

# Video Games and Costume Art

-digitalizing analogue methods of costume design

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### **Abstract**

This thesis explores ways of integrating a costume professional to the character art team in the game industry. The research suggests, that integrating costume knowledge into the character design pipeline increases the storytelling value of the characters and provides tools for the narrative. The exploration of integrating a costume professional into game character creation as a process is still rare and little information of costume in games and experiences in transferring an analogue character building skillset into a digital one can be found, therefore this research was generated to provide knowledge on the subject.

The research's main emphasis is on immersion-driven AAA-games that employ 3D-graphics and human characters and are either photorealistic or represent stylized realism. Technology for depicting reality is advancing and digital industries have become aware of the extensive skills required to depict increasingly realistic worlds. Also, tools for character art are beginning to lean on actual costume construction: the pattern based cloth simulation software entitled Marvelous Designer has become the industry standard for character clothing. The material of this thesis is based on the author's experience as an intern and Costume Artist at the game company Remedy Entertainment and on data collection in the form of participant observation, conversational interviews, archival searches and assorted documents as an internal employee of the company. Therefore, an ethnographical research that applies to qualitative, descriptive, nonmathematical and naturalistic research methods is utilized in this thesis.

The result of this research is a costume production pipeline for integrating a costume professional into the game character design process. It is formed by comparing costuming processes of game and film industries to explore the similarities and differences in methods to analyze the most effective combination of these two. The final pipeline introduces the costume professional's position during the different stages of the character design process. Furthermore, the thesis categorizes aspects essential for a costume designer to internalize in order to become a functional part of the Character Art team and the skills and knowledge required to support the character design in a production. This research identifies the need for costume knowledge in realistic AAA-games. When employing a costume professional into a game production, this thesis offers tools and vocabulary for collaboration. Costume designers are Character Artists, but with different tools and skill set and costume design can be seen as a live form of character art.

**Keywords** costume art, video game, digital costume, character art

**Tekijä** Heli Salomaa **Työn nimi** Videopelit ja pukutaide - analogisten pukusuunnittelumetodien digitalisointi

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### Tiivistelmä

Tämä opinnäytetyö käsittelee pukusuunnittelua peliteollisuudessa ja pukusuunnittelijan tarvetta hahmosuunnitteluprosessissa. Tutkimuksen materiaali perustuu kirjoittajan omaan kokemukseen harjoittelijana ja pukusuunnittelijana (Costume Artist) Remedy Entertainment -peliyhtiön hahmosuunnittelutiimissä. Työ esittelee eri peliyhtiöiden hahmotiimien käyttämiä pukusuunnittelumetodeja ja arvioi, miten pukusuunnittelun tiedostaminen erillisenä osana hahmosuunnitteluprosessia ja puvun kerronnallisten elementtien tunnistaminen ja hyödyntäminen tukee uskottavan pelihahmon luomista realistisissa peleissä. Tutkimuksen lähtökohtana on ajatus, että pukusuunnittelun integroiminen hahmosuunnitteluprosessiin syventää hahmoa ja kuluttajan pelikokemusta ja näin ollen nostaa pelin arvoa tuotteena. Tutkimuksen tuloksena syntyi uusi pukusuunnittelun tuotantolinja (Costume production pipeline) peliteollisuuden käyttöön. Se esittelee pukusuunnittelijan asemoitumisen pelituotannon hahmosuunnitteluprosessiin.

Teknologinen kehitys mahdollistaa yhä realistisempien digitaalisten todellisuuksien luomisen, jonka seurauksena peliteollisuus työllistää enenevässä määrin myös perinteisten alojen erityisosaajia, kuten arkkitehtejä sekä elokuva-alan valosuunnittelijoita. Myös digitaalisen hahmonluonnin työvälineet nojaavat jo tosielämän vaatetuotantoon: vaatesimulaatio-ohjelma Marvelous Designer perustuu vaatteiden kaavoihin ja on laajalti käytössä pelihahmojen suunnittelussa. Pelit, joita tutkimus tarkastelee, ovat AAA-pelejä, jotka hyödyntävät 3D-grafiikkaa ja ihmishahmoja ja jotka ovat joko photorealistisia tai edustavat tyyliteltyä realismia. Tutkimuksen materiaali on koostettu keskustelullisista, strukturoimattomista haastatteluista, kirjoittajan työpäiväkirjasta, yhtiön edellisten pelien arkistomateriaaleista, sekä yhtiön sisäisistä ohjeistuksista.

Tutkimus esittelee keinoja, joilla fyysisen ihmisvartalon kanssa työskentelemään kouluttautunut pukusuunnittelija voi integroitua digitaaliseen hahmonluontiprosessiin ja osoittaa, että pukusuunnittelijat ovat analogisilla metodeilla työskenteleviä hahmosuunnittelijoita. Hahmosuunnittelun etu suhteessa esitystaiteen pukusuunnitteluun on vapaus näyttelijän fyysisen ruumiin sekä fysiikan lakien tuottamista rajoitteista. Vaatesuunnittelu keskittyy vaatteeseen ja pukusuunnittelu fyysisen ihmisruumiin ja vaateen synnyttämään kombinaatioon ja interaktioon, mutta hahmosuunnittelu tarjoaa pukusuunnittelullisesti rajoittamattoman vapauden hahmotulkintaan.

**Avainsanat** pukusuunnittelu, pelihahmo, digitaalinen puku, videopeli

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# Terminology

## *AAA games*

A game title developed by a large studio, funded by a massive budget of often millions of dollars. A AAA-game is planned to sell a considerable amount of copies. Publishers generally produce the title for the major platforms (currently Xbox One, PS4 and PC) to maximize profits. (Schultz, 2016).

## *Asset*

An asset is any type of resource utilized in a game: a sound file, a texture, or a humanoid character, which exist within the virtual environment. (Mohov, 2017). This thesis refers to 3D model-assets: three-dimensional polygon meshes such as vehicle, architecture or everyday objects that are created with 3D-software such as 3Dmax or ZBrush (Assinen, 2013: 9).

## *CGI*

Two definitions for CGI exist; the one significant for this research is Computer Generated Imagery, which refers to 3D graphics employed in film, TV, and other types of visual electronic media such as games. Majority of modern action films include some CGI for special effects, while other films, such as Pixar's and Disney's animated films are built completely from computer-generated graphics (Christensson, 2010). CGI can be adopted to manipulate the environment and produce photorealistic images. Additionally, it is more cost-effective than traditional photographic imagery, thus it has become a popular method of telling stories in visual entertainment. It allows creating images

and effects which may not be feasible in other methods (Techopedia, 2017a).

## *Costume Artist*

A costume professional working in game industry as part of the Character Art team. This title was created at Remedy when I entered the production as a costume specialist and is utilized in this thesis to separate the title from the one in performance arts (costume designer). La Motte (2001) specifies the role of a costume designer as "*an employee, who renders services by creating and designing costumes for principal players and others in any motion picture or television series*". (44)

## *First- and third-person games*

In 1<sup>st</sup> person games, the perspective of the player to the game's events is through the eyes of the player-character. In 3<sup>rd</sup> person games, the player-character is viewed from a 3<sup>rd</sup> person perspective, commonly from behind and slightly above the character.

## *Game Developer*

Electronic game developers make games for mobile phones, PCs and game consoles. Development includes all aspects of game creation: from the initial idea to game mechanics and visual concept to producing concept art of the game's visual world: characters, objects and scenery. On production stage, the characters, objects and scenery are brought to life by computer modelling, and finally programmers code the ideas into digital form. The whole process is overseen by a project manager or a game director.

#### *Gameplay*

Gameplay defines how a player interacts with the video game. It describes how the game is played, the set of rules, the plot, and the ways of defeating obstacles of the game. The player's overall experience is also part of the gameplay. Gameplay features present actions that player can employ the character to perform, such as running, shooting, jumping or manufacturing items. (Techopedia, 2017b).

#### *Interaction*

Interaction involves actions or input of a user. The term is commonly associated with two-way electronic communication systems that involve a user's orders or responses, for example, telephone or computer (Merriam-Webster, [no date]).

#### *MoCap*

Motion capture transfers the movements of an actor to a digital character. Once captured, motion is mapped onto a virtual skeleton of the animated character with a software such as Autodesk's Motionbuilder. Modern video games benefit from hiring actors to generate MoCap trajectories when a high level of realism is targeted. (Dent, 2014).

#### *NPC*

A non-player character that the player has no control over.

#### *Orthographic illustration*

An orthographic illustration is a method of expressing an object from multiple perspectives i.e. front, side and back.

#### *Photo-scanning*

A method of transforming a real-world item directly into a digital 3D-form, which can be further processed in the production pipeline (Assinen, 2013: 9). The approach consists of capturing the object by photography from several overlapping angles.

#### *Player-character*

Player-character is controlled by the player and is commonly the protagonist of the narrative.

#### *RPG*

In video role-playing games (RPG) the player controls one or several fictional characters that execute tasks in an imaginary world. Three basic elements are found in traditional RPGs: a menu-based combat system, the feature of improving character's statistics during the game, and a central quest that frames the main narration of the game. The genre has several branches: Action/RPG, Strategy/RPG, Adventure/RPG and Online RPG. (Techopedia, 2017c).

#### *Texture*

To achieve different surface textures, assets are mapped with colour and texture maps. These can be diffuse maps, bump maps or specular maps, among others. (Assinen, 2013: 9).



# 1 Introduction

*Angry Birds are wearing bowls*, was the first information of game character costumes I received after deciding the subject of this research. The announcement was made at a game character lecture by a former Character Artist of Rovio, Emma Kantanen, who designed characters for the Star Wars version of the Angry Birds franchise. My interest in game characters' costumes originated from the beginning of the millennium, when I was introduced to *Diablo II* (Blizzard North, 2000), which initiated my career as a game consumer. I drifted into theatre and performance costume design but costuming a game character remained as a professional goal which, with the technology involved and the necessity of modelling skills in the field, seemed beyond my reach.

During my years with performance arts, my focus of interest evolved from traditional methods of costume manufacturing to fabric manipulation methods by technical means, such as laser cutting, until my Master's studies permitted me access to projects that required costume design for CGI-characters. With the working experience from these projects, I applied for an internship at Remedy, known for story driven games such as *Max Payne* (2001) and *Alan Wake* (2010). Remedy was willing to explore the co-operation between game and costume design with me and I worked for them as an intern for four months during Fall 2016 and continued as part of the Character Art team as a Costume Artist from the beginning of 2017.

The main aim of this Master of Arts thesis is to explore the need of a costume professional in the game industry and ways in which costume design knowledge can be integrated into the character design of game development and thus increase the storytelling value of the character's costume choices. Costuming processes of game and film industries are compared in order to find similarities and differences to analyze the most effective way of combining these for an upgraded workflow of character design process in the game industry. I aim to prove that involving a costume designer to the game development process adds production value through the costume designer's knowledge of materials, costume construction and deeper level of analysis and interpretation of human nature on a conceptual level.

The terminology and abbreviations employed in this thesis have been established in the game industry. After chapters 1 "Introduction" and 2 "Literature review", chapter 3 compares the costume production of film and game industries and itemizes deviations essential for a costume designer to acknowledge in order to integrate into the digital fields. Chapter 4 introduces costume processes in game industry and refers to several games for a general overview of the current methods of costuming a game character. Chapter 5 declares the phases of designing a game character through my own experience as a Costume Artist at Remedy. It also presents technical aspects of manufacturing a digital costume, which differs considerably from creating an actual garment.

Topics such as conventions of designing female characters in the industry, costuming unreal, inhuman characters and creating

costumes with unrealistic attributes could also be considered in this type of a research, but this thesis chose not to focus on them because these are considered beyond the scope of the research of this thesis.

## 1.1 The subject area

This thesis concentrates on immersion-driven AAA-games that utilize 3D-graphics and human characters and are either photorealistic or represent stylized realism. Stylized realism can be photorealistic in some aspects, but it often includes simplification or exaggeration. An immersive medium is designed in a manner to provide the consumer with a feeling of direct contact with the content without an interference of the medium (Bolter and Grusin, 1999: 21-22). Realism in this research indicates to the style, where an accurate representation of real life is the highest aspiration.

The choice of narrowing the game cases to the more realistic ones with fairly recent publishing years is driven by my assumption on the role of a costume designer in game character design, which is to increase and support the realism of the characters. Technical advancements allow depicting characters increasingly realistically, which requires knowledge of costume construction that many Character Artists are not familiar with. Commonly, the most recent games with a realistic vision aim to exceed the level of realism of the previously published ones, but the trend of realistic game development might pass after it reaches the point of hyperrealism. This could mean that the role

of a costume designer might evolve into emphasising the character interpretation and believability over the realistic depiction. Oxspring et al. (2013) claim that believability is not necessarily connected to being realistic. Where realism aims to simulate the real world as accurately as possible, believability is about preserving the consistency with the player's expectations within the fiction of the game (6).

Film and games as mediums utilize a similar form of presentation: 3D material is viewed on 2D screens, which affects the display of the costume. Costume design is always affected by the medium of presentation. For this reason, the costume pipeline of film production is employed for comparison instead of performance arts', where the product is mostly viewed without an interference of a device. Nevertheless, the main tools of costume production in different live arts are similar, and hence, my experience of performance costumes can be presented beside film production.

The history of costume design in films reaches a century back, when an initial costume office was established by designer Clare West, inaugurated as one of the first "studio designers" in the film industry in 1915. By the 1920s costume design became valued as an important factor in film production with an expanding department with notable budgets. (Film Reference, no date). In games, however, one of the first clothed human characters was Jumpman, later known as Super Mario, in a game *Donkey Kong* (Shigeru Miyamoto, 1981). The very early characters were depicted with pixel graphics and only consisted of few colours, but recently the technology has allowed

depicting game clothing realistically, generating a need for material- and cloth behaviour knowledge along with the skills of creating visual support for character's personalities. When a realistic depiction of an animated character is desired, the tangible knowledge of a costume specialist offers the process tools that have been established in the film industry since the beginning of 1920. A need for a Clare West of the game industry is arising.

The material of this research is based on information collected in a form of a working diary during the time of my employment. The inside knowledge of Remedy's character design pipeline is gathered through co-working and conversational, unstructured interviews with the employees of the company. Unstructured interviews are a method, where open-ended questions are answered with interviewee's own words. The questions are rarely prepared before-hand. (Kawamura, 2011: 55). In addition to gathering data on the character design process in Remedy, I had access to the archives of Remedy's previous projects and an internal guidebook *Character Modelling Guidelines for Outsourcing* (Huovinen et al. [no date]). These sources provided me with deep internal knowledge of game development and a view of the character costuming methods utilized before hiring an in-house costume designer.

To familiarize with the products of this research, I played games and made observations on the movement, texture and costume construction of the characters' outfits from the perspective of a consumer, constructing a qualitative analysis of the subjects. Several games were also viewed as playthroughs and captured in

screenshots from Youtube, in addition to lectures and panel discussions on game development.

An ethnographical research method is utilized in this thesis. It applies to qualitative, descriptive, nonmathematical and naturalistic research methods and includes data collection in forms of participant observation, conversational interviews, archival searches and assorted documents. These methods provide firsthand experience of the phenomena and, according to Kawamura (2011) are generally not valid for generalization to other cases. (45, 52). Contrary to her argument, the methods presented in this thesis are presumably executable also in other game companies apart from Remedy. According to Kawamura, ethnography as a research method requires the researcher to immerse themselves in the field with an awareness to objectivity (2011: 51). I became completely immersed in the work, which could cause criticism over my objectivity, but the nature of the research demanded complete engagement to the designer's role.

The exploration of integrating a costume professional into game character creation as a process is still rare and the search for equivalent experiences in transferring an analogue character building skillset into a digital one revealed little information of costumes in games. The lack and variety of costume processes in the game industry exposed a need for a clear costume production pipeline. Therefore, this research is necessary to fill in the knowledge gap in the field. The qualitative approach is chosen for the nature of the phenomenon. The approach is exploratory and utilized when the researched have difficulties

identifying the important variables to examine (cf. Kawamura, 2011: 111).

My experience in the field forms the majority of this research, and the few introduced processes are employed as a comparative material of previous costume specific character design processes. Examples of film and game industry utilized in this thesis are based on my own experiences in the fields unless stated otherwise. Performance arts refer to traditional actor-based art forms at theatre, dance and circus, whereas the examples of game production are intertwined with the procedures and methods utilized at Remedy. Game companies employ individual workflows, and some parts of the process introduced in this research may not apply generally.

## 1.2 Costume in the game character context

Costume design is a form of visual storytelling; the character's background, age, social status and personality can be made readable with one glance. Costume also reveals facts about the surroundings, such as the society, climate, and period. Albert Wolsky indicates, that the costume needs to support the story and has nothing to do with everyday fashion or looking attractive: costume design is about what people wear and why, what is their class and what are their needs (cited in Landis, 2003: 173). Narrative art commonly presents one or multiple characters, and if clothed, the visualization of a character requires a viewpoint on the wearable elements. During the data collection of this research, multiple Character Artists claimed the

costume as an inseparable part of a character. Many are masters in character interpretation through costume, but only a few have knowledge of the reality of clothing. Improbable costume construction solutions decrease the believability and quality of the character's appearance when aiming for a high level of realism.

Compared to the linearity of film, the game's player can influence the story, and the plot might differ each time the game is played. Usually, the control over perspective to other characters and camera angles also depend on the decisions of the player, within limits set by the developer. Bolter and Grusin (1999) point out these interactive differences between perspectives in computer animation and other arts. In painting and photography, the consumer's point of view is fixed. In film, the point of view is in motion but controlled by the director or an editor. (28-29). In a computer game, the point of view is generally interactive with the player.

Tavinor (2011) argues in his article *Video Games as Mass Art*, that the participatory role of the player, that allows making decisions and performing actions to shape the game environment, sets video games apart from other forms of mass art. In other mass arts, such as film and music, the product acts identically every time consumed. This participatory role also inflicts *somatic displacement*, introduced by Holopainen and Meyers (2000). The term refers to the ability of a person to project the mental model of themselves into another physical form, such as a game character or a car. Driving a car requires the driver to project their body image to the physical form of the

car which, in a case of an accident, causes the driver to say “he hit me!” instead of “he hit my car!”. This kind of displacement is an extension of the body as in utilizing a tool when in games the manner of displacement is often the transferal of the somatic model into an object in the environment. In both cases, the potential of controlling the focus of displacement heightens the experience. (Holopainen, 2008: 46). Therefore, the phenomena occur stronger with a game character than a protagonist of a film, since the consumer can control the focus of the displacement in games, whereas cinema is lacking the physical engagement and the feeling of control.

The research of Holopainen and Meyers (2000) links the displacement to the use of technological advancements; hence, it is a modern phenomenon. Theatre is not mentioned in the research, nor the connotation of the somatic displacement in performance arts. Linking the phenomenon to technology excludes theatre as a medium where the viewing of the product does not necessarily involve a device. Also, it might be easier to project oneself on a character whose actual body is not present.

The level of somatic displacement varies between different types of video games, and it affects the player’s relationship on the character’s costume. Fron et al. (2007) explore the relationship between the player, the costume and the game character through a series of software features called dress-up mechanics (4). The following two dress-up mechanics present opposite levels of somatic displacement.

In *Doll-Play*, the player dresses up a game character that is not distinctively the player, but over which they have an (often god-like) agency. An analogue form of this action is dressing up a physical paper doll, and life simulation games, such as *The Sims* (Maxis, 2000), can be seen as a variation of this mode. (Fron et al., 2007: 5). *Doll-Play* mechanic does not actuate somatic displacement, for it emphasizes the actions upon the character, not the act through the character. In a dress-up mode the collective has named the *Identity/Avatar/Costume* mechanic, the player appears as the character and experiences somatic displacement when controlling the character. In an analogue form of this mechanics, the consumer dresses up in a costume. Dress-up mechanics variate greatly in different cases and are not necessarily either of the mentioned but something in between. (Fron et al., 2007: 5).

The concepts of *Doll-Play* and *Identity/Avatar/Costume* dress-up mechanics are connected to the differences between fashion- and costume design. Matinaro (2014) categorizes the different costume professional-wearer -relationships in her thesis of *Three Personas of an Actor. A dressmaker* manufactures a garment to a customer who, as the subscriber of the product, designates the aesthetics and functionality of it. The garment is generated according to the client’s wishes, for the body of the customer. A *fashion designer* designs the garment according to the marketing needs, based on the assumed wishes of the focus group. The garment is generated on a fitting doll and the fashion designer designates the aesthetics and the functionality of the garment. A *costume designer* designs the garment for both a fictive and an actual person, and the common body of these two. The aesthetic

aspects are negotiated between the designer, the actor and the character, and the actor designates the functionality of the garment. (2). In games, a *Costume Artist* manufactures not only the garment but also the body of the game character. The functionality and comfort aspects of the garment are purely an aesthetic matter and the aesthetics and character interpretation values are discussed with the Lead Character Artist.

As Matinaro (2014) describes, a fashion designer dresses up a fitting mannequin, but a costume designer dresses up a character. It would be beneficial for game developers to be aware of these differences and utilize the right type of clothing specialist for their productions. As soon as the requirements for the costumes exceed the needs of style and the costumes become a messenger of the environment, time period and the character's identity, a costume designer, instead of a fashion designer, is needed.

A template of a consumer-costume relationship in both of the aforementioned dress-up mechanics and in live arts is formed based on somatic displacement and Matinaro's definition of costumier's role in film and performance arts (Figure 1). The grey areas indicate who has an effect on the character's outfit. In a *Doll-Play* game, the player-character is a mannequin and an object over which the player acts an agency upon. In such game the consumer chooses an outfit from a selection designed by a costume designer. The wearable element without expressive functions, other than fashion and style, does not fulfil the definition of a costume and is thus referred to as a garment in this template.

Figure 1 Template of a consumer-costume relationship in games and film and the position of a costume designer in different forms of dressing up a character. Grey areas indicate who affect the character's outfit in different art forms. (Figure by Salomaa)

In *Identity/Avatar/Costume* mechanic the consumer identifies with the character and adopts the environment through somatic displacement. Games such as *Uncharted 4: A Thief's End* (Naughty Dog, 2016) and *Bioshock Infinite* (Irrational Games, 2013) display a character with a pre-defined appearance. In these games, a costume designer defines the character's outfit specifically to support the concept of the environment and the character. The consumer has no authority over the costume decisions but may experience the costume as "theirs". Games with features of customization and extensive outfit options are displayed further in the thesis and are excluded from this template.

The perspective of a third person game requires a user to project their self-image into the character on the screen, but first-person games allow the player to project their whole physical form into the virtual environment, which increases immersion (Holopainen and Meyers, 2000). In third person view the costumed character is constantly on the player's view, but in the first person view the player character's costume is rarely seen, as in real life our clothes are rarely visible to ourselves when worn.

In film and performance arts, the consumer has no effect on the character's costume, but they may identify with the character. The actor and their body have an impact on the costume's functions and the interpretation values. The costume is only a garment until worn by the actor and viewed together as a character.

## 2 Literature review

Game industry and costume designers do not seem to know yet how to approach each other: the common tools and vocabulary are missing. The first section "Costume in games and the value" goes through cases of integrating a costume professional into a game production, the success of the experiments, and the costume's value in game character creation.

The second section "Costume process in film and games" compares the costume processes of the two industries to find an optimal combination of the two for an upgraded costume production pipeline for character design. It categorizes aspects essential for a costume designer to internalize in order to become a functional part of the Character Art team.

The third section "Personal experience assimilated into reference material" presents the recordings of my participatory role in the game industry and introduces methods parallel to the ones I have adopted during my employment at Remedy. The experience is assimilated with the previous exploration of costume production comparison to visualize the conclusion of the upgraded workflow.

### 2.1 Costume in games and the value

To explore the need for a costume designer in the industry, experiences of integrating one into the production, and

processes that would have benefitted from utilizing one, are presented in this chapter. In addition, the need for costume awareness in character design is evaluated and the ways that have been employed to combine live costuming skills into character art production inspected.

Digital industries have become aware of the extensive skills required to depict increasingly realistic worlds, including knowledge of costume construction. It has been expressed by Jacques-Belletête (Cork, 2015) of *Deus Ex: Mankind Divided* (Eidos Montreal, 2016), who points out the challenges of being a game designer in a field where the level of realism increases constantly. The game designers need to create entire worlds: urbanism, architecture and fashion concepts without having an education for any of them. He emphasizes the importance of consulting the professionals in those fields. For example, the costume process of *Deus Ex: Mankind Divided* required a clothing professional, who solved a challenge of their protagonist's costume by means of traditional cloth manufacturing. (Cork, 2015). The team's aim on realism forced the search for professional help.

The need of clothing knowledge has been recognized also in CGI costuming of animated characters at Pixar, which has utilized tailors for costume making. The tailors construct costumes from flat panels in a similar manner that 2D patterns are employed for cloth cut of live clothing. David Baraff, who worked as a system support data management at Pixar's *Brave*, claims, that in order to model clothes successfully, understanding real tailoring is necessary. Game companies and animation industry both

employ a number of 3D modellers for Character Art, but the people who understand clothes are rare in the industries. (Robertson, 2012).

Also, tools for character art are beginning to lean on realistic costume construction. A cloth simulation software Marvelous Designer has become a common tool for clothing characters in several game companies (Marvelous Designer, 2016). The software is based on actual clothing patterns and has raised a need for costume construction knowledge. The program allows improbable clothing solutions, which has let illogical outfits into the final products and revealed the lack of clothing knowledge. This may cause disruptions of believability, which affects negatively on consumer's playing experience.

Even if the need of costume knowledge is becoming recognized in the industry, designating someone specifically for costume design in a game character creation is rare, and commonly Concept Artists or Character Artists are responsible for the costumes as part of the character design. However, several examples of participating a costume designer into the character design process were found in an online form and the processes were rarely alike; the common factor was the external position of the costume designer in the development. Improvements to some processes can be suggested to upgrade the game costume production pipeline and to create an efficient workflow that brings believability to the character creation.

Lack of knowledge of digital costume manufacturing does not prevent costume professionals from live arts from participating



in game development. Two cases introduce nearly identical processes of integrating a professional costume designer experienced in film and TV industry into the game production. Wendy Cork was invited to design the costumes for *L.A. Noire* (Team Bondi, 2011), located in 1947 Los Angeles, and the process was introduced in a blog post by Rockstar Games (2011). Lyn Paolo, who worked on the costumes of *Grand Theft Auto V* (Rockstar North, 2013) was interviewed by Joe Kucharski (2013) for his blog *Tyranny of Style*. Both designers accessed the character development through photo scanning. Cork's and Paolo's processes reveal the restrictions and advantages of the technically complicated process. Even without knowledge of game development, photo scanning allowed them to implement their expertise into character design process.

Designated costume designers in the game industry have been credited in various ways. Wendy Cork was titled *Principal Costume Designer* in the production of *L.A. Noire*, while two members of the Character Art team, Karmen Coker and Simon Wood, were credited for *Additional Costume Design*. In *GTA5*, Lyn Paolo's title was *Costume Designer*, but also a *Stylist*, Jerry Carnevale and a *Costumer*, Beth Ann Hoppe were mentioned. Mari Shimazaki, who designed the protagonist of *Bayonetta* (PlatinumGames, 2009) was titled as a *Guest Costume Designer* for *Soul Calibur V* (Namco Bandai Games, 2012), (Smillie, 2011). Only the artist who designed costumes for *Bioshock: Infinite*, Claire Hummel, was credited for *Additional Art* without a specific definition of costume. However, costume-related titles have started emerging into the game industry, even if in the majority of game credits costumes remain as an unseparated part of

Character Art. Shimazaki's work for *Soul Calibur V* represents a highly stylized character design and is excluded from this thesis but is mentioned here for the exceptional title. Even if character art processes in various companies differ and the need of a Costume Artist may vary, aligning the position and tasks for costume designers in the game character processes throughout the industry would help integrating more costume knowledge into the development, boost the costume production pipeline efficiency and increase the character interpretation.

The late awakened costume awareness in the game industry may have been caused by the restrictions of the techniques. When advancements in depicting a 3D character evolved into expressing emotion through facial movements, the technique became compatible with also representing seamlines and movement of the clothing, and a need for costume knowledge started becoming beneficial. The film industry has utilized costume design as a tool of storytelling for decades, as *International History of Costume Design* (Film Reference. [no date]) depicts.

Character Artists generally consider costumes as an inseparable part of a digital character. Costumes seem to be commonly considered purely from a *Doll-Play* perspective within the game industry, which may have caused the lack of interest in costumes in character art and unawareness of the character interpretation aspects of costume design. The word costume is also misleading, which may cause additional disinclination in seeing it as an individual aspect of character art. Landis (2003) argues, that fashion and costumes have directly contradicted purposes, and

costumes are never clothes. Fashion designers sell clothes, but costume designers create costumes to sell the character. (7, 81). The separation of costume and fashion design seem to have a major role raising the costume awareness in the game industry. It seems common to underestimate the narrative values of character's clothing by categorizing everything related to garments as fashion.

The benefits of employing a costume designer into a character art team is framed by the value of the costume as a part of the experience. This is explored in Klasturp and Tosca's (2009) research *"Because it just looks cool!" Fashion as character performance: The Case of WoW*. Even if costumes are occasionally employed to support game mechanics, which allows single pieces of garments, for example, to boost character attributes and therefore affect the game experience, Klasturp and Tosca (2009) claim that character's appearance always plays a role in the social context of a multiplayer game. Based on their survey *Fashion in WoW* they suggest, that providing players control over their character's appearance increases the engagement to the game and offers tools for making statements about their identity. (4) Klasturp and Tosca utilize the term "fashion" in their research, even if the concept of "costume" could define the form of clothing in question more accurately for the features of self- environment- and character expression.

Klasturp and Tosca (2009) maintain, that even though the player's interest in clothing is commonly recognized in both computer game theory and design research, its importance and function seems to have received little attention (5-6). While

costume professionals are still waiting for their breakthrough into the industry, several player-driven sites, such as Thottbot.com, and Gizmopolitan, a WoW based fashion magazine, offer players platforms to share fashion tips and advice on how to obtain desired pieces of clothing or put together a perfect outfit. The need of a consumer's identity performance indicates on the need of costume's revaluation in the industry since it increases the value of the final product.

## 2.2 Costume process in film and games

To combine the costume processes of the industries of film and games to construct an upgraded workflow for CGI character's costume creation, a comparison between analogue and digital costuming is utilized. This research evaluates advantages and restrictions of each section of both production lines to explore the ideal combination to integrate costume design into character art. This chapter categorizes the deviations and compatibility of these two processes of character creation.

To visualize and compare the costume production pipelines of the film and the game industry, professionals from both industries are referred to. The production of film industry is introduced by La Motte (2001) in his book *Costume design 101, The Art and Business of Costume Design for Film and Television*. Katherine Isbister's *Better Game Character by Design, The Psychological Approach* (2006) introduces the equivalent production phases of the game industry.

The confluences of the game industry and performance arts are previously itemized by Catharine Bradley (2011) in her article *From Plywood to Pixels: Career Transitions from Theatre to Video Game Design* published in Theatre Design & Technology-magazine. The article represents a rare exploration on the subject of transferring theatrical skills into digital and categorizes similarities in skill requirements of both fields, such as realising concepts, ability to manage challenging deadlines, and interacting with team members with various skill sets to create a unified world, whether tangible or virtual. (66-67).

Bradley introduces aspects of theatre design accurately, but her understanding of the roles and tasks in game development seems questionable. Inaccuracy on the subject might be explained by the origin of Bradley's knowledge of the game industry, but it remains unidentified. The material of this thesis mostly employs the process at Remedy and does not necessarily apply to all development pipelines in the industry. Bradley's suggestions may apply more appropriately to a pipeline of another developer. Nevertheless, her arguments are contradicted with the knowledge I have gathered on the roles and positions in the game industry.

### 2.2.1 Game costume production

To understand the game character design process and to define the position of a costume designer in character development, the process of costume construction in games is explored. Methods and phases of production pipeline are introduced as

content for a costume designer to study in order to set the creative team of a game company. Several sources are referenced from concept art to modelling, texturing and simulation rigging, to clarify the CGI-character development. Correspondingly, some methods that have proved efficient in game character art are adaptable into live arts and could improve character creation in the field.

Basics of character art are adopted for this research from Valve's (2015) *Dota 2 Workshop — Character Art Guide*. It provides information about character's silhouette, colour and value. The method has a purely aesthetic value, and the guidebook does not editorialize psychological aspects of creating a character. However, it offers tools for costume designers to utilize in analogue costume illustration. In addition, *Mirror's Edge Catalyst's* (EA Dice, 2016) Character Art team created an innovative solution to maintaining the protagonist's costume iconic (*Mirror's Edge*, 2015), which provides another method to adopt into analogue costuming.

Art books are collections of the pre-production phase and concept art from along the game development. They generally provide more concept art and discussion about the character development than the online sources but lack information about the production phase. Nevertheless, the artbook of Jacques-Belletête, et al. (2016) *The Art of Deus Ex Universe* gives an overview of costume production of various characters from *Deus Ex: Mankind Divided*. In addition, the book provides an insight into restrictions and solutions of game development. Communication outlined by technical restrictions is a major part

of creating a CGI character. The Senior Character Artist of Naughty Dog, Colin Thomas, (PlayStation, 2014a) and a film costume designer Joanna Johnston (2012) both agree, that understanding technical restrictions and generating a fluent dialogue with all the professional throughout the pipeline is essential for an effective character design.

It is common in the industry to share information of new techniques in a form of panels and lectures. Naughty Dog's presentation (PlayStation, 2014a) on the character development in *Uncharted 4: The Thief's End* reveals their character art pipeline with detail. The team introduces the process from concept art to modelling and texturing Nathan Drake, the game's protagonist, and this information is utilized for production comparison along the research. The presentation can be found in the commonplace video-sharing website Youtube.

Some companies have already internalized an efficient and meaningful costume design process into their development. Monnet (2016) describes, that the production team of *Dishonored 2* (Arkane Studios, 2016) prioritized character's costumes and integrated a well-thought-out costume process into the character creation. The team utilized primary sources of costume history and remained consistent in their costume design. Their product also offers a view into stylized realism in games, which is not as restricted by reality as realistically designed games, and thus offers a wider selection of character interpretation tools from a costume design perspective.

## 2.2.2 Control over character

In addition to deviations in production, the consumer's participatory role and control over character set games apart from other forms of mass art. In his article of *Video Games as Mass Art*, Tavinor (2011) argues, that what connects mass arts such as films, popular music and animations is that the product is created at once, and the creators have full control on what the consumers observe. By contrast, what is depicted in games usually depends on the player. Game narratives are not fixed at the time of their production, as the traditional mass art fictions usually are. Instead, the game exists as a set of possibilities awaiting the input of a player. (Tavinor, 2011). The participatory role of the consumer inflicts somatic displacement, which affects consumer's relationship on the character's costume. It is essential for a costume designer to take into account the various relationships between the consumer and the costume. Different games offer players different levels of control over the character's appearance, which limits the work of the designer.

Fron et al. (2007) separate the analogue dress-up from digital by pointing out the platform: digital dress-up exists within the context of software. They introduce software features called *dress-up mechanics* to define the relationship between player, the costume and the game character. Their suggestion of two opposite types of *dress-up mechanics* resonates with Landis's (2003) view on the differences of fashion and costume design. *Identity/Avatar/Costume* mechanic represents a digital version of costume design, while *Doll-Play* mechanic resembles fashion design.

## 2.3 Combining the analogue and digital

To advance knowledge concerning the issue of improving game costume production, my experience of integrating analogue costume skills into digital character design is employed. This chapter categorizes the recordings of my employment to Remedy and contrasts it with parallel costume production methods in both fields.

### 2.3.1 Process references

The classified nature of the current Remedy project (P7) prevents direct examples in the artistic section of this thesis, therefore only the character development methods I have adopted are introduced to enlighten the process integrated into Remedy's production pipeline.

To implement script analysis skills in game character development, a modification of Lajos Egri's *bone structure of a three-dimensional character* (Lankoski et al. 2003) is employed. The costume concept process of Phillip Boutte Jr. was introduced in an interview by Joe Kucharski (2014) and it is utilized to demonstrate the current costume workflow at Remedy, and La Motte (2001) participates in the conversation of costume illustrations from the perspective of live costumes. The knowledge of materials from my previous projects in performance arts is adapted to produce texture suggestions, presented besides costume concepts. Kaija Rudkiewicz (Concept Art World, 2013) has employed a similar method in her character

concepts for *Ryse: Son of Rome* (Crytek, 2013), which is therefore introduced as a method reference.

I have adopted the common game character design process, and Claire Hummel's design process for *Bioshock Infinite* is employed as a process reference. Hummel, interviewed by Mulrooney (2013) introduces the phases of character design from silhouette sketches to the final 3D model. In addition, the success of the project is estimated and possible conflicts in costume design tracked by this example.

### 2.3.2 Digitalizing physicality

This chapter categorizes the advantages of tactile knowledge and digitalizing bodily experiments in character art. As a Costume Artist, I aim to transfer my physical knowledge of costume manufacturing into digital reality.

As a theatre-based costume designer, my approach to costumes is human-based and tangible. Through experiencing the costume's performative lifespan from designing and manufacturing to the stage, I am familiar with the effects different materials and a human body have on the costume. While this might be an advantage in game costume design, I have also felt a shift of identity from a costume designer towards a character designer, and it might be related to the subject of the missing body. As a costume designer, I encounter the actor and consider their needs regarding the costume, which, while adding a twist to the costume designing process, also is

rewarding when the costume comes alive on stage and the actor forms a relationship to the costume. For this reason, I reference Matinaro's (2014) thesis of *Three sides of an Actor* (My translation) investigating the professional relationship between the costume designer and actor in a theatre costume designing process, and how the lack of this interaction changes the design process when working in the game industry. Suzanne Osmond (2017) engages in the discussion with her presentation *Fitting Threads: Creativity and Collaboration* at Costume and Research in Finland seminar. She suggests, that the interaction between a designer, a draper and a performer in a fitting room is essential for the creative process. The collaboration is enhanced when the expert knowledge of these professionals meet in the space.

The advantage of the tangible knowledge of materials is also acknowledged by Bradley (2011). She claims, that there is an internal logic to the way things are made, and it is internalized by manipulating the actual materials such as wood, fabric and metal. This tangible knowledge provides believability to digital rendering and texturing of metalwork, costumes and carpentry. (66). The understanding of how a garment is made and how it drapes have become as important as the level of realistic details increase with graphics capabilities. When the details fail to convince the player, the suspension of disbelief is disrupted. According to Bradley, believability is the key to immersion in the fictional world. Whether the design is hyper-realistic or stylized, the consistency of internal logic and functionality is important.

Furthermore, the benefits of digitalizing tactile knowledge are utilized by Ed Hooks [no date]. He teaches game animators the

techniques of applying practical experience into digital art through bodily experiments. Brad Bird (2011) states in the foreword of Hooks' book *Acting for Animators*, that Hooks managed to bring performance into the art of animation.

At Remedy, I have adopted several types of reality references, such as photo- and live references to support communication. These references create confluences to reality, and the method is commonly adopted by several game developers to increase the reality of their design. For example, textile references were utilized in *Mirror's Edge: Catalyst*. (Mirror's Edge, 2015). The method has been adopted also into the costume processes of CGI-character in films. Joanna Johnston (2012) provided live references in a form of costumed maquettes in *The Spiderwick Chronicles*, and motion references in *The Polar Express* (2004).

The importance of a realistically moving CGI-clothes is acknowledged in the productions of *Alan Wake* and the animation *Brave*. One of the creators of *Alan Wake*, Enqvist, claimed in 2010, that several game developers had published products with cloth simulation that resembled either silk or rubber. As he found the current results unsatisfying for the level of realism Remedy was aiming for in *Alan Wake*, a new system for cloth simulation was created. Also, Pixar ended up creating a new technique for *Brave's* cloth simulation. Interviewed by Terdiman (2012) Claudia Chung claims, that since everyone has personal experience of how cloth moves, the simulation needs to be accurate to prevent distractions to the viewers.

### 3 Costume production comparison

Through comparison of live- and digital costuming the similarities in the processes are sought; which are the aspects of game character design that already are familiar to a costume designer, and which features deviating from film and performance arts processes are essential to internalize in order to transit costuming methods into the game industry successfully.

Previously this comparison has been employed by Catherine Bradley (2011). She argues, that the thinking behind the processes of developing a game and creating a performance on stage are similar. She leans on a statement by Lynda Bathory, a former technical director turned modeller and texture artist, who claims, that designing a video game world is identical to the theatre, only virtual. (62). Bradley (2011) maintains that the title of Character Artist is particularly relevant to costume designers since Character Artists are specialized in creating expressive, meaningful characters with the combination of skills in make-up, hair, and clothing (63). According to recruitment definitions of most game companies, extensive skills of modelling and texturing are required for Character Artists, which exceeds the usual skillset of a costume designer. In addition, at Remedy, the creative freedom of Character Artists is limited by the pre-defined concepts of the characters designed by the Lead Character Artist.

Furthermore, Bradley (2011) holds the view, that Concept Artists' character renderings can be highly improved by knowledge of costume construction and garment cutting (66). Concept Artists create the concepts according to instructions from the narrative team and leads, and the concepts are taken further by the Lead Character Artist. Currently, at Remedy the Concept Artists rarely depict characters, and the characters are created by the Lead Character Artist and me. Bradley (2011) maintains, that the costume designer is accustomed to the procedures of script analysis, which is rarely covered in game design training programs. The analysis specifies important plot details that help to convey story elements into the set, prop and character design. This, according to Bradley, makes the imagined world have resonance and a logical flow. (66-67). However, Bradley's observation applies only to certain game productions. At Remedy, the character creation begins with character bios, and the script is written concurrently with the production.

Processes in both film and game industries can be divided into three sections: pre-production, production and postproduction. La Motte's (2001) list of costume designer's assignments in preproduction and production of a film corresponds directly with the ones in performance arts: designing costumes and supervising all aspects of costume creation are required. His description of the film production contains translating 2D drawings into 3D costumes by deciding which garments are manufactured, which are found, instructing the seamstresses with the construction of the designs, supervising the fittings and following the creation from inception to completion. Costume designer establishes the look of the character and reacts to

changes if needed, maintaining the visual consistency of each character. Furthermore, a costume designer needs to attend meetings and communicate with directors, producers and actors, have knowledge of the script breakdown and changes, and employ research. (44-46). In performance arts, the production is concluded by the premiere. In postproduction phase of a film, the film is edited, and sounds and special effects are added, but costume designers are rarely utilized after the actual production phase in either film nor performance arts.

In game development, the main task of the preproduction is to construct a game design document consisting of *bibles*, that describes the game mechanics (Mohov, 2017):

- an *art bible* describes the art style
- a *narrative bible* defines the story and the characters
- a *technical bible* includes aspects related to programming and tech

Technical ideas are tested to ensure that they are feasible before committing big resources to the project. The production phase includes asset creation, programming, play-testing, marketing and the release. In postproduction, possible updates and downloadable content are provided for consumers. (Isbister, 2006: 256-257). Based on this definition, integrating a costume designer from the beginning of the production provides character narration support for the narrative bible and tactile knowledge of clothing construction for creating assets in production. Downloadable content may contain additional character outfits, which promotes the need for a costume professional also through the postproduction phase.

Costume production pipeline comparison (Figure 2) tracks similarities in the tasks and positions of professionals involved in character costuming in both live and digital industries. In film and performance arts, a costume designer has the main responsibility of the costume production. They guide the costume concept and manufacturing from the script analysis until the final product. At Remedy, the Lead Character Artist guides the costume pipeline. Similar to live costuming, in games the costume concept is framed by character analysis, research, reference search and mood boards before manufacturing. Pre-production in both pipeline forms is mainly executed by an individual designer or artist, while the production phase employs multiple specialists under the guidance of the person responsible of the costume production. Manufacturing a live costume requires professionals such as seamstresses, milliners and shoe makers, while a digital character involves Character Artists and Character Technical Artists. Some game companies employ Shading Artists for the texturing phase while at Remedy also the texturing and shading are Character Artists' tasks. In both pipelines the professional leading the costume production (a costume designer or a Lead Character Artist) discusses the process with the people who guide the overall production. In live arts, in addition to communicating with the visual team, the costume designer requires director's approval on the art direction. In games, the characters are discussed with a Game Director, Art Director and the narrative team, which at Remedy constructs the story and dialogue parallel to the visual character development.



Figure 2 Costume production pipeline comparison according to my experience as a costume designer at performance arts and the previous costume production pipeline of Remedy before integrating a Costume Artist into production (Figure by Salomaa).

Despite the apparent distinctions between of the two pipelines, several phases of the live costuming process relate to the digital equivalent, indicated in yellow in the pipeline comparison. After the concept definitions of preproduction, the costume proceeds into manufacturing. Material search is utilized in performance arts for the garment- and textile gathering, and in games for live-referencing, photo scanning and texturing purposes. Pattern making methods have been recently employed in digital costuming via cloth simulation programs such as Marvelous Designer, which provides clothing manufacturing in a digital form. Modelling and texturing in the game industry corresponds to sewing and textile material decisions of live costumes, and the technique of generating movement to the CGI character and garment by a simulation rig represents the actor that provides life and movement to the costume in live arts. The data required for the characters' movements are tracked from real life actors with motion capture, but the cloth movement is generated by Technical Artists.

In addition to the differences in manufacturing, the loops of costume iteration also create a major dissimilarity between the industries. In performance arts, especially in movement-intense productions such as dance and circus, the costume may undergo several iterations for the reasons of functionality. Costume rehearsals reveal whether the costume performs visually when combined with the set and lights, and functionally when worn by the actor.

Game development concentrates on merging multiple parallel production lines such as character, environment and audio

design to game mechanics and AI, to achieve a unified product. For the reason of multiple parallel production lines, a temporary environment of the game is created. It is equivalent to rehearsals in theatre and provides developers of separate sections a platform to merge their contributions to the game and review the functionality of the combination. It also enables costume testing on characters. During the relatively long production of games, the iteration rounds are commonly throughout and numerous. Bringing a design into the temporary environment requires a concept, material search, modelling, texturing and creating a simulation rig before becoming a temporary asset into the environment. It is not unusual for the entire outfit to change, which obligates repetition of each of the steps. After the final model has been defined and agreed on in the temporary game, the model is brought through the iteration line once again, but with high poly modelling, detailed texturing and an exact simulation rig.

In films, details such as sewing stitches on garments can be visible in close shots, but on a big stage, the small details disappear. Theatre costumes are often viewed from afar, which is compensated by clear silhouettes. Games combine the two: the player commonly controls the distance to NPCs, which creates a demand for designs that are accurate up close and clear from a distance. In the early years of the game industry, outfits were rendered in low-resolution and two-dimensional, and the visual emphasis was on a clear silhouette. Currently, the technology allows seam lines, stitching and other delicate detailing, which raises the bar for garment depiction.

## 4 Costume in games

This chapter reviews costume design of human characters in immersion-driven games during the latest decade, and a variety of approaches to costuming game characters. Many Character Artists claim they do not separate the costume from character design, but when designing a clothed character, an artist inevitably has a standpoint on the costume. The reason for treating the character's clothing as an inseparable part of character design is the often subconscious, socially constructed knowledge of the communicative values of the costume. If subconscious, the narrative attributes of costuming might be defective and contradictory. An identified value of the costume in character design brings the process depth and nuances.

Costume design is to be considered from the perspective of the final medium. Designing for film, theatre, or games all require different approaches and methods of costuming, restricted and benefitted from the final presentation. The following chapter displays costumes in the medium of games, demonstrating the character costuming processes utilized in the industry. Features of costume design in film and performance arts are brought into the discussion for comparison.

### 4.1 Characterization

The main characters in visual narratives are generally designed to be iconic and recognizable. A strict costume-based characterization locks the character down with very limited or zero outfit options, and the storyteller loses the narrative value of costume changes during the story.

Creating an iconic appearance through a single costume assists in the representation of a character, but in creating a realistic game character with a long story timeline with outfit changes, the resources of making the character iconic needs to be based on a consistent style of clothing combined with other recognizable features. Lara Croft in *Tomb Raider* (Core Design, 1996-) is an iconic character with multiple sequels since the first game, *Tomb Raider* (1996). Over the years her clothing and physique have been updated several times, while her outfit has repeated certain features, such as bare arms, boots, figure-revealing clothes and straps around her thighs (Figure 3). In the *Rise of the Tomb Raider* (2013) Lara Croft was updated to a version, where her wardrobe is both functional and offers climate-appropriate outfits for her adventures. An iconic character can be recognizable in various outfits as long as they recite the character's personality.

Figure 3 Lara Croft's evolution. Modified from an image from Browne and Willaert, 2014.

*Mirror's Edge Catalyst's* Character Art team generated a method, *Pixel Faith*, for preserving the iconic look of the first *Mirror's Edge* (EA Dice, 2008) protagonist Faith Connors, while updating the character. The method defined the fundamentals of designing Faith. The character was broken down into the most basic building blocks representing red shoes, white trousers, black shirt, and a singular red glove. The core components were to be kept the same, but artists were allowed to change the details within these blocks. They designed hundreds of shoes, which all had to be red. Working with Pixel Faith did not only involve keeping iconic gear, but also helped to resist temptations to add more, claims the Art Director Jhony Ljungstedt. (*Mirror's Edge*, 2015). A collage of the protagonist's style from the first *Mirror's Edge* to the old and young version of Faith of the sequel reveals the efficiency of the method (Figure 4).

Figure 4 Faith Connors from the *Mirror's Edge*, Pixel Faith (*Mirror's Edge*, 2015), Faith from *Mirror's Edge Catalyst* (*Mirror's Edge* [no date]) and young Faith from *Mirror's Edge Catalyst* (Haagensen, 2016).

## 4.2 Crowds

Game narratives often highlight the main character in the similar fashion to film and performance art. The protagonist's costume requires more function and nuances compared to the common crowd since it needs to stand out and express the character. It is necessary for the crowd members to fit in the environment, express a certain level of variety and avoid consumer's attention by staying anonymous. The crowd's appearance frames the

wealth, culture, politics and period of time in the game context, and therefore defines the social status of the player character in comparison.

Creating multiple NPCs for game environments sets a challenge for budgeting. In *L.A. Noire*, a game set in 1947 Los Angeles, each of the 140 locations has an individual set of NPCs: barmen, patrons, customers, etc. In addition, everywhere the player character ventures, the city is filled with pedestrians walking around the city. The number of distinct NPCs is counted in the hundreds, and the Character Art team needed to create diverse outfits to suit each. Rockstar Games hired a professional costume designer Wendy Cork to provide, along with the principal wardrobe, a variety of live garments for the NPCs, which the team photo scanned and further combined to dress up the entire city. (Rockstar Games, 2011). Cork needed to consider the combination possibilities while choosing the garment library for NPCs. The garments needed to comply with the time period while providing a maximum amount of individual combinations with a reasonable amount of clothing assets. Despite utilizing a limited number of garments, the texture and colour variations and a wide selection of alternative outfit combinations brought necessary diversity into the environment to maintain the believability of the game. Similarly, NPCs' faces require variations, and besides procedural crowd generation techniques introduced by Oxspring et al. (2013), adding face covers to the outfits in the forms of scarfs, helmets or balaclavas offers a shortcut into varying NPCs' faces. (Puomio, 2016b).

The fixed number of human assets employed to create a crowd may lead to a problem of visually similar clones of NPCs in the environment. This lowers the visual variety and affects the believability of the game. Oxspring et al. (2013) conducted a pilot qualitative focus group activity, where participants watched game videos and commented on the lack of diversity in crowds (1-2). A test group playing *Assassin's Creed II* (Ubisoft Montreal, 2009) constantly pointed out identical outfits in a crowd and suspected, that the game manipulated the colours of the clothes leaving the models interchangeable. The focus group felt strongly, that the clones impacted negatively on the player's sense of believability while playing the game. There were also several "false positives" when a visual similarity was caused by an accessory, such as a top hat on more than two characters, which made the players consider the NPCs to look identical. Therefore, it is not only important to vary the NPCs' face, body, and outfits, but also a limited number of accessories might cause an interruption in immersion since they act as a signifier of lack of diversity. (Oxspring et al. 2013: 5, 11). Still, in a later released *Assassin's Creed Unity* (Ubisoft Montreal, 2014), the developers had utilized distractingly low NPC variety. Several identical NPCs can be tracked from the crowd, for example, three copies of the lady in a yellow shirt and a duplicate in a blue shirt on the background (Figure 5).

In films the tertiary characters' height, face and body types naturally vary, and the most uncomplicated method of creating a contemporary crowd is requesting extra actors to arrive at in the location in an apparel chosen from one's private wardrobe, according to pre-defined costume instructions. Additionally, live crowds are organic and the individual member's movements thus unpredictable. In games, the NPC's movements tend to be mechanical and repetitive and may cause the feeling of similarity even when the outfits differ. Creating unified groups, such as armies, games have the advantage. Repeating uniforms for an endless number of soldiers and pacing the movements is easier than a common crowd, whereas creating a unified group for reality requires masses of resources and rehearsals.

Figure 5 *Assassin's Creed Unity's* protagonist and a crowd with duplicated NPCs (Marvelous Designer, 2016).

## 4.3 Guiding the consistency in a chronology

As a fictional media, games can locate their characters to worlds beyond the present timeline and reality. Especially in these cases, costume has a major responsibility in supporting the environment design and delivering the atmosphere and information about the surroundings. Both exaggerating and understating the characters' style causes implausibility as well as inconsistencies with the environment. The costume may be also employed to emphasize character's misplacement, for example, in narratives based on time travel. Costumes and surroundings are visual key factors in creating a believable environment for the narrative.

### 4.3.1 Contemporary

As in theatre and film, designing contemporary costumes often require more subtle methods of character interpretation than characters located in historical- or fantasy environments, since the common present-day clothing is familiar to the consumers. In contemporary projects, a successful costume design is a one that does not distract the consumer from the narrative. The protagonist Nathan Drake of *Uncharted 4: The Thief's End* is well recognized among the players of the previous *Uncharted*-games (Naughty Dog, 2007-2016). Drake's characteristics established in the previous *Uncharted*-games include jeans, a half-tugged shirt and a gun holster with over-shoulder straps. The colour palette consists of neutral tones. Drake's outfit for the new sequel was carefully varied within these limits (Figure 6).

Figure 6 Nathan Drake, early costume concepts (PlayStation, 2014a).

Since the visual restrictions set by the history of the character and maintenance of the iconic appearance prevented major changes, the costume design concentrated on details, such as undershirt- and collar variations (Figure 7).

The contemporary costume can be deliberately neutral and ordinary to enhance character's relatability. The player character of *Quantum Break*, Jack Joyce, is dressed as an "everyman" (Puomio, 2017a). His outfit options board introduces variations of three-piece contemporary costumes that represent the archetypical menswear of present day: jeans, buttoned shirt or a hoodie, and a jacket. (Figure 8). The hoodie may have been excluded from the final outfit for the resemblance to Remedy's previous game's protagonist, Alan Wake.

Figure 7 Nathan Drake's costume exploration by Ashley Swidowski (Swidowski, [no date]).



Figure 8 Jack Joyce outfit options by Antti Puomio (Remedy Archives, [no date]).

### 4.3.2 Historical

Designing historical period for any medium requires thorough familiarization with the time period through reference material. It is beneficial to base even a stylized historical concept on referencing; costume history offers an endless selection of various authentic styles and guides the consistency.

It is not unusual for game developers to base the game concept on a combination of a historical era and fantasy, such as in *Dishonored 2*. The team stayed loyal to the classic Victorian-era familiarized by the first *Dishonored* (Arkane Studios, 2012), but adopted a style more suitable for a southern country with lighter colours and clothing materials. They pursued authenticity by following the dress codes of the time: aristocrats would keep their layers of clothing on even in the heat of the summer days while working-class remove their shirts and let the sun mark their bodies. The team attempted expressing the wealth, social class and locations through character's costume, and to fit character's costume to the environment was a top priority. (Monnet, 2016). Adopting an entire periodical concept of displaying wealth by the amount and quality of material and layers of clothing despite the climate, enriches the game's world and binds it with the historical facts. This brings the world consistency and a sense of familiarity.

Another game project leaning on references of costume history is *Bioshock Infinite*, which is set in the year 1912. A Concept Artist responsible for costuming three characters for the game, Claire Hummel, emphasizes the importance of primary sources.

She announces, that collecting reference before creating a concept adds legitimacy and depth to the character; the variety and cultural context of any time period are impossible to recreate without historical reference. (Mulrooney, 2013).

Interviewed by Mulrooney (2013), Hummel reveals her costume design process for *Bioshock Infinite*. The Character Art team had set a few aesthetic pillars: the general colour scheme and a youthful “schoolgirl” look they wanted to maintain with the character of Elizabeth. Despite the fact that school uniforms were not as prevalent in 1912 as today, the costume was created to reflect one to echo the theme and communicate the character's youth to the players. (Hummel, 2016). Hummel deliberately stepped aside from the historical facts to utilize a costume feature, which expresses certain desired attributes to the present-day audience.

Designing the Lutece twins for the project, Hummel worked with minimal information of the characters: the instructions merely described the twins as the city's equivalent of Nikola Tesla. Hummel's work as an assigned costume Concept Artist was further from fashion designer's than costume designer's position, but the full potential of utilizing costume narration was insufficient without further personality content and deeper analysis of the characters. Even if their appearance eventually reflected the commercial beauty ideal during the time: Rosalind was inspired by the “Gibson girl” and Robert by the “Arrow Collar man” (Mulrooney, 2013), Lutece twins became more stylish and contemporary than the rest of the characters, which supported their role as time travellers. (Figure 9).

Figure 9 Rosalind and Robert Lutece costume concept (Mulrooney, 2013).

*The Witcher 3: Wild Hunt's* (CD Projekt RED, 2015) costume concept combines features from several historical eras and present-day fashion into an environment that resembles the Middle Ages. In Figure 10 a peasant's shirt is ill-fitted and seems to have sleeves tightened with rubber bands. To make the character more sexually appealing the shirt's bodice have been simply split without considering the costume construction, time period or functionality required by the peasant's occupation. Referencing historical- and costume construction related sources could prevent implausible costume solutions.

Figure 10 Peasant from *Witcher 3: Wild Hunt* (CD Projekt RED, 2015).

#### 4.3.3 Futuristic

In futuristic game narratives, consistency becomes an essential feature of the visualization. When the concept lacks confluences to any known time period, whether present or historical, the visual style may leap out of hands. Without the artistic team mutually agreeing on the boundaries of the style, even innovative features may inundate into visual noise.

*Deus Ex: Mankind Divided* is set in the year 2027, and lead by Executive Art Director Jonathan Jacques-Belletête, the Character Art team created a world which is described by them as a mix of

cyberpunk and Renaissance era fashion. Jacques-Belletête claims, that inspired by the combination of transhumanism and Renaissance era they created a new sub-genre of cyberpunk, which had to look both futuristic and contemporary at the same

time. Before designing primary characters, the team approached the fashion recipe by focusing on dressing up less important NPC's first (Jacques-Belletête et al., 2016: 82-83) (Figure 11).

Figure 11 *Deus Ex: Mankind Divided* 2016: NPC outfits. *Civilians* on left, *Prague civilians* on the right. (Jacques-Belletête et al. 2016: 82-83, 86-87)

The *Civilians* designs are a mix of present-day clothing with renaissance era-inspired details and experimental surfaces, but the colours were kept dark and muted. The *Prague civilians* are, according to the creators, designed to express the game's corporate feudalism metaphor (Jacques-Belletête et al., 2016: 87). The costumes are based on present-day fashion collections from houses such as Acronym and InAisce (Figure 12) and display large corporate logos. The team also collaborated with Errolson Hugh from Acronym to finalize their protagonist Adam Jensen and utilized Gareth Pugh's catwalk fashion photos as direct reference for their character Zhao Yun Ru.

*"We wanted to ensure that civilians had our visual signature, but not to cross that threshold where everything starts to look too theatrical",* says Jacques-Belletête (et al., 2016: 12). The Deus Ex team had experience of crossing the threshold in question. Designing the previous game, *Deus Ex: Human Revolution* (Eidos Montreal, 2011) the NPCs lacked consistency, and in order of creating a futuristic world, the outfits were slightly extravagant. An early NPC costume concept board shows that the inspiration emerged from a long timeline of costume history, current day and cyber fashion (Figure 13).

Figure 12 An outfit by InAisce (InAisce, [no date]) and two styles designed by Acronym (Cruz, 2014 and Wray, 2013).

Figure 13 *Deus Ex: Human Revolution* 2011: NPC costume concept board (Plunkett, 2011).

Creating *Deus Ex: Human Revolution* Jacques-Belletête learned the importance of consulting with real designers in clothing, products and architecture, and nowadays he believes nothing should be made from scratch. He compares the costume process of *Deus Ex: Human Revolution* to *Deus Ex: Mankind Divided* recalling, that “*Even now, I think the crazier ones that we did [in Mankind Divided] were probably more wearable than some of the least crazy ones we did in Human Revolution*” (Cork, 2015).

Finding a factor bound to our time increases the credibility of the period-definition. The Character Art team of *Remember Me* (Dontnod Entertainment, 2013) increased the period-believability by keeping the textile materials recognizable for the players. Set in 2084, the protagonist is wearing jeans, a t-shirt and a leather jacket, tailored in a fashion that conforms the futuristic concept of the game (Figure 14).

#### 4.4.1 Informative costume

Besides providing visual support to the character, period and environment and reflecting the character's personality, the costume can communicate functions essential to game mechanics. The costume can deliver vital information about the character's skills and condition, or even provide new abilities when worn.

*Dead Space's* (EA Redwood Shores, 2008) developers pursued a high level of transparent immediacy by integrating HUD-delivered information into character's costume and gear (Figure 15). HUD (head-up display), also called a Status Bar, informs the player of functions and condition of the character. It is commonly visually displayed on the screen and part of the game user's interface. Transparent immediacy in games and other digital mediums seek to make digital technology "transparent", and a transparent interface would be one that erases itself. The aim is to make the consumer unaware of the medium but generates a feeling of an immediate relationship to the content of that medium. (Bolter and Grusin, 1999: 21, 23-24).

Figure 14 Nilin from *Remember Me* (Briclot et al. 2013: 29).

### 4.4 Exclusive features of the medium

Confining the time period, utilizing reference material and pursuing iconic, memorable characters are basic principals in film and performance arts as well as in the game industry, and designing NPCs is relatable to designing crowds for film or stage. However, the game industry has costume-related design features utilized exclusively in the medium. The costume can reach beyond the role of an aesthetic asset and a character expression and become employed into gameplay as a messenger and an upgrade of the character's condition and abilities.

Figure 15 The character's costume has glowing parts indicating the character's condition: a spine imitative health bar on the back, half a circle expressing stasis, and a screen on the gun monitoring the amount of ammo (Vicious Computers, 2009).

On the contrary, hypermediacy makes us aware of the medium (Bolter and Grusin, 1999: 34); for instance, the further player advances their character in *World of Warcraft* (Blizzard Entertainment, 2004), a massive multiplayer online role-playing game (MMORPG), the more actions appear visible on the HUD offering shortcuts to character functions and advancing the development of the character (Figure 16). A costume designer needs to be aware of these additional requirements for the costume and prepare to offer solutions if the production has set immersion as a goal through integrating HUD-related information into the character's outfit.

Figure 16 A visible interface in *World of Warcraft* (Curse Entertainment, 2014).

However, the HUD-delivered information can be integrated into the costume while at the same time displaying it on the screen, similarly as in *World of Warcraft*. Both the *Deus Ex* and *Halo* series employ a Head-Mounted Display (HMD) (Figure 17). It is a display mounted or projected onto the character's sight or helmet's visor and aims for total immersion. (Techopedia, 2017d). It functions solely on first-person views, while *Dead Space* represents the rare occasion of integrating the HUD into character's costume in third person perspective.



#### 4.4.2 Customization

Character customization allows the player to take control over the character's appearance to modify it according to tactical reasons or visual preferences. Games are a rare medium where an outsider, the consumer, is partly given the position of a costume designer. The customization in games often include body and face modifications, but this chapter only addresses the costume adaptations. Awareness of the level of control affects the costume designer's work: the less control the player has on the costume choices, the heavier is the costume's emphasis on the narrative and the easier it is to support storytelling through appearance. The costume approach needs to be estimated according to the customization level chosen for the production.

Game developers commonly guide the visual entity of customization by offering the player a limited amount of clothing options. However, player's control over the appearance varies significantly among games. Figure 18 roughly categorizes five grades of player control over costume choices from no control to full control.

Figure 17 Heads-up Display of the *Halo 5: Guardians* (343 Industries, 2015) (Screen capture by Haloprov, [no date]).

Games that feature a non-customizable protagonist, such as *Alan Wake*, maintain the player character's outfit constant throughout the entire gaming experience. This approach maintains the character's appearance more memorable but may cause interruptions in believability, if the change of surroundings demand more appropriate clothing. Such example is *Beyond: Two Souls* (Quantic Dream, 2013), which does not support customization, but the protagonist undergoes several costume changes during the game. The changes follow the narrative, which leads the protagonist through an event at an embassy, a hospital, and exteriors with low temperature. These two levels of non-existent player's costume control align with film and performance productions, where the costume designer creates the costume narrative without the interference of the consumer.

*L.A. Noire* presents low-level player-control over the character's appearance. The protagonist has seven outfits, of which several augment the character's abilities, such as defence or attack qualities (Figure 19). These attributes can be emphasized through costume features, which seems to be moderately utilized in the late 40's style outfit selection of *L.A. Noire*. The *Hawkshaw* outfit, which allows the character to take an extra dose of damage, features a comparatively casual look fit for a fist fight without a restricting jacket. The *Button man* outfit implies a low position of an organized crime syndicate, such as the mafia. The origin of the word comes from the buttons of a uniform. (Your Dictionary, [no date]). Implications of the name do not appear on the outfit, but the jacket has a pair of pockets as if for carrying the extra ammo. However, not everything requires visualization on the costume.

Figure 18 Player's control over customization varieties (Figure by Salomaa).

Figure 19 L.A. Noire Three examples of outfit options (Team Bondi, 2011).

Outfits can be achieved by accomplishing tasks, after which they are available throughout the game. They are designed in a manner that associates with the character's profession, fits the overall environment of the game, and does not contradict with environmental features, such as the climate, at any point of the game events.

Some games provide enhancement in the form of a full costume, as in *L.A. Noire*, but many fantasy games offer the player combination options by separating the outfits into several pieces of garments, that can then be freely composited by the players. Multiple RPGs (role-playing-games) allow high-level of character customization. Games such as *The Elder Scrolls: Skyrim* (Bethesda

Game Studios, 2011) and *Witcher 3: Wild Hunt* offer in-game clothing- and dyeing shops to allow the player to enhance the looks of their player character. In addition to augmenting the character's abilities, the garments have also performative value (cf. Klasttrup and Tosca, 2009).

*The Legend of Zelda: Breath of the Wild* (Nintendo, 2017) provides the player ostensible control over the character's outfits. Various environments are hostile to the character without a certain outfit and climbing to an icy mountain without warm clothes causes health loss and eventually the character's death. The character directs the player's actions and outfit

decisions by providing feedback on its condition by expressing cold, heat or exhaustion.

Games such as *The Second Life* (Linden Lab, 2003), offer players an opportunity to freely create clothes for the characters, which has formed online markets for unique player-designed character outfits. The only outfit limitations are the ones caused by the technique and the level of the creator's skills. *Second Life* is a free-form game entirely under the player's control and the outfit does not have a narrative function for a costume designer to become involved with. In these games, a clothing professional's input is purely in fashion design.

## 5 Costume Art

In this chapter, I go through my experiences as a Costume Artist at Remedy, based on a record of a working diary and unstructured conversations with a variety of professionals of the company. I came to Remedy to explore the need of a costume specialist in the industry, and through trial and error have established an alternative process to the character costume pipeline and communication tools for the co-operation between the company and me.

Overall, the game industry is starting to realize the advantages of utilizing a costume specialist for their character processes, but the basis for integrating professionals have not been founded yet. People who have worked as costume designers for the game industry, such as Claire Hummel, Lyn Paolo and Wendy Cork, had

only a vague idea of the characters and the world they designed costumes for. They were provided little information about the characters, and Paolo and Cork, who originate from the film and tv productions, were not familiar with game development processes or how the productions might influence the final costumes. The character costuming process at Remedy is exceptional, including me as a designated costume designer from an early stage of production and through every step of the pipeline. This chapter describes the career transition from the film and performance arts to the game industry based on my personal experience.

### 5.1 Integration

This chapter introduces my experiences of integrating a costume designer's set of skills into the character production. As shown in Figure 2, the character pipeline is long and in larger companies, it involves several professionals. Each game character is a co-creation of several artists, and artists can freely generate adjustments on the appearance of the character based on demands of technical functionality, time priorities or personal preferences. This trait made me concerned about the consistency of costume concepts along the pipeline. It is essential for the costume designer to understand the final product to maintain the costume concept and consistency without restricting the artistic freedom of the Artists involved.

At the beginning of my internship, I was not aware of the multiple phases of character creation, so I could not determine at which points I could be of use, and how. In order to define my position in the production, I examined the whole process from concept design to texturing and creating a simulation rig. Originally, I imagined learning everything costume related through the development line and processing the garment aspects on every stage of the production myself. Soon I learned about the complex technical process of character creation, and realized, that I will need to identify the specific parts of the

pipeline where a costume designer could be introduced to. Fortunately, the more knowledge I gathered of the technical aspects of digital cloth creation, the more involved I became with the costumes throughout the development line.

A template of Costume Artist's position in game production pipeline is utilized for comparing pipelines with and without a designated costume professional in production (Figure 20). The template reuses the second part of Figure 2 to contrast the adjusted pipeline with an integrated Costume Artist.

Figure 20 Costume Artist's position in the pipeline (Figure by Salomaa).

In order to employ script analysis in character production without a defined script, I attempted modifying methods for character analysis. To estimate the game's world and atmosphere, I participated in research, reference material exploration and mood board construction. Contrary to the earlier costume production pipeline of Remedy, a separate Concept Artist is no longer involved in the preproduction.

Drawing skills were used for concept art, and costume construction knowledge for tailoring the concepts via photo scanning and Marvelous Designer. Delivering material for photo scanning requires the same skill set as a costumier in film productions, and is based on searching and modifying or manufacturing garments depicted in concept art. Familiarizing the technology of photo scanning helps to avoid materials that could introduce challenges for the technology. Marvelous Designer requires patterning skills and costume construction knowledge. When produced carefully, base models created by scanning and Marvelous Designer deliver the costume clearly to the modeller and prevents changes caused by technical reasons and errors in visual communication. A method of employing photoshoots for character construction will be discussed further in the thesis.

The reason for introducing modelling, texturing and simulation rig as part of the thesis, regardless of my lack of direct involvement with the tasks, is mostly the result of realizing the need of a costume professional in these phases, but also noting the challenges of communicating clearly the needed costume

related information to the professionals of these techniques. Lead Character Artist of Remedy mentions, that if the Concept Artist has no modelling experience, the characters may experience several shifts along the pipeline (Puomio, 2016c). To deliver the design clearly to the game, it is essential for the costume designer to be able to follow the costume through each stage of the production

In addition, films are employing CGI technology increasingly, which sets new demands on the skill sets of costume designers. Joanna Johnston (2012) argues, that understanding technical requirements and constraints, and maintaining an open dialogue with the visual effects team is becoming essential for any costume designer (296). In addition to constraints, CGI costuming allows additional tools for character interpretation, which reveals the live costuming boundaries of materiality and physical laws.

Joanna Johnston (2012) is one of the first costume designers who became professionally involved with CGI characters. She designed costumes for *Who Framed Roger Rabbit* (1988) and, despite being initially responsible for costuming the live human actors of the film, participated also in designing the CGI characters. Designing Jessica Rabbit, she met both the advantages and restrictions of CGI costuming. Johnston wanted Jessica to defy gravity in an extreme way and designed a dress impossible to wear in reality. Originally, her idea was to give the character an entirely sequined, constantly shimmering gown but found out the considerable expenses of the feature. As a

compromise, the dress shimmered through one scene and was unsequined for the rest of the film. (296).

Budgeting sets the most considerable restrictions on game character design. Film and performance costume budget includes the costume materials, costume and workshop rentals, logistics, and manufacturing expenses, that includes various human resources in forms of specialists ranging from pattern-, prop- and shoemakers to seamstresses, milliners and wardrobe personnel. While games are virtual and the need for real clothing is smaller, the majority of the expenses is caused by the technical equipment and the human resources needed to execute the characters. The manufacturing specialists needed for creating a character in the game industry are Character Artists and Technical Artists and Animators, who produce the motion capture and photo scanning data, and design, model, texturize, and rig the character. In addition to the artists creating the design, a character's "cost" also includes game resources such as memory and processing power.

For the confidential nature of Remedy's current project, P7, I cannot share more details about the game. However, to demonstrate the functionality of the adjusted costume production pipeline, I introduce the first round of the protagonist's costume. I will refer to the character as X.

I designed X in Spring 2017 after several iterations of costume concepts. The outfit was created in Marvellous Designer by means of digital patterning and sewing. The digitally dressed-up 3D model of the character was then transferred into a modelling

program for a "clean up" and light texturing by a Character Artist and then delivered to a Character Technical Artist. She added movement to the character's skeleton and the outfit, and we communicated several times about the textiles and weight of the garment, and how folds act in movement. First, we lacked the vocabulary, and the technical language of rigging left me confused. We ended up utilizing reference pictures and hand-drawn sketches about the costume's movement, and I spent time next to the Character Technical Artist's computer discussing the matter, while she worked on the rig. This way X's outfit was delivered from the concept to the temporary game environment unchanged. There we quickly saw the malfunctioning parts of the costume and were able to take it on the next round of iteration. It is important to deliver a template of a costume idea quickly to the test environment to see the technical obstacles impossible to predict in the concept phase.

During Fall 2017 the workstations of the whole Character Art team of Project 7 were moved to be in close proximity to each other. The team consists of the Lead Character Artist, three Character Artists and me as a Costume Artist. I provide detailed digital costume renderings consisting of characters' hair, physical features and outfits with simple backgrounds, and Concept Artists integrate them in their concepts of the game environment. The progress is regularly reported to the Game Director responsible for the overall look of the game, and he contributes further feedback on the characters.



At this stage, the game consists of simple temporary versions of every aspect of the game: the environment, characters, audio, game mechanics, and possible quests and puzzles. This temporary version is a sketch of the game and is employed to observe the input of different departments come together. When the Leads approve a character's concept, it is given to a Character Artist, who creates a temporary character that will be rigged and then delivered to the current world of the game. I provide the Character Artists reference pictures and assistance in costume construction when needed.

## 5.2 Communication

Originally, I had planned to research a comparison of a costume designer-modeller communication and a costume designer-seamstress communication, but learned, that my current position as a Costume Artist is not directly comparable to the position of a costume designer in performance arts. A costume designer is in charge of the complete visual path of the costume and the character, and my education and experience in the field allow me to generate a costume from sketch to stage myself, which authorizes communication and common vocabulary with each section of a costume department along with the production line. In the game industry, as a Costume Artist, the technique of generating the costume requires knowledge and skills I do not possess. The tools, details and vocabulary need to be shared to

deliver costume ideas into a digital form through the character pipeline.

At the beginning of my internship, I experienced difficulties when communicating my costume knowledge onward. As someone without technical skills I tried advising a Character Artist with fitting an outfit to a character, causing mild annoyance for both parties; for myself for not being able to express suggestions for improvements to co-create a more fitted and realistic garment and for the modeller for getting involved with his work. At this point, I also lacked the knowledge of the process and did not have the vocabulary nor the competency to give advice on the matter. I was challenged by how to deliver needed information without causing interruptions and annoyance to other team members. Character Artists have the skills, capacity and independence to adjust each other's work and they are accustomed to working independently and relatively freely.

The importance of communication between the professionals of costume production pipeline was also emphasized in a panel discussion by the Character Art team of *Uncharted 4: A Thief's End*. According to the company's Senior Character Artist Colin Thomas, the costume decisions need to be confirmed with the whole pipeline early in the concept stage. Especially technically challenging assets need to be introduced to the Character Technical Artists beforehand to discuss the achievability of the garment. For example, adding a jacket on the character requires an appropriate rig to make it move in a natural manner. The

people responsible for concepts need to assure, that colleagues further down the pipeline are able to deliver the design. Creating *Uncharted 4's* protagonist Nathan Drake, many aspects needed rethinking based on technical restrictions. Occasionally the team had tools and skills to solve challenging solutions, but other resources, such as budgeting, prevented delivering them into the game. (PlayStation, 2014a).

Since the importance of communication is emphasized when integrating the contributions of the professionals specialized in more tactile knowledge and lacking extensive technical skills into the production, I have utilized several types of referencing. The reference materials are closely related to the processes of analogue costume design: references provide connections to reality. I provide visual and tactile references in form of collages, live garments and, in the future, recordings of clothing's movements. Recently also a method of presence reference has emerged into the process in a form of live actors.

### 5.2.1 Mood and costume boards

Mood boards are a common visual method of communication in multiple artistic fields. They are utilized to visualize a certain topic or atmosphere, and they set a base for a concept. Costume boards are employed to define individual garments of an outfit and are commonly utilized in the production stage for collecting

and purchasing materials. Mood boards are more abstract, costume boards more definitive.

Costume boards were utilized for *Quantum Break*. The game had sections of live action TV episodes supporting the narrative, which gave consumers a chance to compare the accuracy of the actors to their digital doubles. The idea was to add 20-minute sequences in between the playing experience, presenting the game's antagonist's viewpoint on the events.

Along with the game production in Espoo, Finland, the TV production was in progress in the US. The characters were designed primarily for the game, which set the Lead Character Artist into the position of a costume designer for the TV series. Directing costumes from a distance was challenging and caused difficulties further in the game production. Even if detailed costume boards (Figure 21) were sent to the American costume designer Frank Helmer working on the TV production, some garments that ended up in the live episodes were not agreed upon. Nevertheless, outfits visible on the TV show had to be replicated in the game to maintain consistency between these two, and the lack of knowledge of technical restrictions of game development at the TV production ended up causing extra work in game production later in the process. For example, despite challenges of photo scanning reflective materials, a character in the live production was dressed up in a shiny suit, later titled as "the snake suit" by the game developers. (Puomio, 2017b).

Figure 21 Costume board of the final outfit of the *Quantum Break* protagonist Jack Joyce (Remedy Archives, [no date]).

### 5.2.2 Photo reference

I utilize photo reference to communicate costume details to modellers. The references are generally found via online search engines immediately after a request for details. Occasionally I generate line drawings of costume construction for a simplified presentation of the garment's structure.

Photo reference was a predecessor of photo scanning. At Remedy, a photo scanning software was introduced to the process in 2011. Until then, the costumes were modelled by hand in modelling programs, and photos and live reference garments were a key component in manufacturing the outfits. (Blåfield, 2017). During the development of *Alan Wake* (2010), the photo references were still utilized extensively in character production. After defining the character's final costume concept, pieces of the outfits were photographed separately (Figure 22).

Figure 22 Photo reference pictures of Barry's costume (Remedy Archives, [no date]).

The costumes were then photographed worn by the actors standing in an A-pose (Figure 23). This stage was essential for estimating the silhouettes of the characters and the fit of the costume, as well as the proportions and facial features of the characters. Photo referencing as a technique can be viewed as a 2D version of photo scanning.

Figure 23 A selection of NPCs for *Alan Wake* (Remedy Archives, [no date]).

### 5.2.3 Live and motion reference

Photo references do not always fulfil the informative qualities required for detailed 3D assets, and a task demands live costume references. I have provided modellers live samples such as collars and pocket structures, and occasionally clothing worn by someone at the office is employed to clarify construction details. Especially textures and material behaviour when worn are examined over live samples.

Johnston (2012) has provided animators live reference costume material. In *The Spiderwick Chronicles*, she received maquettes of the inhuman creatures, which she costumed. These models were then utilized as a blueprint for the final designs, and the computer animators were provided with a detailed three-

dimensional object of the character with all its colour, texture and form to be delivered into a digital form. (299). Even if photo scanning has emerged to various fields of digital manufacturing, live references are still utilized to support transitioning objects into digital replicas. For a modeller or an animator, it can be extremely useful to have a reference to the real-life costume for the drapes, textures and costume construction.

The reference needs of Character Technical Artists' differ from modellers'. In addition to providing visual information in the form of a live reference, the material needs to express the weight and movement of the clothing and is most conveniently delivered in as a motion reference video. In *Polar Express* (2004), a full motion capture production, Johnston (2012) manufactured costumes to be filmed in a range of motions, such as jumping,

laying, running and skipping, as a reference for the computer animators. The costumes were then handed to the computer team as live reference material. (2012: 297). Also Claudia Chung, the simulation supervisor of Pixar's *Brave*, recalls the challenges of representing moving clothes on digital characters. The team tried to utilize references from films, but the research led to realizing the importance of tactile costumes for the process. It was necessary to see how the garments drape and move, and feel the weight of them. (Terdiman, 2012).

### 5.2.1 Presence reference

A major difference between costume design in theatre and games is the amount of actor's physical and professional input in character interpretation. I am accustomed to having a person with a background, personality, complexes and body type to dress, and sometimes a major part of my work as a costume designer is to support the work of the actor. The final costume may be a compromise between me, the director and the actor. In the game industry, my subjects do not have clothing preferences or demands on functionality.

Furthermore, in performance arts, the character is traditionally interpreted by a single person on stage. In games, the character can be interpreted by a combination of several people. A short documentary *Creating Elizabeth: The Women That Brought Her to Life* (Video Game Music Vault, 2013), introduces the people who were combined to create a character called Elizabeth for *Bioshock Infinite* (Figure 24). Anna Moleva's face and facial

expressions were photo scanned and utilized for marketing pictures of the character, Courtnee Draper provided the character with her voice, Heather Gordon performed her movements, and Level Designer and Programmers created her brain. Utilizing multiple people for character's physical and audio interpretation require a mutual understanding of the character's attributes and personality.

Figure 24 Elisabeth has multiple creators (Video Game Music Vault, 2013).

Even if in the beginning of my exploration at Remedy I found the lack of an actor a liberating factor, during the production I recognized a feeling of a missing component. As a Costume Artist I create the physique of the game character along with the costume and have a role in supporting the character's personality definitions, but I experienced a lack of a dimension.

According to Osmond (2017), the interaction between a designer, a draper and a performer in a fitting room is essential for the creative process, as the space serves as a platform of collaboration between the expert knowledge of these professionals. The attachments of this collaboration to my creative process were revealed by the transition into the new field and the sudden absence of this feature.

Remedy's Game Director Mikael Kasurinen touched on the subject by mentioning the process of creating *Alan Wake* and dressing up actor Ilkka Villi (Figure 25). Kasurinen complimented the actor's input in creating Alan Wake by bringing the character alive and noted the difference in *Quantum Break*, in which the project was lacking the actor-in-costume -interaction with the team. (Kasurinen, 2017). The process of capturing photo references for *Alan Wake*'s protagonist differed from the ones with NPCs (Figure 23). At a photoshoot, Ilkka Villi empathized with the character and materialized the presence of Alan Wake, while the actors of NPCs provided the characters only their physical bodies in neutral poses. He became a live reference for the character. I have named the method a presence reference, and it became a tool for character interpretation at Remedy. The method has brought together analogue and digital costume design and became a concrete form of integrating costuming skills into character art.

Figure 25 Creating Alan Wake with Saku Lehtinen and Ilkka Villi (Remedy Archives, [no date]).

To return the method of presence referencing into the process, the actors of the current Remedy project are invited for photoshoots, for which I provide referential costumes and props to help actors to internalize their characters. Utilizing an actor for the character exploration and recording it in photoshoots and live videos help us bring the character alive and define the co-created idea of the appearance and the personality of the character. The method has been stated effective, which has raised a request for more defined costumes. Along with supporting the actor's work in materializing the character, manufacturing the costume also defines the form of the costume

for photo scanning and minimizes the possible changes of the look further down the pipeline. Receiving increased budgets and number of working hours for the preparations of the photoshoots communicates the method's value in character creation.

The actors are provided only a brief character introduction before the photoshoot, which prevents a deeper character analysis from the actor's behalf. Major directions come from a Game Director during the photoshoot. Therefore, the actor's contribution to the character is mostly facial expressions, gestures and physical presence. From the perspective of a costume, the actor-costume designer -relationship differs from performance arts. During fittings, the actor may comment on the functionality of the costume, but in the lack of deeper character familiarization, the actor does not possess the quorum for the character's style and preferences.

The interaction between an actor and a costume designer can be complex. Matinaro (2014) argues, that in a fitting room the costume designer does not encounter only the actor, but three sides of them: the private self, the professional self, and the character. The costume designer needs to be aware of these when receiving feedback on the costume and collaborating with the actor, to adjust the critic into the appropriate context. The comments of the actor's private self often connect with the apprehension of one's attractiveness, and the professional self comments on the functionality of the costume, and the feedback is based on the interpretation of the character. The character comments on both, but often from the perspective of the play's

inner world and the personality of the character. (2. *My Translation*).

Creating presence references connects directly to my history with live costumes. The costume supports the actor in making a connection to the character and visualizes the common comprehension of the character to the viewers and co-creators. Osmond (2017) lists the functional aspects of a costume, and what it affords the performer: supporting technique and enabling an embodiment of character sensation.

A form of presence reference can be recognized in the methods of Ed Hooks, who trains actors and animators, and has a technique of abstracting practical experience and applying it into other disciplines, such as animating. Hooks has taught game animators at Blizzard and Ubisoft to utilize acting techniques in order to improve their animation work through bodily experiment (Hooks, [no date]). In a similar fashion, through the awareness of tactile costumes, I aim to bring the sense of reality into the character design process.

Sally E. Dean has brought depth to the sense of connection between body and costume in performance arts. Her project *The Somatic Movement, Costume & Performance* aims to bring awareness to the *inner body* as opposed to the outer form of the body and its aesthetic style or placement. With *inner body*, she refers to the body underneath the skin (Dean, 2016: 99). My research is related to the concept of somatic movement by the confluence of separated inner and outer bodies. I view current character art as a process concentrated purely on the outer body



of the character, and my work aims to bring the inner body to the character through costuming actors for presence reference and integrating my tactile knowledge of costumes and human body into the process.

### 5.3 Character analysis

Similar to performance and film productions, game development consists of various professionals from different fields collaborating to accomplish one product. The characters, the world and the story are built up laterally, and at the beginning of the production, Character and Concept Artists work with very little information of the character’s personalities. In film and performance arts, costume designer and other team members generally receive the script and analyze the characters, atmosphere and environment carefully at a very early stage of the project. Due to this difference, I attempted constructing analyzing methods in the form of tables and charts to bring depth to the characters, and to avoid the assignment becoming a process of dressing up paper dolls.

Bringing depth to a character without personality definitions is a challenging task, and to provide an initial selection of character types to support the narrative, I began the process by creating a rough selection of style directions. The example (Table 1) categorizes two demos of different style directions: rich and careless for a male character with an undefined background. For each style, I defined the silhouette and a combination of garments to achieve it, the message the outfit expresses when

worn, materials, colour options and accessories. The following example is not connected to any current Remedy project.

Table 1 An example of my approach to designing the character’s style directions.

The table proved ineffective. The early stage of the narrative was yet undefinable, and the table had soon no attachments to what the story and characters evolved into. The initial idea of forming Table 1 was elevated by my motive to inspire the player to contemplate, even subconsciously, the character’s background: what has led to the outfit choices of the character.

In the costume process common in performance arts, the character creation starts with psychological aspects of character design before or along the initial visual attempts to approach the character. A game as a form of entertainment is still a relatively young form of narrative art and might be experiencing a late emergence of deeper character representation. Katherine

Isbister (2006) indicates in her book *Better Game Character by Design, The Psychological Approach*, that adding psychological approach to game character design leads to more consistent characters, stronger integration for rooting characters into the gameplay and creating broader appeal to target groups, who appreciate emotionally and socially engaging games. (255, 258.).

Lajos Egri (1960) proposes a concrete solution for creating a credible character for any narrative art, such as literature, film, theatre or games. He points out, that every object has three dimensions: depth, height and width, and argues, that human beings have three dimensions as well: physiology, sociology and psychology. It is equally important to know the character's nature as the reasons for it. (34). Based on this theory, Egri formed *bone structure of a three-dimensional character*, which Lankoski, Heliö and Ekman (2003) adapted and mobilized into the context of computer games (9) (Table 2).

Table 2 *Bone structure of a three-dimensional character* by Lajos Egri, adapted by Lankoski, Heliö, and Ekman (2003: 9).

After the narrative department provided further information in a form of character bios, I utilized Lajos Egri's *bone structure of a three-dimensional character* and entered the most recent character traits into the table. By turning the method around by, instead of creating a character based on the information, tracking and categorizing the available data, I attempted to offer the game's writer a tool to inflict further definitions of the character's personality. The method turned out to be ineffectual for the writer but provided me with a way to stay on track of the characters' attributes.

## 5.4 Concept Art

As in many creative visual processes, the game costume concept design begins with research and familiarizing with the environment, time period and any character traits available in the early stage of the development. Based on this information, a variety of reference material is collected for the initial source of inspiration and to aid internal communication of the team. The lack of character definition at the beginning of the development provides creative freedom and a chance to affect the story and even casting through character design.

At Remedy, the overall ideas of the game are created in concept design groups. These ideas define the universe of the game and they function as guidelines for Concept Artists, who start illustrating the possibilities of this universe and continue focusing the concept. This material generally outlines the unwanted ideas that can be deleted from the overall concept. Concept Artists are responsible for the visual development of the game and led by an Art Director, who is in charge of the visual look of the product. From the Concept Artist, the drawings proceed to the Art Director and the rest of the team, which defines the direction of the concept even further. (Puomio, 2016c). The conceptualizing process is necessary to explore various visual solutions to a design problem before moving into production with final 3D assets (Assinen, 2013: 20).

Concept Art is not made for a consumer but for the company's inner communication. It is utilized to support the common understanding of the visuals of the game and to increase

consistency and unity of the designed world. Bradley (2011) points out, that concepts help the team members to understand the parameters of the design vision by establishing the characters. Similarly, in a theatre the various teams are inspired and guided by set and costume renderings, that keep the visual world cohesive. (63).

La Motte (2001) considers the variety of viewers of a single costume illustration when visualizing his idea. In film and performance arts, generating the sketch for a tailor demands details of the garment's cuts and panels, but as an illustration, it looks stiff. For the director and producer of the production, the sketch should deliver the mood and personality of the character in a form of a concept. Introducing the illustration to an actor requires another style decision; whether to illustrate the costume on a mannequin alike the actor or to draw it in a manner common for fashion sketches, with long legs and relatively small heads. La Motte (2001) solved the problem of delivering the costume ideas to different viewers by generating several sketches of each costume. He argues, that the costume rendering should be readable, expressive, and help sell the idea. (56-58). The trend in games' concept art is to combine these features into one concept by depicting a highly realistic and informatively detailed illustration of a dynamically posed character, and commonly actor's face is added to the concept as soon as the casting is finalized. The details of the character can be also defined further on costume boards. The concept needs to be readable by the Art Director and creative team and express the 3D form of the character for the modeller.

### 5.4.1 Process

The character concept process is fairly common throughout the game industry. Claire Hummel's design process for *Bioshock Infinite*'s Elizabeth is referred for the alike process I have utilized after transitioning into the industry.

Hummel's process begun with studying a brief introduction of the female character, Elizabeth, and a set of previous concepts the Character Art team of *Bioshock Infinite* had worked on until inviting her to join the development process. Generating Elisabeth's concept, Hummel followed a common workflow of character design: from black and white silhouettes to more detailed concepts and colour variations, to the final, refined design. On the first round of concepts, Hummel concentrated on finding a design that was appropriate for Elizabeth's age and the period of time and creating an iconic appearance (Mulrooney, 2013) (Figure 26).

Figure 26 Costume concept by Hummel. The first round of concepts (Mulrooney, 2013).

During the next round, Hummel added details: trims, buckles and pleating to make a relatively plain costume of a white blouse and a darker skirt more unique. Hummel also added hair variation at this stage. After defining the outfit and hair of the character, the chosen elements were combined and colour variations were added (Figure 27).

Finally, Hummel illustrated the final concept with details from back and front (Figure 28). It is also common to display a side view of the character on the final concept.

Figure 28 The final concept of Elizabeth (Mulrooney, 2013).

#### 5.4.2 The shape and depth: silhouette and value

Some of the preliminary design principles that affect the costume choices in character design in the game industry are the character silhouette, but it also applies to film and performance

Figure 27 Hair, costume details and colour study of Elizabeth's outfit (Mulrooney, 2013).

arts. La Motte (2001) recommends looking for four main things when estimating a period costume: besides lines, seams, cuts, details and construction, the silhouette is affected by fabric and jewellery. He recommends considering what reflects the character or conditions best. He recommends listing the character's personality features and then translating them into costume using cut, fabric and colour. (50-51). La Motte limits the precision of silhouette to period costume design, but I find it equally useful for creating a contemporary character on stage.

In games, a silhouette is a form of player-communication, and especially action games employ a visual definition of game's enemies for communicational purposes. Player's reaction to a certain enemy type must be instant and intuitive to achieve the set goals, such as survival. (Puomio, 2016a). For similar reasons, characters are rarely one coloured. From distance, communicating gestures can be challenging for a unicolored character: the colour of the arms should be contrasted with the colour of the bodice. In 3<sup>rd</sup> person games, according to Valve's (2015) Character Art Guide, it is crucially important for players to not only instantly identify their character among others, but also the way they are facing for movement anticipation during gameplay.

These examples emphasize the silhouettes' value in instant gameplay situations, where the visual communication is connected to the game mechanics and playability.

In *Dishonored 2* silhouettes were adopted to communicate characters' personalities and backgrounds. The Art Director of *Dishonored 2*, Sebastien Mitton, found the character's anatomy as important in telling the story as the costume. He wanted the consumers to recognize different representatives of professions and the character's silhouette played a major part in the process. (Monnet, 2016). A costume is a tool for emphasizing features or to hide them, whether the character is on stage or in a game, but games have the advantage of modifying the features further beyond physical restrictions, not only utilizing the costume but adjusting the body of the character as well. The characters Stilton and Jindosh (Figure 29) display the method. Both are wealthy, but the team communicated their backgrounds through their anatomy and costume.

line of the coat adds mass to the body. Robust shoes hint on the preference towards functional, more labour-friendly accessories, and the pants are not strictly pressed; he tends to be careless of cloth maintenance. Everything in his clothing is functional and little decorative, and a neck tattoo reveals a non-aristocratic background. Stilton's silhouette study shows, how the character was iterated towards a bulkier form (Figure 30).

Figure 29 Stilton and Jindosh concepts by Sergey Kolesov (Tucker, 2016: 76, 77).

Stilton is a former miner, and though his clothes are fitted for someone of a high status, his physique reveals a body suitable for more physical labour. The standing collars of his coats emphasize the size of his shoulders and neck, and the straight

Figure 30 Silhouette studies of Stilton by Sergey Kolesov (Tucker, 2016: 76).

Jindosh is brilliant, twisted and born wealthy. His posture is straight and body structure slender, as of a man who has not needed to utilize it for challenging tasks. The clothes emphasize the slender waist and the trousers are well pressed. He maintains his clothing well and he has a decorative jabot: he is comfortable employing non-functional elements into his outfit. He recognizes the importance of appearance and how to utilize clothes to communicate wealth.

The Character Artists have more tools for character representation than the costume designers: instead of having the actor's body to build on, the Artists can mould the character's anatomy more freely within the limits of the level of reality and stylization of the game. Digital methods not bound to physical restrictions provide more visual freedom for storytelling. In performance arts, the costume designers are always limited by the presence and anatomy of a human body and can rarely affect the character's body type beforehand through casting. Nevertheless, costume designers have methods of adjusting the actor's body type by costume constructions manoeuvres, such as topping and manipulating the lines and cuts of the garment.

Besides silhouette, a value is an important tool in visual communication. Value estimates the range of lightness and darkness within the subject regardless of colour and saturation. It reveals the focus points of the character and creates the sense of depth and three-dimensionality to the object. (Valve, 2012). In addition, for this reason, silhouette studies are commonly utilized in the game industry before proceeding into more

detailed character concepts. In the silhouette study of Stilton, the range of values are studied besides the silhouette variations.

In contrast to the pre-defined distance to the characters and the set relation between the viewer and a character in a film, in games, the player usually has control over the distance to the characters. Therefore, the characters are designed with clear silhouettes and value, to emphasize the shape and the orientation in the occasion of viewing the character afar. Clear character appearance increases cognitive and visual ergonomics. Visual comfort is relevant in designing games and films, as the information of a 3D form is delivered on a 2D screen (International Ergonomics Association, 2017). The feature of transferring a 3D form to be viewed on a 2D screen on both fields makes it especially important that the product communicates the message visually clearly. Landis (2003) notes that *"the human eye sees three dimensional, but film is two dimensional. A designer needs to look at the costume as camera would."* (78).

I have found the silhouette study essential when I approach the costume of a character. The study proves to be especially effective outlining the appearance of characters displayed in 2D, but whether on stage or screen, the method may have emerged into my costume process indefinitely.



### 5.4.3 Digital Costume Rendering

Digital Costume rendering indicates to the technique of creating a costume illustration digitally. The technique has emerged into the film industry, where the high intensity of producing visuals and the requirements to create more photorealistic renderings has led costume concept artists to adopt several computer programs, such as Photoshop and ZBrush for their art. Concept Artists employ modelling as a sketching tool when a plausible 3D form needs to be depicted and to increase the communicative accuracy of the illustration. (Kucharski, 2014).

My first costume sketches for Remedy were a series of paper printed base characters with pencil lines defining the design. I quickly realized I would need to learn Photoshop to keep up the hectic iteration pace. In the game industry, hand drawing is inconvenient; concept art needs to be quick and informative and adjustable after each round of iteration. It is also valuable to introduce ideas to the team with a comprehensive presentation of the idea. Under an influence of the high artistic level of concept art in the company, I felt pressure to internalize a new drawing technique to have my illustrations in the same visual universe with them. Unlike in film industry, at theatre productions, costume sketches are still generally created with more traditional methods of drawing.

Costume Concept Artist Phillip Boutte Jr. revealed his costume illustration process in an interview by Joe Kucharski (2014), and it resembles the one I have internalized. Boutte begins the process with a silhouette study of photo collages in order to

achieve a look of photo-real illustration (Figure 31). The grey tones are utilized to track the values of the appearance. Boutte claims, that the greatest advantage of digital rendering is productivity. The colour of the garments can be changed instead of painting them over, and layering iterations of the costumes allow many convenient accidents, enabling unpredicted costume variations (Kucharski, 2014). When I design costume variations for a character, I generally sketch a few pieces of garments and combine them freely, creating series of variations for the feedback meetings with the leads and directors.

Figure 31 Silhouette study for X-Men: Days of Future Past by Phillip Boutte Jr., costume designer Louise Mingenbach (Kucharski, 2014).

As a costume illustrator, Boutte does not design the costumes himself but generates renderings of the costume designers' ideas. The game industry sometimes combines the positions of

Concept Artist and costume designer under the title of a Character Artists. My position as a Costume Artist requires both costume design and costume rendering skills, along with knowledge of the later stages of the process. Occasionally Concept Artists only create the draft of the idea or the mood of the character, and the responsibility of defining the character's details and textures fall on the Character Artists.

Many game companies search their inspiration from fashion, and the method of combining character concepts from a selection of

images reveal direct adoptions from catwalks into characters' outfits. *Deus Ex: Mankind Divided* character Zhao Yun Ru's dress was partly borrowed from Gareth Pugh's ready-to-wear fashion show, partly from historical references. Comparing these images reveal the commonly generated technique of producing concept art of photo combinations (). The flower pattern of an unknown costume, the collar of the queen (Figure 32 A) and the lower part of Pugh's design (Figure 32 B) were directly cut and pasted into the concept art of Zhao (Figure 32 C).

Figure 32 A. Two pictures from Zhao's inspiration board depicting Queen Elisabeth from the film *The Queen* (2012) and a catwalk outfit (Bourdeau, 2012) B. Gareth Pugh's design from ready-to-wear fashion show Spring 2009 (Vogue 2009). C. Costume concepts and D. the final character concept of Zhao (Jacques-Belletête et al., 2016 : 44-45).

When I adopted digital rendering techniques and started constructing costume concepts by combining photos of ready garments and painting over them, I had questions about copyright issues. A Lead Character Artist at Remedy recommended using ready-made clothing for my costume renderings to ensure the accessibility of the actual pieces of garments for photo scanning. I realized the idea does not differ from designing costumes for a film or stage: creating a character in love with Prada products is dressed in Prada or a believable equivalent of the brand. The costumes will be credited to the costume designer, even if not every single outfit was designed by them. Deciding the best combination of clothing to support the characters and narrative designates the costume designer. However, a costume designer can bring the process unique, bespoke costumes that support the narrative and help Character Artists construct the costumes in a valid way. They can offer the realism seeking developers a touch of the actual costume production that seems to be now pursued mostly through reference pictures and copying the catwalk styles.

Remedy's modelling guidelines state, that the assets need to be adjusted to avoid direct recognition of any certain prop. However, the prop should appear familiar to the player as if they were real-life props and models. One way of achieving this is to mix features from various props together (Huovinen et al. [no date]: 30). Commonly costume designers also distress or modify the bought garments to make them look more worn or to avoid recognition, unless needed for the narrative reasons.

Generating concept art with photo-collages leads to artistic similarities between different game developers' high-quality concept art. Exploring Remedy's concept art archives, it was impossible to tell the difference between different artists' work. In realistic games, it seems a convention to build up the character by copy-pasting the actor's face in the concept with ready-made clothes and pictures of hair-dos without major adjustments. However stylized realism provides more freedom to visually express characters beyond the restrictions of reality. *Dishonored 2* is here introduced as an example of hand-drawn concept art (Figure 33). The productivity and efficiency aspects in creating the illustrations from photo combinations are undeniable, but it seems to leave little room for individual artistic expression. However, concept artists' commissions in game production are closer to a designer's than an illustrator's, and the concepts are produced for production purposes. (Puomio, 2018).

Figure 33 Concept art of Sokolov by Cédric Peyravernay (Tucker, 2016:75).

According to Puomio, the orthographic illustration popular in game character design does not function ideally in solving the construction problems of a character. 3D modelling is more efficient for determining and predicting the possible complications in character design than a 2D illustration (Puomio, 2016c). Considering my personal career history, the statement seems to apply also in performance arts, since my illustrations have always been referential and conceptual and I had adopted a habit of defining the design further in the production. The manufacturing phase provides more concrete tools to solve construction obstacles and to define the costumes, and I find it necessary to have room for multiple solutions that I consider depending on the circumstances and possible shifts in the character along the production.

My inability to express 3D forms in illustrations drove me to experiment with Marvelous Designer, a cloth simulation program, to deliver costume ideas. Despite the accuracy of depicting the costume in the program, the trial failed, because in the program the characters lack personality and are presented in a stiff A-pose. According to Puomio, concept art is never only for defining the look, it should also express the attitude and personality of the character, which is equally important when illustrating a character for film and stage (Puomio, 2017b). Afterwards, I adopted digital rendering and photo combination methods for transferring my ideas into illustrations.

Eidos Montreal approached a challenging costume construction problem by integrating a fashion specialist into the production of

*Deus Ex: Mankind Divided*. The need of maintaining their protagonist Adam Jensen's augmented and highly functional arms constantly visible made the process complicated. The arms became larger as they transformed into various blades and pneumatic weapons. (Jacques-Belletête et al., 2016: 12). Acronym solved the problematic construction by manufacturing Jensen's coat (Figure 34). Only after Acronym's involvement, the concept art was finalized.

Figure 34 Hugh Errolson wearing a prototype of Jensen's coat and Jensen's trench coat concept, probably defined after Acronym's intervention (Jacques-Belletête et al., 2016: 24-25).

Acronym created a completely functional coat with retractable, foldable sleeves (Figure 35). Understanding costume

construction was a key element of finalizing the problematic trench coat.

Figure 35 Jensen's foldable sleeves (Jacques-Belletête et al., 2016: 24 and Cork, 2015).

## 5.5 From Concept to Costume

The following chapter categorizes the stages of delivering a costume concept into the final product. The stages are essential for a costume designer to internalize for reasons of communication and technical restrictions that need to be considered already in the early stages of creating costume concepts, and to understand the dissimilarities of costume construction in live and digital costuming.

Modelling, texturing and creating a simulation rig and animation for the character are the most expensive phases of game

character creation. In addition to the constraints caused by the expenses of various aesthetic features, especially the simulation rig causes major restrictions to costume design in games and a designer needs to be aware of them to avoid conflicts further down the pipeline. The technical skills needed for these phases exceed the requirements of a Costume Artists, but even if one cannot contribute to the process technically, it is necessary to be aware of the processes and the technical requirements. A fluent communication between team members is the key to efficient design iterations since the job descriptions of a Costume Artist and 3D character developers are significantly far apart.

In this chapter, production phases of live and digital costumes are assimilated. 3D modelling refers to actualizing a live costume by tailoring or selecting and adjusting ready-made clothes based on costume concepts. After modelling, the character is texturized, which as a procedure resembles choosing textile materials for clothing. Movement is provided by a simulated rig in the game industry and by an actor in live arts.

### 5.5.1 Digitalizing the Concept/Tailoring

Transferring a concept from a 2D illustration into a 3D form requires modelling. This research introduces two approaches to achieve a realistic outfit model: photo scanning and a cloth simulation program Marvelous Designer. These approaches allow utilizing analogue costume design skills into character design process since they are based on live reference material and pattern making. 3D assets can be also modelled by sculpting, but utilizing exact 3D reference as the base material provides the end result more defined attachments to reality. A modeller constructs a functional, detailed 3D model of a character based on concept art likewise a seamstress would refine a costume sketch into a costume. This chapter explores the procedures of importing the concept into 3D.

The character concept for *Bioshock Infinite* by Hummel and the final 3D model of the character are compared in Figure 36. In the 3D version of the character (right on the figure), the pleats are immobile and added as a texture on the surface of the skirt, since the current simulation technique prevents creating a natural movement for pleats. Also, in reality, the lower stamps of the skirt would not stay attached on top of the pleats but dangle lower in an unaesthetic angle. However, Hummel might have been perfectly aware of these technical obstacles but was free to explore options not hindered by reality due to the stylization of the game. In a game with a realistic aim, similarly implemented construction solutions might cause disruption in believability.

Figure 36 Elizabeth's final 2D concept by Hummel and 3D model by an unknown Character Artist (Hummel, 2016).

The process of transferring the 2D concept into 3D affected the final model (Figure 36). The stamps crossing the pleats are reduced from three to two per group and the hem of the skirt is wider in the 3D model. The reason for the stamp reduction may have been for the clarity of detailing: the body proportions differ from the ones in 2D concept, and three stamps could have made

the skirt appear crowded. The width of the hem may have been increased for the purpose of character's mobility. Unless made unnaturally flexible, a narrower skirt functions poorly on a running character, and causes modelled surfaces going through each other. This technical error is called "clipping".

Hummel meant the skirt to be adjusted high on the waist, but the final model displays it lower. The cause may have been the modeller's difficulties in reading the height of the line from the concept sketch and comprehending the costume's silhouette. However, the 3D character's body type differs from the concept's one, and that may have led to a compromise on the waistline.

The interview (Mulrooney, 2013) lacks a mention of Hummel's possible involvement in the modelling phase of the character, and a question of if the small additions such as sleeve cuffs and collar necklace were added without consulting the designer stays unanswered. The cuffs were added for a minor narrative driven costume adjustment: when the player-character meets Elisabeth for the first time, the cuffs are turned down and buttoned up (Figure 37). Further in the game, Elisabeth is released from her life-long prison, and as a signal of her liberation, the cuffs are turned up for a more casual appearance (Figure 36, 3D model). Hummel's concept was well delivered into the game through the character manufacturing process, which shows little need for compromises.

Figure 37 Elisabeth in-game (Generic Gaming, 2013).

If the character has a budget for only one modelled outfit, adding another one needs valid justification. The Character Art team of *Deus Ex: Mankind Divided* was challenged by the design of their protagonist Adam Jensen's costume. It needed to be multifunctional and suitable equally for urban explorations, social and infiltration missions. After several iterations without a conclusion, the demanded functions were divided into two outfits. Adding a costume change had a major impact on the

overall production: the budget, game system and the story. (Jacques-Belletête et al., 2016: 18). The expense of costume changes leads to pursuing a single multifunctional costume design for game characters, who often need to fit various alternative surroundings wearing one costume throughout.

The team had a related problem with another character, Eliza Cassan. In the game, Cassan is a famous public figure and a style icon. Since the team was limited by only one 3D outfit model for Cassan, they expressed her formidable wardrobe by displaying her wearing different attires in various 2D ads in the game environment (Figure 38). Though illustrated, the idea of portraying a fashion guru with multiple costume options was communicated to the player. (Jacques-Belletête et al., 2016: 37). A technically challenging and an expensive character solution has to be well justified to pass to the production. The length and expense of an individual character's process depend on the role of the character from the gameplay perspective (Puomio, 2016c).



Figure 38 Eliza Cassan's outfits, modified images from *The Art of Deus Ex Universe* (Jacques-Belletête et al., 2016: 36-37). Concept Art of the 3D model, concepts of Cassan's outfits for ads and an in-game screen capture of Eliza in news (IGN, 2015).

#### 5.5.1.1 Photo scanning/Stock costumes

Photo scanning digitalizes a whole outfit or a single object, and it is also utilized for face- and environment scanning. Photo scanning provides modellers accurate reference material for the model. The technique consists of several photographs of an item taken from various angles that are imported into a program, which builds a 3D model based on the photos. An alternative method for photo scanning is sculpting the character's whole form in a modelling program. In such cases, if realism is pursued, live references are highly recommended.

At least two costume designers have previously been hired for game productions with a background in film, Lyn Paolo and Wendy Cork, and both adapted the workflows of film costumes into game costume design. They designed the outfits, collected garments and outfit combinations for specific characters and assigned them to photo scanning (Figure 39). Neither Cork nor Paolo needed extensive technical skills in costuming game characters since they were able to use photo scanning as the tool for transferring designs into the games.

Figure 39 Left: Original sketches with fabric samples; Middle: Erika Heynatz as Elsa Lichtman; Right: The finished product: Elsa in-game. (Rockstar games, 2011)

Possibly encouraged by the good results of inviting a professional costume designer into the process, Rockstar Games later hired another specialist, Lyn Paolo, for *GTA 5* (*Grand Theft Auto 5*). Paolo received concept boards instead of a script, and the entire project was created in secrecy; she only heard the title of the game on the day of the release. Otherwise, the process was similar to Cork's: Paolo designed the primary characters based on concept boards and helped to create a database of garments and accessories for NPCs through photo scanning. (Kucharski, 2013).

The last example of integrating a professional costume designer into game development is my own work at Remedy Entertainment. The divisive aspect of the processes of Cork and Paolo is the internal nature of my employment, which offers me tools for the entire character design pipeline instead of approaching the process solely through photo scanning and allows a nearly simultaneous view to the progress of the script development. Receiving little character information beforehand and finishing the project in photo scanning excluded the designers from finalizing the costume concepts. Paolo highlights the costume designer's need of retaining some creative control after the scanning and mentions the possibilities of altering the colours and textures of the outfits after they are scanned as one of the major differences between game- and film costuming. (Kucharski, 2013).

At Remedy, the modellers are free to make changes to the original design in either the scanning stage or further during modelling. Modellers vary greatly: many are self-taught and accustomed to creating characters in their specific way. Some follow the scan conscientiously when others work more freely. Folds communicate the quality of the fabric and express the weariness of the garment. In addition to the expressive qualities of the folds, they also have a major technical role in making the character's motions more believable. The folds function as a hinge to the limbs, and the folds and the fit are the most significant reasons why costumes are digitalized through photo scanning. It is also utilized for detailing: to avoid a straight sleeve that tends to look dull and lifeless in the final game, the whole

sleeve is sometimes pulled up slightly to create small folds for the whole arm (Figure 40).

Figure 40 Scanned jacket and the same garment after cleaning and re-sculpting. The sleeve is pulled up slightly to form small wrinkles on the arm. (Huovinen et al., [no date]: 12)

In performance arts, the designer can affect the feeling of weariness by material choices, and worn by a person, the garments always have a life of their own. For example, choosing linen for costume material requires knowledge of how the garment lives during the possibly multiple performances. Worn by a moving actor on the heat of the stage, the linen garment gains more structure after every performance, unless straightened in between the shows. Achieving similar effect on game character's costume requires either a live reference or tangible knowledge of material attributes.

On a 3D model, folds express the material of the garment. In theory, any material texture can be added on the garment after the photo scanning, but to achieve realism, the texture needs to be equal to the textile. The fit reveals the textile nevertheless: adding a cotton texture on a photo scanned coat made of wool may cause a disruption in credibility. Wool gives the garment a soft, solid form, which matches poorly to the sharper lines and folds of cotton.

Some games, despite photo scanning, display improbable folding patterns on characters. The protagonist of *L.A. Noire* has a horizontal wrinkle across the back of his jacket and wrinkles on the sides that create an impression of the material being pulled towards the armholes (Figure 41). The reason might not be the unawareness of the realistic depiction of the suit, but an effort of adding interest on the back of the character in a third person game, in the same way sleeves are sometimes pulled up slightly to create structure to the otherwise straight and, from a 3D model perspective, uninteresting surface. The wrinkles on the *L.A. Noire*'s protagonist, however, only communicate an ill-fitted jacket.

Figure 41 Improbable wrinkles across the back of the protagonist's jacket communicate an ill fit (Team Bondi, 2011).

A fit is a form of communication. A good fit can communicate appearance awareness and wealth. If the character's attributes demand a bespoke suit, a Character Artist needs to acknowledge the difference of a proper and poor fit. Remedy's former Senior Character Artist John Crossland emphasized the need for tailoring when costuming a game character. He considers the costume construction knowledge an important skill for a modeller. (Crossland, 2016).

Photo scanning sets technical restrictions on a costume, which are necessary to consider when gathering material. It is noteworthy to pay attention to the textile's reflectivity and tone since reflective or light absorbing surfaces can make the scan inaccurate and should be avoided. In case of an object too dark,

it is first powdered with chalk to form an uneven surface for best scanning results. (Rask 2016a). Photo scanning only records the form of the object, which makes the colour of the garment indifferent.

The first task I received as an intern was to search for clothes for photo scanning, based on a costume concept. This task was close to my expertise, and after finding suitable garments I made minor changes to the details according to the concept. I offered to adjust the character even further by completing the outfit by sewing but quickly found it unnecessary. Most adjustments can be made in the modelling program, and the scanned outfit is mostly referential. I had not realized the scanning is also only a sketch and the outfit can be further modified significantly after the scanning. It proved costume designer unnecessary for this specific stage of character creation. In this case, I was not involved as a designer but a supplier.

#### 5.5.1.2 *Marvelous designer/Patternmaking*

Cloth simulation software Marvelous Designer has been adopted by character creators in both film and game industries. It is a pattern based program commonly employed to produce an outfit base for modelling in a similar fashion as photo scanning generates a base model for further processing. Photo scanning is an efficient tool for easily accessible contemporary costumes. Pattern knowledge is a noticeable advantage when utilizing Marvelous Designer in the character costume development.

Before my internship at Remedy, the company had not employed Marvelous Designer in their productions. The program

was introduced to the process as a technique that allowed me to take a step into the production beyond Concept Art, without hands-on knowledge of modelling software. The first two characters I designed for Remedy were patterned and sewn together digitally in Marvelous Designer and were then manufactured by a seamstress for photo scanning, which provided a more detailed digital version of the costume. Marvelous Designer is based on clothing patterns, and it was possible to print out and employ the actual patterns created in the program. Photo scanning is adopted for a more detailed structure of the costume, since digitally produced costumes have no signs of being worn by a human body, nor have they been marked individual by a contact to a physical skin.

Nevertheless, Marvelous Designer was deemed as a useful new tool for Remedy's character pipeline, and I ran a short workshop for Character Artists about pattern making. As the fashion industry utilizes base patterns for standard bodies to create their designs, I suggested creating a 3D clothing asset library of basic garments for Remedy. Ready-made digital bodices, sleeves and

collars could function as a shortcut for clothing temporary character assets for the temporary environment. In order to employ the clothing library effectively and to modify the garments according to each particular task, Character Artists benefit from the knowledge of patterns and clothing construction.

Marvelous Designer has also been utilized the *Assassin's Creed* franchise and *Witcher 3: Wild Hunt* by the Junior Character Modeller of the productions, Diana Sindel. She remarks, that the program helped to avoid stretch and "tear" caused by lack of clothing knowledge in poly modelling. (Marvelous Designer, 2016). Artists are rarely aware of the amount of extra material required in the specific sections of realistic garments, where a mobility of a human body needs to be considered, such as on the back of a jacket where a sleeve is attached to the bodice. To demonstrate the use of Marvelous Designer on a game character, the costuming process of one of the characters in *Witcher 3* is presented in Figure 42.

Figure 42 Outfit's patterns in Marvelous Designer and the final character (Marvelous Designer, 2016).

### 5.5.2 Texturing/Fabric shop

3D models are mapped with colour and texture maps to create different surfaces. (Assinen, 2013: 9). A shader contains instructions of how the object is displayed and expresses the material of the object, such as skin or textile. Texture maps provide surface attributes information to shaders such as reflectivity, colour, surface structure and transparency. (Toledo, 2010).

In games, restrictions that concern physical materials are generally avoidable. *Mirror's Edge Catalyst's* Character Art team searched for advanced types of multi-purpose technical fabrics in the pursuit of functional and realistic outfit for the protagonist

Faith and discovered prototype materials generated for sportswear and military. The materials were yet exceedingly expensive for real-world mass production, an obstacle insignificant for game developers. The research on the actual textile confirmed, that the costume materials remained realistic without entering "magical realms" in the design process. (Mirror's Edge, 2015).

The material options for CGI costumes are unlimited. Only a small sample of live fabric can be utilized to create uniforms for an entire digital army, and the material strain on the environment would be close to zero. According to Bradley (2011), games offer an alternative of creating materials based on aesthetic value rather than cost, when in theatre the limited

budgets and the requirements of storage- and mobility has provoked various methods of representing different materials in cost- and weight-efficient replicas, such as painting plywood to look like marble (63). Although the material solutions in games may be free of constraints of reality, Wolsky (cited in Landis, 2003) mentions the 2D screen's flattening effect on film's clothing textures, which also applies to the medium of games. He further mentions the transition from theatre to film and the differences caused by the change of the medium, which resonate with the transition from theatre to games.

In the first decades of the game industry, only one shader existed for all game assets. The surfaces of different materials, such as character's faces and brick walls, looked identical. Figure 43 of *Thief: The Dark Project* (Looking Glass Studios, 1998) provides an example of this visual feature of early game development.

In modern realistic games the clothing seams and textile materials, along with hard materials of props and surroundings, can be interpreted accurately. Naughty Dog's Senior Shading Artist Yibing Jiang has interpreted textile materials with high detail for *Uncharted 4*. (Figure 44). By the looks of her work, she seems familiar with the implementations of different textiles. The current technical solutions allow believable fabric surfaces, but some game character's clothing resembles plastic despite the technical advances (Figure 45). Although, even if game costumes are not restricted by physical laws, the demands of an actor's body or the price or amount of the actual materials, different textures require different processing power. A surface resembling plastic on an asset is more economical to create than a textile material surface. Therefore, the occasionally inaccurate presentations of textile materials in high-quality realistic games may be due to budgeting priorities instead of lack of material knowledge.

Figure 43 In the first *Thief* game, only one shader was applied to all materials (Zevik, 2010).

Figure 44 Shading of Nathan Drake's and Elena's clothing materials (Jiang, 2016).

Figure 45 The texture of the collared shirt looks plastic in a trailer of *Death Stranding* (Kojima Productions, 2016).

In 2014, Naughty Dog's Character Artists had a panel at E3 about creating the iconic protagonist of *Uncharted 4*, and they utilized the character's high poly version in the presentation (left on Figure 46). In the final game, the character is commonly transferred in a low poly model since the high poly character would contain too much data for the game to run at a sufficient speed. The poly count affects the representation of textiles. Even if textiles are created with a high level of realism for *Uncharted 4: The Thief's End*, wet textile materials seems to remain a challenge for game developers. In a trailer of the game, the character's shirt resembles shiny fake leather instead of a wet knitted fabric (right on Figure 46). Wetness commonly seems to be solved with an extensive shine on the surface (Figure 47).



Figure 46 Comparison between Nathan Drake's high poly version and the character in-game (PlayStation, 2014a and 2014b).

Figure 47 Peasant in the rain  
(CD Projekt RED, 2015).

Different types of materials set challenges on shading techniques. In *Quantum Break*, Beth is wearing a jacket constructed of a slightly unrealistic rubber-like material (left on Figure 48). Another character, Amy, is wearing a hoodie and jeans, and the materials are recognizable by the textures (right on Figure 48). According to Puomio (2016b), smooth textile surfaces were more challenging to create than rough ones at the time of the production.

Figure 48 Beth is wearing an unrecognizable rubbery textile. Amy's textiles are more accurately generated. (Remedy Entertainment, 2016)

Texture requirements can exceed the limits of realism in games located beyond the contemporary world. In *Mass Effect: Andromeda* (BioWare, 2017), the protagonist is wearing an anonymous, bendy, metal-like material that reacts to the body movements as a textile would (Figure 49). However, in further inspection, the material is not metal, but the illusion of a body armour has been created by layering an artificial, technical material on top of harder, possibly metallic pieces of body armour. This material was believable enough to support the storyline based on an alternative future in space.

Figure 49 The character in white is wearing a slightly bendy metallic material (Mass Effect, 2016).

The texture is a form of communication, as demonstrated in *Deus Ex: Mankind Divided*. One of the characters, Lucius DeBeers, is over a century old and wears a suit that monitors vital signs in order to administer medicine. The Character Art team attempted to make it appear as if the suit was the only reason DeBeers could still stand. (Jacques-Belletête et al., 2016: 25, 53) The concept art (Figure 50) reveals the material choice for the character: shiny, technical and artificial. His clothing material has presumably been also inexpensive to produce.

Figure 50 Lucius DeBeers Concept Art (Jacques-Belletête et al., 2016: 52) and a screen capture in-game (The Wolf, 2016).

Remedy's current project has not yet proceeded into texturing of the characters' costumes, but I have contributed to this future phase in the form of material samples, in a similar fashion I provide samples of costume materials to the artistic teams of live performances. After a concept is confirmed, I construct texture reference boards of the characters similar to what illustrator and concept artist Kaija Rudkiewicz has done for *Ryse: Son of Rome* (Figure 51).

requires several versions of the same outfit, and the illusion of the costume falling apart is operated through costume changes.

Figure 51 Concept art by Kaija Rudkiewicz (Concept Art World, 2013).

Creating costumes digitally may leave the garments to seem unused or unrealistically worn out. Adding wear, distressing and manipulating materials is one of the basic skills of a costume designer. According to Bradley (2011), patina makes the characters more believable and unified with their situation within the game environment (63). In *Bioshock Infinite*, the female protagonist escapes and fights, and the costume communicates the events by becoming gradually distressed (Figure 52). In theatre and film, distressing a costume usually

Figure 52 Elizabeth's dress gradually distressed (Mulrooney, 2013).

Distressing a costume requires knowledge of the garment's natural distressing points. In regular use, the cuffs, collars and hem of a shirt experience the most stress and tend to decay first. Depending on the cut and fit of the garment, certain seams are exposed to greater stress and may unravel. Especially in medieval fantasy games that utilize patches and large stitching as an aesthetic element to add detailing on costumes (Figure 53), the distressing can manifest in unrealistic parts of the garment. In Elisabeth's case, the rips of the skirt and shirt may have been

caused by impacts and do not need to follow the natural distressing.

Figure 53 For visual interest, patches with large stitching are employed (Marek, [no date]).

actor recorded in a motion capture studio, but anything related to the motion of the clothing are produced by Character Technical Artists and physics simulations.

The tactile knowledge of the stiffness and weight of the fabric and how it is attached to the body are essential in creating credible motion on the character's costume; a light summer dress does not move identically to a winter coat. The cloth's movements communicate the attributes of the material, and this is commonly utilized to emphasise the character's movements. To add interest and life-like attributes to a game character, Concept and Character Artists tend to add clothing- or accessory features such as a sash, long hems or an open coat to provide secondary movement.

The current simulation technique sets multiple restrictions on the character's costumes. The denser the render mesh (Figure 54) is, the smoother the cloth. Creating a flowy, light cloth requires a mesh with high density, which also increases the need for computational power. It is more economical to make thick, only slightly moving garments. With the current technical solutions at Remedy, also long skirts, capes that cover more than the back of the character and wide trousers are challenging to simulate realistically. Representing an outfit consisting of several layers is likewise technically challenging since all the layers need to interact correctly with each other (Terdiman, 2012).

### 5.5.3 Simulation Rig/MoCap/Acting

Rigging is a technique, where a virtual skeleton of joints and bones is created for a model. Motion capture data or animation can then be added to the skeleton of the character or a modelled garment. Character's movements are provided by an

Figure 54 Render mesh (Screen capture by Minnaert, 2016).

Claudia Chung argues, that since people have a very tactile personal experience of how hair and clothing moves, the sense of a garment moving wrong on an animated character might lead to the lost focus of the film's narrative. (Terdiman, 2012).

## 6 Conclusion

This study set out to explore the need for a costume designer in the game industry, and ways of integrating the analogue costume skill set into digital character creation. Through trial and error, an alternative costume production pipeline for character development was formed to better utilize a costume professional in game production.

This research has identified the need for a costume designer in realistic AAA-games, but to maximize the benefits of a costume professional in the production, knowledge of game development is advantageous. The study has also shown that, correspondingly, costume knowledge is becoming a necessary skill for any Character Artist working with games. These two professional groups would benefit from each other's expertise. Notwithstanding the relatively limited sample, as the character art development differs depending on a company and this research leans on the production pipeline at Remedy, this work offers these two groups tools and vocabulary for collaboration. Communication throughout the costume production pipeline is necessary to align with the character costume design practices.

My intention is not to intervene in the creativity of the game industry. This thesis mostly applies to productions that aim for a high level of realism. The Character Artists are already masters at character interpretation, but the restrictions of reality are approaching their field, and to improve their characters, internalizing costume knowledge or employing costume professionals for support only enhances their final products.

It is unfortunate that the study could not include concrete examples of costume work for Project 7, and the reconstructed costume process had to be referred to similar cases. Until the release of the project, everything created for P7 will be confidential; if the work at Remedy was added as an artistic part to this thesis, also the written part would have stayed hidden from a public view for an unknown time. I found it necessary to

share the research with colleagues sooner since the technical part of this thesis will expire relatively fast.

As someone accustomed to working with tactile materials and actors, the leap from analogue costume design into digital caused not only a revision of working methods but also disturbance on my professional identity. In the beginning of the internship, I assumed the tactile methods I had utilized in the field of performances would be partly or directly transformable into the digital costuming process, and my approach to the process was highly tangible. The features of a newcomer were mentioned as a good qualification: my mood boards had no references from other games and the technical restrictions did not affect my designs. After half a year of working in the company, my workflow had become closer to one of a Character Artist than a costume designer. I adopted the game developers' methods for character creation, studied and internalized the technical restrictions, and bypassed my background as a costume specialist. After a year in the company, my workflow had become a combination of both fields with added features.

Ethnography as the chosen research method for this thesis required immersion into the field with an awareness of objectivity, but as mentioned in chapter 1.1. "The subject area", my professional self and actions in the specific environment became a research subject. The identity transition may have been partly caused by the lack of actor interaction. The process of live costuming generally begins with the body of an actor, to which the first contact is made in the scene of taking measurements. I associate costume strongly with a human body.

I cover and hide the actors' physical body and personality with a costume to create a character. In games, the costume completes the character, emphasizes the character's attributes and is more purely and genuinely the character's property. In performance arts, according to Matinaro, an actor interaction is unavoidable, and the costume always complements the actor's physical form.

The shift in identity has also strong verbal connections, particularly to the term *costume*. Landis (2012) frames the conflict in her book *Filmcraft, Costume Design* (8):

*The word "costume" works against us. The word is vulgar when what we do is incredibly refined. "Costume" is invariably associated with Halloween, fancy dress, parade, theme park, Mardi Gras, carnival, and the clothes in fantasy and period films.*

After a career transition to the game industry, I constantly found myself explaining the difference of fashion and costume design and emphasizing the character design aspects of the craft to colleagues I met at game events. Even if the event of my title transforming from a Character Art Intern into a Costume Artist after the four months of internship provided a sensation of a new era for costume art, the subsequential appearance of my identity conflict caused me to introduce myself as a Character Concept Artist rather than a Costume Artist for the more descriptive value of the title. As a Costume Artist, I am generally assumed to be interested specifically in costuming games that support *Doll-Play* mechanics, where the act of dressing the character up is a digital form of a paper-doll play with little or

none narrative aspects. In some game productions, costume seems to have been designed only for emphasizing the character's attractiveness despite the personality attributes, and the character interpretation qualities of the costume have become underestimated. While providing information about the game industry for my costume designer colleagues, my aim is furthermore to advance the profile of costumes and the level of knowledge of the value of costuming in character art in games.

Further experimental investigations in other game companies are needed to estimate the efficiency and necessity of the upgraded workflow introduced in this study. Before this, I will need to adopt further technical skills to support my capability for game development. At the moment the positions available in many companies require extensive modelling and other technical skills far from my current capacity. The title closest to my present position as a Costume Artist is a Concept Artist, which requires sketching concepts for environments, objects and atmospheres among the characters. A Character Artist produces mostly 3D models and the involvement in designing the

character depends on the company. Integrating knowledge of modelling and simulation rigging technique into my skillset allows applying for CGI-related positions in both film and game industry. In the future, I intend to apply for foreign game companies to expand the character's costume awareness in the industry.

Costume designers are Character Artists, but with different tools and skill set. Although costume design can be seen as a live form of character art, costume designers rarely experience the freedom of creating the human inside the costume as well: the anatomy, face, and other physical features are challenging to achieve as definitely as in traditional entertainment arts. If fashion's emphasis is on clothes and costume design concentrates on the costume-actor combination to create a character in the limits of anatomy and physical laws, the character art in the game industry is a step towards an increased creative freedom in character interpretation through costume.



## 7 Reference List

- Assinen, V. (2013). *Secret lab*. (Bachelor's thesis, Lahti University of Applied Sciences, Institute of design and fine arts. Lahti. Finland.)
- Bird, B. (2011). Foreword. In: Hooks, E. *Acting for Animators*. 4<sup>th</sup> Edition. Milton Park, Abingdon and New York: Routledge, xi.
- Bolter, J. D., Grusin, R. (1999) *Remediation, Understanding New Media*. Cambridge, Mass: MIT Press.
- Bradley, C. (2011). From Plywood to Pixels: Career transitions from theatre to video game design. In: *Theatre Design & Technology*. **47**(3)
- Christensson, P. (2010). *CGI Definition*. [Online]. [17<sup>th</sup> of March, 2017]. Available: <https://techterms.com/definition/cgi>.
- Cork, J. (2015). *Haute Future: How Fashion Designers Improved Deus Ex*. [Online]. [3<sup>th</sup> of March 2017]. Available: <http://www.gameinformer.com/b/features/archive/2015/04/24/haute-future-how-fashion-designers-improved-adam-jensen-s-deus-ex-coat.aspx>.
- Dean, S. E. (2016). *Where is the body in the costume design process?* *Studies in Costume & Performance*, 1: 1, p. 99–101. [Online]. [10<sup>th</sup> of Dec 2017]. Available: <http://www.sallyedean.com/wp-content/uploads/Where-is-the-body-in-the-costume-design-process-Sally-E-Dean.pdf>
- Dent, S. (2014). *What you need to know about 3D motion capture*. [Online]. [17<sup>th</sup> of March 2017]. Available: <https://www.engadget.com/2014/07/14/motion-capture-explainer/>.
- Egri, L. (1960) *The Art of Dramatic Writing*, New York: Simon & Schuster.
- Enqvist. (2010). *The Secrets Of Cloth Simulation In Alan Wake*. [Online]. [10<sup>th</sup> of July 2017]. Available: [http://www.gamasutra.com/view/feature/132771/the\\_secrets\\_of\\_cloth\\_simulation\\_in\\_.php](http://www.gamasutra.com/view/feature/132771/the_secrets_of_cloth_simulation_in_.php)
- Film Reference. [no date]. *International History of Costume Design*. [Online]. [8<sup>th</sup> of July 2017]. Available: <http://www.filmreference.com/encyclopedia/Academy-Awards-Crime-Films/Costume-INTERNATIONAL-HISTORY-OF-COSTUME-DESIGN.html>

Fron, J., Fullerton, T., Morie, J.F. and Pearce, C. (2007). *Playing dress-up: Costumes, Roleplay and Imagination*. Paper presented at the Philosophy of Computer Games Conference, January 24-27, 2007. [Online]. [26<sup>th</sup> of July 2017]. Available: <http://www.ludica.org.uk/LudicaDress-Up.pdf>

Holopainen, J., Meyers, S. (2000). *Neuropsychology and Game Design*. Consciousness Reframed III, 24-26 August 2000. [Online]. [26<sup>th</sup> of July 2017]. Available: <http://www.stephan.com/neuro-bio>. Last accessed 28<sup>th</sup> of July 2017

Holopainen, J. (2008). Play, Games and Fun. In: Leino, O. Wirman, H. Fernandez, A. *Extending Experiences: Structure, Analysis and Design of Computer Game Player Experience*. Vaajakoski: Gummerus Printing.

Hooks, E. (no date). CV. [Online]. [10<sup>th</sup> of Dec 2017]. Available: <http://www.edhooks.com/cv.html>

Hummel, C. (2016). *Portfolio*. [Online]. [16<sup>th</sup> of Oct 2017]. Available: <https://clairehummel.artstation.com/>.

Huovinen, M., Crossland, J., Puomio, A., Rask, S., [no date], *Character Modelling Guidelines for Outsourcing*, (Asset Creation Guidelines, PDF), Remedy Entertainment Ltd.

International Ergonomics Association. (2017). *Definition and Domains of Ergonomics*. [Online]. [31<sup>st</sup> of March 2017]. Available: <http://www.iea.cc/whats/index.html>.

Isbister, K. (2006). *Better Game Characters by Design, A Psychological Approach*. San Francisco, CA: Elsevier Inc.

Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books.

Johnston, J. (2012). *The challenges of MoCap and CGI*. In: Landis, D. N. Hollywood Costume. London: V&A Publishing.

Kawamura, Y. (2011). *Doing Research in Fashion and Dress: An Introduction to Qualitative Methods*. Oxford: Berg Publishers.

Klastrup, K. and Tosca, S. (2009). "Because it just looks cool!" *Fashion as character performance: The Case of WoW*. Journal of Virtual Worlds Research. 1 (3).

Kucharski, J. (2013). On the Upswing: Costume Design for Video Games. 14<sup>th</sup> of Oct 2013. *Tyranny of Style*. [Online]. [12<sup>th</sup> of Dec 2016]. Available: <http://tyrannyofstyle.com/home/13901002/costume-design-for-video-games>.

Kucharski, J. (2014). The Digital Costume Illustrations of X-Men: Days of Future Past. 20<sup>th</sup> of June, 2014. *Tyranny of Style*. [Online]. [8<sup>th</sup> of Oct 2017]. Available: <http://tyrannyofstyle.com/costume-illustration-phillip-boutte-jr>

La Motte, R. (2001). *Costume design 101, The Art and Business of Costume Design for Film and Television*. Studio City, CA: Michael Wiese Productions.

Landis, D. (2003). *Costume Design (Screencraft series)*. Burlington, MA: Rotovision.

Landis, D. (2012). *Filmcraft, Costume Design*. East Sussex: Alastair Campbell.

Lankoski, P., Heliö, S., Ekman, I., (2003). *Characters in Computer Games: Toward Understanding Interpretation and Design*. 4-6 Nov 2003, University of Utrecht, The Netherlands. Digital Games Research Conference.

Marvelous Designer. (2016). *Digic Pictures/Game Cinematics*. [Online]. [17th of March 2017]. Available: <http://www.marvelousdesigner.com/cases/digic>

Matinaro, S. (2014). *Pukusuunnittelija ja näyttelijän kolme minää. Haastattelututkimus pukusuunnittelijan ja näyttelijän välisestä kommunikaatiosta ja yhteistyöstä*. [Costume designer and the three personas of an actor. An interview research of the communication and collaboration of the costume designer and actor] (Master's thesis, Aalto University, School of Arts, Design and Architecture, Helsinki, Finland.) [Online]. [30<sup>th</sup> of July 2017]. Available: [https://aaltodoc.aalto.fi/bitstream/handle/123456789/14012/master\\_Matinaro\\_Suvi\\_2014.pdf?sequence=1&isAllowed=y](https://aaltodoc.aalto.fi/bitstream/handle/123456789/14012/master_Matinaro_Suvi_2014.pdf?sequence=1&isAllowed=y).

Merriam-Webster. [no date]. *Interactive*. [Online]. [2<sup>nd</sup> of Feb 2018]. Available: <https://www.merriam-webster.com/dictionary/interactive>

Mirror's Edge. (2015). *Designing Faith: Creating an iconic runner*. [Online]. [4<sup>th</sup> of Feb 2017]. Available: <http://www.mirrorsedge.com/news/designing-faith-creating-an-iconic-runner>

Monnet, J-L. (2016). *Dishonored 2 – Fashion Gallery*. [Online]. [16th of Jan 2017]. Available: <https://bethesda.net/en/article/782pltbO6cQgYwYumOMAmQ/dishonored-2-fashion-gallery>

Mulrooney, M. (2013). *INTERVIEW –In conversation With Claire Hummel*. [Online]. [8<sup>th</sup> of June 2017]. Available: <https://shoomlah.tumblr.com/post/46372988364/hey-you-guys-guess-what-bioshock-infinite-is-out>

Osmond, S. (2017) *Fitting Threads: Creativity and Collaboration*. 4<sup>th</sup> of May 2017, Aalto University, Helsinki. Costume and Research in Finland seminar on Costume Design and related fields.

Oxspring, S., Kirman, B. and Szymanczyk, O. (2013). *Attack of the Clones: Managing Player Perceptions of Visual Variety and Believability in Video Game Crowds*, in *Advances in Computer Entertainment; Lecture Notes in Computer Science Volume 8253*, 2013.

PlayStation. (2014a). *PlayStation Experience | Modeling Nathan Drake: Bringing an Iconic Character to PS4 Panel*. [Online]. [22<sup>nd</sup> of March 2017]. Available: <https://www.youtube.com/watch?v=70jVUBnp6lQ>.

Robertson, B. (2012). The Royal Treatment. *Computer Graphics World*. **35**(4). [Online]. [28<sup>th</sup> of Nov 2017]. Available: <http://www.cgw.com/Publications/CGW/2012/Volume-35-Issue-4-June-July-2012/The-Royal-Treatment.aspx>

Rockstar games (2011). *Behind the Scenes of L.A. Noire's Painstaking Production Design: Part Two – Costume & Wardrobe*. [Online]. [12<sup>th</sup> of Jan 2017]. Available: <http://www.rockstargames.com/newswire/article/13391/behind-the-scenes-of-la-noires-painstaking-production-design-par.html>

Schultz, W. (2016). *AAA Game*. [Online]. [29<sup>th</sup> of Jan 2017]. Available: <http://gameindustry.about.com/od/glossary/g/Aaa-Game.html>

Smillie, C. J. (2011). *'Bayonetta' Designer Working On 'Soul Calibur 5' Costumes*. [Online]. [26<sup>th</sup> of July 2017]. Available: <https://gamerant.com/soul-calibur-5-costumes-bayonetta-designer-cj-117939/>.

Tavinor, G. (2011). *Video Games as Mass Art*. [Online]. [16<sup>th</sup> of March 2017]. Available: <http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=616&searchstr=Volume+4>

Techopedia. (2017a). *Computer Generated Imagery (CGI)*. [Online]. [17<sup>th</sup> of March 2017]. Available: <https://www.techopedia.com/definition/24069/computer-generated-imagery-cgi>

Techopedia. (2017b). *Gameplay*. [Online]. [17<sup>th</sup> of March 2017]. Available: <https://www.techopedia.com/definition/1911/gameplay>

Techopedia. (2017c). *Role-playing Game (RPG)*. [Online]. [26<sup>th</sup> of Nov 2017]. Available: <https://www.techopedia.com/definition/27052/role-playing-game-rpg>

Techopedia. (2017d). *Head-Mounted Display (HMD)* [Online]. [31<sup>th</sup> of Nov 2017]. Available: <https://www.techopedia.com/definition/2342/head-mounted-display-hmd>

Terdiman T. (2012). *Bravely going where Pixar animation tech has never gone*. [Online]. [21<sup>th</sup> of March 2017]. Available: <https://www.cnet.com/news/bravely-going-where-pixar-animation-tech-has-never-gone/>

Toledo, P. (2010). *Brief Considerations About Materials*. 21<sup>th</sup> of Oct 2010. *Manufato*. [Online]. [12<sup>th</sup> of Dec 2017]. Available: <http://www.manufato.com/?p=902>

Valve (2015). *Dota 2 Workshop - Character Art Guide*. [Online]. [6<sup>th</sup> of Feb 2017]. Available: <https://support.steampowered.com/kb/9334-YDXV-8590/dota-2-workshop-character-art-guide#silhouette>

Video Game Music Vault. (2013). *Creating Elizabeth: The Women That Brought Her to Life*. [Online]. [20<sup>th</sup> of Nov 2017]. Available: <https://www.youtube.com/watch?v=P4hwNNs76lY>

Your Dictionary. [no date]. *Button Man*. [Online]. [19<sup>th</sup> of Oct 2017]. Available: <http://www.yourdictionary.com/button-man>

## 7.1 Figures

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Figure 2

Figure by Salomaa. *Costume production pipeline comparison*

### Figure 3

Browne, R. and Willaert, K. (2014) *The Many Faces of Lara Croft: Tomb Raider*. [Online]. [Accessed: 20<sup>th</sup> of Jan 2018]. Available: [https://www.halloweencostumes.com/blog/p-468-tomb-raider-infographic.aspx?utm\\_source=connexity](https://www.halloweencostumes.com/blog/p-468-tomb-raider-infographic.aspx?utm_source=connexity).

### Figure 4

Mirror's Edge. (2015). *Designing Faith: Creating an iconic runner*. [Online]. [Accessed: 4th of Feb 2017]. Available: <http://www.mirrorsedge.com/news/designing-faith-creating-an-iconic-runner>.

Mirror's Edge [no date]. *Faith Connors from Mirror's Edge*. [Online]. [Accessed: 17<sup>th</sup> of April 2017]. Available: <http://www.mirrorsedge.com/characters>.

Haagensen, P. (2016) *Young Faith, Artwork by DICE*. [Online]. [21th of Nov 2017]. Available: <https://www.candb.com/en/artwork/1864/young-faith-dice.html>.

### Figure 5

Marvelous Designer. (2016). *Digic Pictures/Game Cinematics*. [Online]. [Accessed: 17<sup>th</sup> of March 2017]. Available: <http://www.marvelousdesigner.com/cases/digic>

### Figure 6

PlayStation. (2014a). *PlayStation Experience | Modeling Nathan Drake: Bringing an Iconic Character to PS4 Panel*. [Online]. [Accessed: 22th of March 2017]. Available: <https://www.youtube.com/>.

### Figure 7

Swidowski, A. [no date]. Portfolio. *Nathan Drake Costume Exploration*. [Online]. [Accessed : 13th of Aug 2017]. Available: <http://aswidowski.artstation.com/projects/9k4AW>.

Figure 8

Remedy Archives. [no date].

Figure 9

Mulrooney, M. (2013). *INTERVIEW –In Conversation with Claire Hummel*. [Online]. [Accessed: 8<sup>th</sup> of June 2017]. Available: <https://alternativemagazineonline.co.uk/2013/06/06/interview-in-conversation-with-claire-hummel-concept-artist-bioshock-infinite/>.

Figure 10

CD Projekt RED. (2015). Screen capture. *Witcher 3: Wild Hunt*. Microsoft Windows [Game]. CD Projekt.

Figure 11

Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books. p. 82-83, 86-87

Figure 12

InAisce. [no date]. *Work*. [Online]. [Accessed: 21<sup>th</sup> of Jan 2018]. Available: <http://www.inaisce.com/work/>.

Cruz, J. (2014). *NikeLab Presents a New Direction for ACG, Bringing Outdoor Gear to the City With Its First Collection*. [Online]. [16<sup>th</sup> of Dec 2014]. Available: <http://www.complex.com/style/2014/12/nike-new-direction-for-acg-outdoor-gear-to-the-city-in-new-collection>. Accessed: 20<sup>th</sup> of Jan 2018.

Wray, A. (2013). *Acronym's Uncompromising Focus on Function*. [Online]. [4<sup>th</sup> of Sept 2013]. Available: <https://www.businessoffashion.com/articles/intelligence/acronyms-uncompromising-focus-on-function>. Accessed: 20<sup>th</sup> of Jan 2018.

Figure 13

Plunkett, L. (2011). *More of Deus Ex: Human Revolution's Amazing Concept Art*. [Online]. [Accessed: 27<sup>th</sup> of June 2017]. Available: <http://kotaku.com/5844550/more-of-deus-ex-human-revolutions-amazing-concept-art/>.

Figure 14

Briclot, A., Koch, M. and Moris, J-M. (2013). *The Art of Remember Me*. Milwaukee: Dark Horse Books. P. 29.

Figure 15

Vicious Computers. (2009). *Dead Space Gameplay: Chapter 5 HD Part 1*. [Online]. [Accessed: 19<sup>th</sup> of Oct 2017]. Available: <https://www.youtube.com/>.

Figure 16

Curse Entertainment. (2014). *World of Warcraft - 5 Most Memorable Boss Fights*. [Online]. [19<sup>th</sup> of Oct 2017]. Available: <https://www.youtube.com/>.

Figure 17

Haloprov. [no date]. *Heads-up Display of the Halo 5: Guardians*. [Online]. [3<sup>rd</sup> of Feb 2018]. Available: [http://halo.wikia.com/wiki/Heads-up\\_display](http://halo.wikia.com/wiki/Heads-up_display)

Figure 18

Figure by Salomaa. *Player's control over customization varieties*.

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Team Bondi. (2011). Screen capture. *L.A. Noire*. Xbox 360 [Game]. Rockstar Games.

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Remedy Archives. [no date].



Figure 22

Remedy Archives. [no date].

Figure 23

Remedy Archives. [no date].

Figure 24

Video Game Music Vault. (2013). *Bioshock Infinite – Creating Elisabeth: The Women That Brought Her To Life*. [Online]. [Accessed: 26<sup>th</sup> of Sept 2017]. Available: <https://www.youtube.com/>.

Figure 25

Remedy Archives. [no date].

Figure 26

Mulrooney, M. (2013). *INTERVIEW –In conversation With Claire Hummel*. [Online]. [Accessed: 8<sup>th</sup> of June 2017]. Available: <https://alternativemagazineonline.co.uk/2013/06/06/interview-in-conversation-with-claire-hummel-concept-artist-bioshock-infinite/>.

Figure 27

Mulrooney, M. (2013). *INTERVIEW –In conversation With Claire Hummel*. [Online]. [Accessed: 8<sup>th</sup> of June 2017]. Available: <https://alternativemagazineonline.co.uk/2013/06/06/interview-in-conversation-with-claire-hummel-concept-artist-bioshock-infinite/>.

Figure 28

Mulrooney, M. (2013). *INTERVIEW –In conversation With Claire Hummel*. [Online]. [Accessed: 8<sup>th</sup> of June 2017]. Available: <https://alternativemagazineonline.co.uk/2013/06/06/interview-in-conversation-with-claire-hummel-concept-artist-bioshock-infinite/>.

Figure 29

Tucker, I. (2016). *The Art of Dishonored 2*. Milwaukee: Dark horse books. 49. p. 76, 77.

Figure 30

Tucker, I. (2016). *The Art of Dishonored 2*. Milwaukee: Dark horse books. 49. p. 76.

Figure 31

Kucharski, J. (2014b). *The Digital Costume Illustrations of X-Men: Days of Future Past*. [Online]. [Accessed 8<sup>th</sup> of Oct 2017]. Available: <http://tyrannyofstyle.com/costume-illustration-phillip-boutte-jr>.

Figure 32

- A. Bourdeau, V. [2012]. Designing Women. 26<sup>th</sup> of Oct. *Eidos Montreal Community*. [Online]. [3<sup>rd</sup> of March 2012]. Available: <http://community.eidosmontreal.com/blogs/Designing-Women>
- B. Vogue. (2009). *Gareth Pugh ready-to-wear Spring 2009*. [Online]. [Accessed: 16<sup>th</sup> of March 2017]. Available: <http://www.vogue.com/fashion-shows/spring-2009-ready-to-wear/gareth-pugh/slideshow/collection#19>.
- C. Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books. p. 44-45.
- D. Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books. p. 44-45.

Figure 33

Tucker, I. (2016). *The Art of Dishonored 2*. Milwaukee: Dark horse books. 49. p. 75.

Figure 34

Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books. P. 24-25.

#### Figure 35

Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books. P. 24.

Cork, J. (2015). *Haute Future: How Fashion Designers Improved Deus Ex*. [Online]. [Accessed: 3rd of March 2017]. Available: <http://www.gameinformer.com/b/features/archive/2015/04/24/haute-future-how-fashion-designers-improved-adam-jensen-s-deus-ex-coat.aspx>.

#### Figure 36

Hummel, C. (2016). *Portfolio*. [Online]. [Accessed: 16<sup>th</sup> of Oct 2017]. Available: <https://clairehummel.artstation.com/>.

#### Figure 37

Generic Gaming. (2013) *Bioshock Infinite – Finding Elisabeth*. [Online]. [Accessed: 19<sup>th</sup> of Oct 2017]. Available: <https://www.youtube.com/>

#### Figure 38

Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books. p. 36-37

IGN. (2015). *Deus Ex: Mankind Divided - E3 2015 Gameplay Demo*. [Online]. [Accessed: 21th of Jan 2018]. Available: <https://www.youtube.com/watch?v=lv8A6RFlc2k>.

#### Figure 39

Rockstar Games (2011). *Behind the Scenes of L.A. Noire's Painstaking Production Design: Part Two – Costume & Wardrobe*. [Online]. [Accessed: 12<sup>th</sup> of Jan 2017]. Available: <http://www.rockstargames.com/newswire/article/13391/behind-the-scenes-of-la-noires-painstaking-production-design-par.html>.

#### Figure 40

Huovinen, M., Crossland, J., Puomio, A., Rask, S., [no date], *Character Modelling Guidelines for Outsourcing*, (Asset Creation Guidelines, PDF), Remedy Entertainment Ltd. p. 12.

Figure 41

Team Bondi. (2011). Screen capture. *L.A. Noire*. Xbox 360 [Game]. Rockstar Games.

Figure 42

Marvelous Designer. (2016). *Digic Pictures/Game Cinematics*. [Online]. [Accessed: 17th of March 2017]. Available: <http://www.marvelousdesigner.com/cases/digic>

Figure 43

Zevik (2010). *"Thief 1: The Dark Project", full walkthrough, Mission 12 - Undercover, Part ½*. [Online]. [Accessed: 26<sup>th</sup> of March 2017]. Available: <https://www.youtube.com/>.

Figure 44

Jiang, Y. (2016). Portfolio. *Uncharted 4 Characters' Fabric Material*. [Online]. [Accessed: 8<sup>th</sup> of Oct 2017]. Available: <http://yibing.cgsociety.org/>

Figure 45

Kojima Productions, 2016. *Death Stranding - Teaser Trailer - TGA 2016 - 4K*. [Online]. [Accessed: 21st of Jan 2018]. [https://www.youtube.com/watch?v=H2Hy96sOnq8&has\\_verified=1](https://www.youtube.com/watch?v=H2Hy96sOnq8&has_verified=1).

Figure 46

PlayStation. (2014a). *PlayStation Experience | Modeling Nathan Drake: Bringing an Iconic Character to PS4 Panel*. [Online]. [Accessed: 22<sup>nd</sup> of March 2017]. Available: <https://www.youtube.com/>

PlayStation. (2014b). *Uncharted 4: A Thief's End E3 2014 Trailer (PS4)* [Online]. [Accessed: 21<sup>st</sup> of Jan 2018]. <https://www.youtube.com/watch?v=y1Rx-Bbht5E>.

Figure 47

*Witcher 3: Wild Hunt*. (2015). Screen capture. Microsoft Windows, PlayStation 4, Xbox One [Game]. CD Projekt RED:

Figure 48

*Quantum Break*. (2016). Screen captures. Microsoft Windows, Xbox One [Game]. Microsoft Studios.

Figure 49

Mass Effect. (2016). *MASS EFFECT: ANDROMEDA – Official Gameplay Trailer - 4K* [Online]. [Accessed: 21<sup>st</sup> of Jan 2018].  
<https://www.youtube.com/watch?v=NOIzH6UcoW4>.

Figure 50

Jacques-Belletête, J., Dubeau, M. and Davies, P. (2016). *The Art of Deus Ex Universe*. London: Titan Books. P. 52.

The Wolf. (2016). *Deus Ex Mankind Divided Illuminati cinematic*. [Online]. [Accessed: 21<sup>th</sup> of Jan 2018]. Available:  
<https://www.youtube.com/>

Figure 51

Concept Art World (2013). *Ryse: Son of Rome Character Concept Art by Kaija Rudkiewicz*. [Online]. [Accessed: 2nd of Mar 2017.] Available:  
<http://conceptartworld.com/news/ryse-son-of-rome-character-concept-art-by-kaija-rudkiewicz/>.

Figure 52

Mulrooney, M. (2013). *INTERVIEW –In conversation With Claire Hummel*. [Online]. [Accessed: 8<sup>th</sup> of June 2017]. Available:  
<https://alternativemagazineonline.co.uk/2013/06/06/interview-in-conversation-with-claire-hummel-concept-artist-bioshock-infinite/>.

Figure 53

Marek, J. [no date]. Portfolio. *Beggars*. [Online]. [Accessed: 21th of Jan 2017]. Available: <https://www.artstation.com/artwork/414qk>.

Figure 54

Minnaert, K. (2016). *Render Mesh*.

## 7.2 Conversations

- Crossland, J. 2016. *Conversation with Heli Salomaa* 19<sup>th</sup> of Sept.
- Blåfield, H. 2017. *Conversation with Heli Salomaa* 31<sup>th</sup> of May.
- Kasurinen, M. 2017. *Conversation with Heli Salomaa* 9<sup>th</sup> of Oct.
- Mohov, S. 2017. *Conversation with Heli Salomaa* 20<sup>th</sup> of July.
- Puomio, A. 2016a. *Conversation with Heli Salomaa*, 29<sup>th</sup> of Aug.
- Puomio, A. 2016b. *Conversation with Heli Salomaa*, 2<sup>nd</sup> of Sept.
- Puomio, A. 2016c. *Conversation with Heli Salomaa*, 28<sup>th</sup> of Sept.
- Puomio, A. 2017a. *Conversation with Heli Salomaa*, 17<sup>th</sup> of Oct.
- Puomio, A. 2017b. *Conversation with Heli Salomaa*, 29<sup>th</sup> of Oct.
- Puomio, A. 2018. *Conversation with Heli Salomaa*, 22<sup>th</sup> of March.
- Rask, S. 2016a. *Conversation with Heli Salomaa* 29<sup>th</sup> of Aug.
- Rask, S. 2016b. *Conversation with Heli Salomaa* 6<sup>th</sup> of Sept.

## 7.3 Games

343 Industries. (2015). *Halo 5: Guardians*. [Game]. Microsoft Studios.

Arkane Studios. (2012). *Dishonored*. [Game]. Bethesda Softworks.

Arkane Studios. (2016). *Dishonored 2*. Xbox One [Game]. Bethesda Softworks.

Bethesda Game Studios. (2011). *The Elder Scrolls V: Skyrim*. Microsoft Windows [Game]. Bethesda Softworks.

BioWare. (2017). *Mass Effect: Andromeda*. [Game]. Electronic Arts.

Blizzard Entertainment. (2004). *World of Warcraft*. Microsoft Windows [Game]. Blizzard Entertainment.

Blizzard North. (2000). *Diablo II*. Microsoft Windows [Game]. Blizzard Entertainment.

CD Projekt RED. (2015). *Witcher 3: Wild Hunt*. Microsoft Windows [Game]. CD Projekt.

Core Design. (1996-2015). *Tomb Raider series*. [Game]. Eidos Interactive, Square Enix.

Crytek. (2013). *Ryse: Son of Rome*. [Game]. Microsoft Studios.

Dontnod Entertainment. (2013). *Remember Me*. [Game]. Capcom.

EA Dice. (2008). *Mirror's Edge*. [Game]. Electronic Arts.

EA Dice. (2016). *Mirror's Edge Catalyst*. [Game]. Electronic Arts.

EA Redwood Shores. (2008). *Dead Space*. [Game]. Electronic Arts.

Eidos Montreal. (2011). *Deus Ex: Human Revolution*. [Game]. Square Enix.

Eidos Montreal. (2016). *Deus Ex: Mankind Divided*. Microsoft Windows [Game]. Square Enix.

Irrational Games. (2013). *Bioshock Infinite*. Xbox 360 [Game]. 2K Games.

Kojima Productions. (To be published in 2019). *Death Stranding*. [Game]. Sony Interactive Entertainment.

Linden Lab. (2003). *Second Life*. [Online Virtual World]. Linden Lab.

Looking Glass Studios. (1998). *Thief: The Dark Project*. (1998). [Game]. Eidos Interactive.

Maxis. (2000). *The Sims*. Microsoft Windows [Game]. Electronic Arts.

Namco Bandai Games. (2012). *Soul Calibur V*. [Game]. Namco Bandai Games.

Naughty Dog. (2007-2016). *Uncharted-series*. [Game]. Sony Computer Entertainment.

Naughty Dog. (2016). *Uncharted 4: A Thief's End*. PlayStation 4 [Game]. Sony Computer Entertainment.

Nintendo. (2017). *The Legend of Zelda: Breath of the Wild*. Nintendo Switch [Game]. Nintendo.

PlatinumGames. (2009). *Bayonetta*. [Game]. Sega.

Quantic Dream. (2013). *Beyond: Two Souls*. [Game]. Sony Computer Entertainment.

Remedy Entertainment. (2001). *Max Payne*. [Game]. Microsoft Windows.

Remedy Entertainment. (2010). *Alan Wake*. [Game]. Microsoft Studios.

Remedy Entertainment. (2016). *Quantum Break*. Microsoft Windows. [Game]. Microsoft Studios.

Rockstar North. (2013). *Grand Theft Auto V*. Xbox 360 [Game]. Rockstar Games.

Shigeru Miyamoto. (1981). *Donkey Kong*. Arcade Machine [Game]. Ikegami Tsushinki.

Team Bondi. (2011). *L.A. Noire*. Xbox 360 [Game]. Rockstar Games.

Ubisoft Montreal. (2009). *Assassin's Creed II*. [Game]. Ubisoft.

Ubisoft Montreal. (2014). *Assassin's Creed Unity*. [Game]. Ubisoft.