online nickname does not really reveal a whole lot about a person. Let's say someone uses the nickname computerfan2 online. With just that name, we could not tell a whole lot about the person behind the name, other then perhaps that he or she, might like computers. We also don't know whether this person is a man or a woman (and the discussion on whether or not this is a good thing, we lay aside). This also creates some kind of tension, when you are trying to build a friendly community online. One has absolutely no idea who they are dealing with.

One way to create this trust, is by the use of avatars. When using an avatar,

people have a more general idea of who they are dealing with. An avatar can tell you a lot about the people you are interacting with. It can give insight in what the person likes and or does, and whether that might be something you are interested in too. You can also use an avatar to express yourself on what you would like to be. One other important aspect, is whether or not you use an anthropomorphic avatar. Research shows that if you choose a more anthropomorphic avatar, people are more likely to trust you, and see you as a human being (Nowak and Rauh [2005]). It also shows that people are more likely to choose an avatar which matches their gender, and that people actually do base their decision on whether or not to interact with someone, based on their avatar.

With this in mind, it is not a big surprise that many people try to make an avatar that is a better version of themselves. Sometimes, it even happens without us realizing it. MIT professor Sherry Turkle states: 'we think we will be presenting ourselves, but our profile ends up as somebody else - often the fantasy of who we want to be' (Turkle [2011]) Almost all people like it, when other people like them. So when people create these avatars, they create them based on their environment and what they want to achieve. For instance, if you would try and sell products, you would choose an avatar that is serious, trustworthy, yet playful. And if you for instance play an online character, with which you intend to play in a group, you would most likely create a female character. Because that way they are more likely to be invited into a group than if they were a male character. Some real-world stigma's have transferred perfectly to the online world.

A real world example of this came to light during the interview with the administrators of De Digitale Stad. He told us a story about how he was approached by someone who had a sexy woman as a profile picture. She asked him to meet him at a coffee place around the corner of the office. Once he got inside, the sexy woman was nowhere to be found. Instead, a small fat man came to him and thanked him. It turns out that the man wanted to be a woman, and DDS allowed him to practice that, using a different avatar. It even helped him made the decision to undergo a sex-change operation.

The acting of a person is also influenced by his avatar. A Person with a trusty avatar will perform more reliable interacting them somebody that has got a avatar that looks less reliableWood et al. [2005]. The message that is given by the avatar is unconsciously perceived by the user that is assigned to this avatar. Like in the analog world people are prejudice and making a opinion on somebodies appearance in the digital world this also holds. Not only the person is acting different on the same context from two different avatars. Also the alacrity to stay in contact with this person determines this Gottschalk [2010].

7.2 Multiplication of our center of acting and experience by avatars

The German philosophical anthropologist Helmuth Plessner formulated in his study *Die Stufen des Organischen und der Mensch* (1928) different levels of

modes of being based on the way organic beings realize the boundary between themselves and their surroundings, the *positionality*.

Stones are completely externally bounded. They do not have a clear boundary they can experience to distinguish the inside and outside world. Plants do have a clear distinction between in- and outside, but cannot experience their boundary. Animals, however, operate from a center and do experience the world from within their bodies. Humans go a step further: they can reflect upon their center. They can move beyond their center (*ex-centric*), develop a relation with their center, and have an experience of their experience of the world. According to Plessner, this makes humans naturally artificial.

The excentricness of humans causes that we do not merely exist, but want to make something of our existence. Technology plays a very important role in reaching this. With technology we create a artificial environment.

According to Jos de Mul in *Cyberspace Odyssee* (2002), new technologies add an extra dimension to Plessner's positionality theory. With avatars used in virtual environments the user is experiencing and acting through the avatar. The center of our experience is no longer only inside our body, but also in the avatar. The center of our experience is not moved to the avatar; the center is doubled. De Mul calls this multiplication of centricity *poly-excentricity* Verbeek [2011].

In De Digitale Stad the used avatars are fairly simple and merely used for the recognition of users. An user has no ways to express feelings through its avatar. Experiencing and acting in DDS is based more on communication by text than by the avatars. However, this do not change the question how our center of acting and experience is moving by an online identity. Poly-excentricity remains a valid concept.

Note that De Mul's extensions of Plessner's theories are not enough to support all new technologies, such as devices to stimulate the brain of stem cell technology. These technologies do not change the center of acting and experiencing, but our consciousness. This is called *meta-excentricity* It poses questions on what the boundary of a human and its environment is and if these boundaries can be changed by human interference; the central theme of Verbeek [2011]. The theories of the philosophers Donna Haraway and Bernard Stiegler, which will not be explained here for brevity, lead to the conclusion that our ability to interfere by technological exactly characterize what we are: naturally artificial.

7.3 Women and their avatars

A study of 14 fanatical women players of the online computer games World of Warcraft and Age of Conan (Consalvo et al. [2009]) showed that women clearly spend time on the appearance of their avatars. They all prefer having avatars of their own gender, either because they wanted to have an avatar that is in some way similar to themselves or because they didn't like the appearance of male avatars.

Available female avatars in computer games often have a sexy appearance, even

with fantasy races. Several of the interviewed women stated that they were not happy with this, while some carefully pointed out that they were not bothered by this. The researchers were not sure how to interpret these answers. Past research showed that women players do not like hypersexual female avatars. The author speculates that it could be that women now accept such avatars, but they could also be afraid to state their opinion, to avoid that they are seen as too critical. Additionally, the women that did state their concerns, could have done this because they wanted to give a politically correct answer to the researchers.

Apart from the bodily appearance, an avatar can be customized by armor and weapons. While the players who liked to fight preferred bonuses above look, players with other preferences often choose to ignore certain items because of the looks. However, nobody consistently used sub-optimal gear only because the appearance. World of Warcraft later implemented a feature called 'transmogrification' that took care of this problem. This new feature allowed players to keep the gear with the better stats, but make it look like a different item, and thus keeping the good looks of their character.

The players were proud of their creations and often created histories about their character. Extra customization options were always welcome, but a lack of options is no reason to leave a game. However, it could be the nudity in Age of Conan could be a barrier for new players to start playing.

No research has been done yet about fashion and avatars of males.

7.4 Effects of avatars on cooperation

Internet has provided us with new ways to communicate, such as email, video conferencing, phone calls over the internet, instant messaging and online games. Communication by using avatars in a virtual three-dimensional world to represent oneself is another possibility. This form of communication takes place in a so-called *collaborative virtual environment* (CVE). Communication and collaboration by means of CVE's can take place between groups of people.

Compared to video conferencing, a CVE gives an illusion of a 3D world, often projected on a 2D screen. However, the use of avatars limits users in non-verbal communication, an important aspect of face-to-face communication. Garau [2006] studied which minimal set of expressiveness is necessary for a good collaboration, as complete support is not possible due technical constraints.

The addition of more advanced eye gaze, made a positive contribution to interaction. Random liveliness did not add value; the animation should reflect some aspect of the conversation. An example is to determine who is going to talk. For this to work, it is important that the visual appearance of avatars is of high quality too. Eye gaze experiments on avatars with low realism, showed a negative impact. The authors argue that more research is necessary to explain this phenomenon. Note that realism is not the same as photo-realism; humans are able to decode non-verbal communication of cartoons.

The researchers also focused on a single form of non-verbal communication. It

is questionable if this can be justified, as there are signs that behaviors are interdependent.

Developments in technology enables us to succeed in this better and better(Schroeder and Axelsson [2006]). Future will tell what influence developments as Oculus Rift will have.

The use of a virtual world has interesting side effects. The physical appearance and surroundings of the communication partner is not visible. Avatars do not need to resemble the person behind it. In fact, there is unlimited freedom in choosing your appearance.

Van der Land [2013] discovered that 2D avatars that combine similarity and self identification are more effective in generating team performance and social liking than avatars that do not combine these features. The author divided 240 participants in groups of three. Each member of the team was assigned an avatar, either:

1. their own photo as avatar
2. a photo in which the photo's of the team members were morphed
3. a cartoon, different from the cartoon of the other team members
4. the same cartoon

After this, the group had to solve a murder mystery. It was found out the the teams with morphed avatars shared more clues with each other, were more motivated and more strategic in their problem solving. Avatar appearance does matter.

A lot of IT-companies are struggling this days to innovate the avatar what is is on this momentKohler et al. [2011]. To get the cooperativeness higher then it is this days or what would be the best avatar for that specific company is a hard puzzle to solve. The evolving market of digitalization is a unstoppable train that every company need to catch to get on the right track. That sets a high pressure on the market to do it right. Even new innovation get embraced by some new theories about the right track. But after looking at more then twenty papers about this subject it looks like every researcher has got his own conclusion and theory about this subject. Because the results are so divided it is to hard even for big IT-companies to improve the experience of avatars for their gaining.

Chapter 8

Conclusion

All in all we can conclude that avatars have a big impact on everyone. Not just for people who lived in De Digitale Stad, but for the whole society. The concept has grown from being an incarnation of a god, to an (online) identifier, to a symbol of trust and safety.

In De Digitale Stad, the introduction of the avatar was quite new. There were very few places around, that offered users the ability to interact with one another using avatars. This caused a big boom in social activity in DDS. The threshold to interact with other people was significantly lower in an online environment. And the fact that you became a face in the crowd, yet still recognizable was a blessing for many. People felt much safer in the environment and real social connections were made. People even experimented with different avatars and the way people reacted to that.

Outside DDS avatars still carry on their power. People still feel more comfortable online, when interacting with other people. They can pretend to be what they want, and often we pretend (sometimes unknowingly) to be a better version of ourselves. We have seen that even for cooperation purposes, an avatar really can make a difference.

Even in online games, where the avatar often walks around in 3d, people seem to spend an awful lot of time trying to look good for other people. People they might not even know. It makes it easier for people to fit in a group with like minded people.

Because web archeology is a fairly new topic not much is know about the Do's and Don't s. This gave us a great opportunity to be at the frontier of web archeology just as the developers of the avatar generator were at the frontier of the usage of avatars. DDS is a one of a few sites that are currently 'dug up' from the past, but many more websites will require this procedure in the future. In 18 years or so, a new generation will be digging up the remains of Hyves, stored on some dusty USB that cannot be connected to any hyper modern computer of that time and the researchers will have to return to the museum to get it working again.

Chapter 9

Future research

To fully explore what is available in the freeze of De Digitale Stad, a large part of DDS needs to be made usable again. For example, the landing page, houses, landing page and public forums need to be restored. This will give a more complete experience of the city than separate files. Given the goals of and available time within this course, this is not possible. Rebuilding De Digitale Stad would be really interesting project and hopefully fits in another course. It will be a great value for the museum and education of the museum visitors. It will be very challenging to rebuild the complete city, as the architecture of the systems used in DDS (Sun Sparc) is very different from the architecture (i386/amd64) used nowadays. Additionally, it is questionable if it is interesting to restore a chess game, for example.

Given the progress so far, we think it should be possible to resurrect a large portion of De Digitale Stad. There is for example the aforementioned landing page. From this landing page, we can branch out to all sorts of good stuff. One of the things that should be possible to do, it perhaps to restore the login/register mechanism. We found the register script, the password database, as well as the login script. In theory we should be able to link these together, to get the functionality working again. We should then be able to register a user, which then should be able to access DDS.

A lot of research can be done on conversations the users had. It is quite easy to find the communication between users through email as well as news groups. Furthermore, Erwin and Mieg were working on side projects within their home directories which could lead into interesting find that even they might have forgotten. Erwin and Mieg probably were not the only ones working on side projects in DDS: other users could be as well.

Even though we were not able to get as much as we wanted out of the data, the process of digging through it is interesting in itself. We have done web archaeology for this project, which is quite a new field. We have described our steps thoroughly, which makes it easier for others to recreate the steps for themselves. If more people would follow Re:DDS they could get interested in doing this kind of digital archaeology, therefore preserving a part of our own culture. It is actually one of the goals of the project: showing the world what it

takes to reconstruct parts of the "ancient" internet. Unesco has already adopted a resolution on digital cultural heritage back in 2003 UNE [2003]. An interesting read on this subject is Nicholson [2005].

On the avatar side, we haven't touched the use of avatars in marketing. In literature, we found out that some businesses had given their web shop give a sense of personality. However, we cannot name one modern web shop with avatars. It could be that avatars in web shops are extinct nowadays. If this is the case, there must be a reason. Another great point for research is why males tend to choose a male avatar.

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Chapter 10

Colophon

- Ferry:
  1. Structure of the report, start of LaTeX file
  2. Introduction
  3. Paragraphs about obtaining and reading tapes
  4. Large part of Chapter 'Introduction Re:DDS and web archaeology'
  5. Section 'Obtaining the data'
  6. Section 'Multiplication of our center of acting and experience by avatars'
  7. Section 'Visit to the museum'
  8. Section 'Women and their avatars'
  9. Section 'Effects of avatars on cooperation'
  10. Start of 'Future research'
  11. A web archeologist's toolkit
  12. Proofread/rewrite
- Marcel:
  1. Section 'Obtaining the Data'
  2. Section 'Accessing the Data'
  3. Section 'Digging through the Data'
  4. Section 'Findings'
  5. Section 'The Importance Of Avatars'
  6. Subsection 'Hyves'
  7. Chapter 'Brief history Of Avatars'
  8. Chapter 'Conclusion'

9. Part of Chapter ‘Introduction’
10. Part of Chapter ‘Future Research’
11. Proofread/rewrite

- Marc:
  1. Chapter ‘Avatars in the DDS’
  2. Section ‘Accessing the Data’
  3. Subsection ‘Hyves’
  4. Subsection ‘Gopher’
  5. Subsection ‘User generation’
  6. Subsection ‘Home folders’
  7. Subsection ‘The DODO Program’
  8. Part of Chapter ‘Introduction’
  9. Part of Chapter ‘Future Research’
  10. Proofread/rewrite
- Gerard:
  1. Chapter ‘Background on DDS’
  2. Chapter ‘Re:DDS and web archaeology’ (excluding ‘Hyves’)
  3. Part of Chapter ‘Future Research’
  4. Proofread/rewrite
- Sander:
  1. Added information in several sections.
  2. Proofread/rewrite

Part III

Appendix

Chapter 11

A web archeologist's toolkit

This sheet gives an overview of a *technical web* archeologist's tools. As explained in the report, using Unix command line tools is strongly recommended. Therefore, the toolkit mainly consists of command line tools.

- **tar** - for extracting tar files (*tarballs*), both compressed and uncompressed. See section 4.3 for the explanation of a tar file.
- **diff** - to show the differences between two files
- A text editor, such as `vi` or `nano`. Vi is good at reading large files, but has a strong learning curve.
- **hex editor** - a hex editor is a program, that can view a file in a hexadecimal format. for viewing corrupted files
- **rsync** - to merge directories
- **du** - to view the disk usage of a file or directory
- **FileLight** - program to visualize folder structures. It reads subfolders/files and produces an image to show how much of the directory is filled with that particular file/folder.
- **find** - search for files in a given directory, for example to find the location of a specific file.
- **grep** and **fgrep** - find files that contain the specified query in the content. `grep` supports regular expressions, which mean that more extensive search queries are possible, at the cost of speed. `fgrep` takes the specified query literally and is therefore faster.
- **head** and **tail** - shows the first, respectively last, lines of a file.
- **tree** - produces a tree-like output, that shows the structure of the files inside a folder.

Commands inherent to using the command line

- **ls** for listing the contents of a directory
- **cd** for changing directories
- **pwd** to show the current directory
- **cp** and **mv** for copying and moving or renaming files
- **rm** to remove items and/or directories
- **man** to show a manual for the specified command

Knowledge about writing HTML pages, the Unix folder structure and web server knowledge doesn't hurt either.

Make backups of your progress regularly.