IMAGINING
THE ARCHITECTURE OF
SCIENCE FICTION

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INTRODUCTION

Film and architecture are two forms of art inherently related to each other. This goes far beyond the films of Eisenstein and Wiene, two filmmakers adored by the architecture community. The practice where film and architecture come together, production design, is a much overlooked profession by architects. Production design shows how stories can be told through design, with its main goal being complementing the narrative of a film. Because film is not bound to reality, it leaves room for experimentation. Vidler (1993) calls film "a laboratory for the exploration of the built world" (p. 45). Film architecture can illustrate different places and times without the restrictions of the real world (Vidler, 1993)

This is even more the case when moving to the fictional environment. Science fiction is one of the main genres in film where the stories reach far beyond what we know from our daily lives. It gives designers the chance to let their imagination run wild and explore new and innovative design solutions. Science fiction design can help inspire humankind. The futuristic civilizations portrayed in science fiction are an incredibly powerful to reflect on contemporary society and its technological advances (Fortin, 2011). It can be a warning for where our world is headed or an inspiration to show us where society could go. Science fiction scenarios can project the possibilities of the future, as the seminal *2001: A Space Odyssey* (1968) shows, or leave us in fear about our own reality, like The Wachowski Brothers' *The Matrix* (1999) does.

Much has been written on the topic of science fiction. There are endless amounts of literature discussing the concepts created by science-fiction authors or the way science-fiction cinema portrays our world. On the topic of production design, there has been written much about the practical nature of set building of these fictional environments. Yet, literature on the topic of translating written science fiction into (spatial) design concepts is very limited.

This paper explores the imagination process of science-fiction designers. Its aim is to map their creative process of moving from words to imagery. The paper consists of two parts. The first part focuses on learning from the science-fiction designers. With watching their work and interviewing them, their imagination process is decomposed and mapped. The second part puts the learnings from part one into practice. It explains the process of designing a fictional environment using the same steps as the science-fiction designers.

PART ONE

1. PROBLEM DESCRIPTION

1.1 On (film)architecture

In architecture, a design should find solutions within internal and external constraints. These constraints are for example, user, site and legislation. From the constraints, the architect can start working up towards solutions. The constraints have the purpose to make the building adequately perform its demanded functions (Lawson, 2002). The functions that a building has to fulfil are to be a modifier of climate, behaviour, resources and culture (Hillier and Leaman, 1972). All the aspects that the architect has to take into account are things that he can actually find in the real world. There is an actual site, user, climate and culture that can be observed. A design can be made based upon a clear frame of reference.

When it comes to design for film, there are also these aspects that are described in a script. But that immediately points out what sets the film designer apart from the architect. It is only described. Words are the only source from which a film designer starts. There is no visual reference and no actual user he can talk to. That is where the imagination comes in. The designer has to take the story and for this, comes up with his own imagery.

In film, there is a great variety of worlds that are portrayed. Films that present an unrealistic and fictional environment become an extra challenge for the film designer, as he then has to think outside of what he knows from the real world. We can roughly divide fictional worlds into two categories: fantasy and science fiction. In fantasy films, scenes often take place in natural environments like forests, under the sea or up in the mountains. Science fiction films often times are set in a man-made or built environment. That is why this paper will focus on the latter genre.

When designing architecture, the design process often starts with a design brief and analysis of the context. When designing film architecture, the design process starts with an analysis of the script. This script forms the base of the design but gives no visual reference. That is particularly the case when the story is set in a fictional world. This makes for some big differences between the design processes of architects and film designers. The design processes of both have similar steps, as both parties have to do with spatial design. Yet, in the first part of the process there might be some contrasting steps which are crucial in either of their processes.

Architecture	Film Architecture
Design brief	*Script*
Context analysis	*Script Analysis*
Facilitating contextual issues	*Imagining fictional world*
Formulating design concept	Formulating design concept
Iteration	Iteration
Building	Film

In the first three steps of the design process of a film designer, a translation has to be made from words to imagery. This translation is what sets the film designer apart from the architect and is the essence of what this paper will research.

1.2 Research goal

The goal of this paper is to map the imagination process behind science fiction architecture. The focus lies purely on the design process, in which a design concept has to be derived from a script. When designing film architecture part of the process is also translating design concepts into actually built sets (physically or digitally). But since there already is a lot of literature on this subject, that will not be the focus of this paper.

1.3 Research question

How can we imagine science fiction architecture based on a scenario?

1.3.1 Subquestions
How do you translate a scenario into a design?
What makes a design seem futuristic or otherworldly?
How can a design complement a storyline?

2. METHODOLOGY

The methodology used for this research consists of two parts. The first part consists of film analyses of nine different films and games from the science fiction genre. This is followed by an interview with the designers of these films and games.

2.1 Focus group

The focus group of this research is members of the art department, as they are responsible for the visual look of a film or game. The people chosen to be interviewed fulfil different roles in the art department because the production design will eventually be a co-creation of their minds. Since the topic of this thesis is science fiction architecture, the participants were selected based on their experience in this genre. Though, as film designers often work on different genres, this does not mean that their work solely involves science fiction. To further clarify the different roles of the interviewed artisans, here a short explanation per role.

Production Designer
The production designer is the head of the art department. The art department is artistically responsible for the environments in which a story takes place. The production designer leads the department consisting of artisans and craftspeople, which are responsible for the look. Together with the director and director of photography he decides what the visual look of the film will be. He also oversees the costume and hair and make-up department in order achieve a singular design result. The production designer usually comes in early on in the pre-production phase, as he comes up with the visual concept of the film together with the director and director of photography (LoBrutto, 2002).

Art Director
The art director is the executive assistant of the production designer. He is head the art department crew on set. Depending

on the production, the production designer may remain off-set and continue designing and coordinating, while the art director works on set with the shooting crew. The art director is responsible for the logistics of getting materials to and from the set. On low-budget films, sometimes there is no production designer. In that case, the art director is responsible for the design of the film (LoBrutto, 2002).

Set Designer
The set designer designs and supervises the sets. His designs are based on the ideas and input of the production designer. Set designers can design one or multiple sets for the film, depending on the size of the production and the set. He is brought in by the production designer create the technical drawings used to construct a set, drafts blueprints based on concepts, or conceptual drawings before overseeing construction of the set. The set designer works together with the director and director of photography to plan how the set will be used and filmed (LoBrutto, 2002).

Concept Artist
Concept artists draw or paint, mostly digitally nowadays, a conception of the production designer's ideas for a set or a design moment for the film. They are especially helpful in fantasy or sci-fi films where completely new environments have to be made up. Concept artists are not often used in low-budget filmmaking, but they can be a valuable tool when trying to raise money for a specific set that needs to be built. Concept artists come on in early in the process as they help drawing out the first conceptions of the production designer (LoBrutto, 2002).

Of course there are many more roles in the art department like the set decorator, property master and location scout. But these four roles were chosen to be interviewed based on their relevance for science fiction architecture.

2.2 Film analysis

A selection of science fiction films was watched and analysed, mainly focusing on the architecture used in the films. Also, as this project is about the architecture of fiction, the focus lies on the fictional architecture and not necessarily the realistic designs of a film. The selection of films is based on the filmmakers that are interviewed for this research. Two films of every interviewee are analysed. The main goal of this film analysis is deriving interview questions about the design. Secondly, aspects that are essential in the design of science fiction architecture were tried to be found.

The films that were chosen for the analysis were based on the following criteria.

1.   Designed by interviewee
The main purpose of the film analyses was to be able to interview film designer and better understand their responses due to familiarity with their work. Questions asked during the interviews are outcomes from the film analysis.

2.   Science fiction
As described earlier, the fictional environment was chosen because this makes it different from real architecture. But in order to not stray too far from the subject of architecture, the science fiction genre was chosen as its stories often take place in built environments.

3.   Architectural value
Science fiction films often show an unrealistic or futuristic environment. Though, in these environments it is not always necessarily the architecture that looks unreal. Sometimes, this is communicated through the design of vehicles, graphics or products. As this   thesis is about architecture, the films chosen for this research show environments where the notion of science fiction is communicated through the architectural design.

The following steps were taken during the film analyses.

1.   Viewing the film

This involved careful viewing of the film a number of times, approximately five to six times per film. Some scenes, especially scenes with architectural value, were watched more often.

2.   Image Capture

With taking stills from each film, the image portrayed could be further analysed and details from the sets can be distilled.

3.   Distilling interview questions

After watching and analysing the films, interview questions can be derived to be asked to the designers of these particular films.

2.3 Interviews

This qualitative research was held in form of semi-structured interviews. This form of interviews was chosen to give the designers the opportunity to freely talk about their design process, as imagination is a very personal and subjective matter. Over the course of three weeks, six different film designers were interviewed in interviews that took approximately one hour. The interviewees are asked a set of questions consisting of two parts. The first part consisted of generic questions that were asked to all of the interviewees. The second part consisted of questions about their own work. These questions have been distilled from the film analysis done beforehand. Four of the interviews were done orally, the method of preference. Two were done over email, due to preference of the designers.

Interview goal
The goal of this research is to find out how designers of films and games translate scenarios into imagery and with this map their imagination and design process of science fiction architecture. For this research, filmmakers have been interviewed that fulfil several roles in the art department. After watching and analysing their films, questions were asked them about imagination and science fiction.

Interview questions
The following questions are generic and have been asked to all of the interviewees.

• When moving from story to final product, what are roughly the steps you go through?

• When you come up with ideas, do you search for references that resemble parts of this, or do you draw this out? How do you combine the two?

• In the imagination process, are choices made arbitrarily, or are these based on research? In case of a combination of both, are there certain parts that are designed arbitrarily and some that are based on research?

• How free do you interpret a scenario? What are the conditions of the scenario that you use in your design?

• A scenario gives both a narrative (e.g. the people are suppressed) and a context (NYC, 2037). How do you combine the two into one design?

• What effect do you think that your role in the art department has on you creative process?

• From where do you get inspiration for science fiction or non-existent architecture?

• Why is science fiction architecture often of such a huge and inhumane scale? Why is science fiction architecture often associated with man-made materials, like metal and glass?

• When designing a new world, where lies the balance between using completely new elements and realistic elements in order to keep a story believable?

• What do you do with you designs to make them appear futuristic?

• When looking at films that are set thirty years into the future, often the city and its architecture look completely different from our world today. Though, when looking thirty years into history, the architecture does not look that different from today. Is design for the future an architectural task?

3. RESULTS

This chapter explains the results found in the research. For easy reading, the analyses have been described per person, first introducing the film designer, then analysing his work and lastly, a summary of the interview held. After a description of every person's interview, a comparison is made between all the interviews.

3.1 Scott Chambliss / Production Designer

Scott Chambliss is a production designer for film and television. Chambliss began his career as an associate set designer for Broadway productions. After that, he became an assistant art director on the films *Scenes from a Mall* (1991) and *Malcolm X* (1992). His credits as a production designer include *Mission: Impossible III* (2006), *Cowboys & Aliens* (2011) and *Star Trek: The Future Begins* (2009). Chambliss has won an Excellence in Production Design Award from the Art Directors Guild and a Primetime Emmy Award for his work on the TV series *Alias*.

For this research, *Star Trek: Into Darkness* (2013) and *Tomorrowland* (2015) have been analysed of which he both was the production designer.
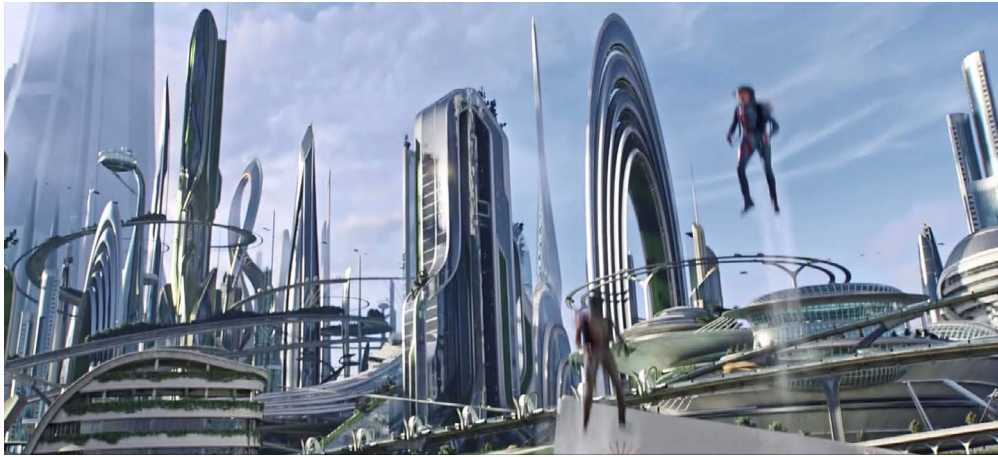
Film analysis

Tomorrowland (2015)

When Casey Newton finds a mysterious coin and touches it, she finds herself in a place called Tomorrowland, in another space and time. But the coin runs out of energy she goes out to find out more about the coin and the place where she was. In her journey, she meets Athena and Frank Walker, a former boy-genius inventor. Athena warns them that the future and therefor also Tomorrowland is in danger. Together they set out on a quest to save the future (Bird, Chernov & Lindelof, 2015).

Tomorrowland is portrayed as a true utopia. The buildings are mostly white and bright and the skies are blue. It is a city with large skyscrapers and clear references to the architecture of Santiago Calatrava and Zaha Hadid. The architecture, with its fluid and round forms, suggest a happy and friendly place. The use of manmade materials together with greenery and water shows that this is a world where nature and technology can happily coexist.

In Casey's journey through the city, the viewer experiences the layered texture of the city. You see her moving through over and under buildings. She passes several stairs, bridges and enters train-like transportation that moves over and under tracks and through buildings. This unfamiliar organisation of the city leaves the character full of wonder.

figure 3.1 Tomorrowland cityscape
(Bird, Chernov & Lindelof 2015)

figure 3.2 Tomorrowland aerial view
(Bird, Chernov & Lindelof 2015)

figure 3.3 Tomorrowland building
(Bird, Chernov & Lindelof 2015)
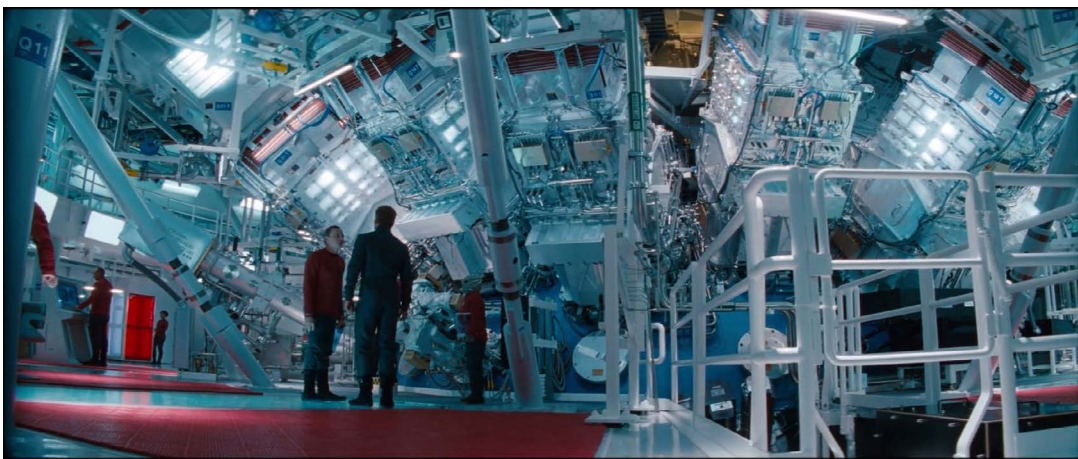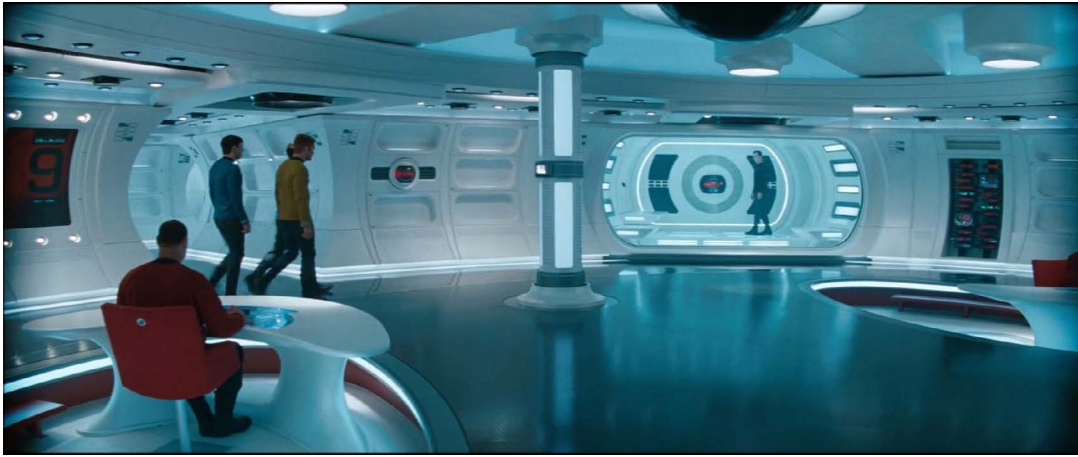
Star Trek: Into Darkness (2013)

When a former employee-turned criminal threatens USS and society, Captain James Kirk sets out on a manhunt with his crew. Having his own reputation to correct, Kirk leads the hunt through the galaxy to planet Klingon to capture this one-man weapon of mass destruction. The hunt brings complications challenging love, friendship and family and eventually will lead the Captain to the most difficult test of his life when he must choose between his loyalty to USS and his crew (Abrams, Burk, Lindelof, Kurtzman & Orzi, 2013).

The spaces where the crew works and might look fancier than one would expect a spaceship to be. This supports the narrative it is the future and space travel is done frequently. Space ships are not just mere transportation crafts but also serve as a home for the crew. The story is set in a future in which technology is used for the better. The technologically advanced spaces have a convivial feel to them. The primary colour palette complements this state of balance.

There is a true distinction between the very functional machine-like spaces and the spaces where the majority of the crew spends most of their time. The machine-like spaces come much closer to what the viewer nowadays would associate with a space craft; the difference may be the bigger scale. The contrasts in appearance between the machine and living areas emphasize the chaotic nature the scenes shot in the engine room have. The breakdown of the engine puts time pressure on the crew and is one of the narrative threads if the film.

figure 3.4 Med bay (Abrams, Burk, Lindelof, Kurtzman & Orci, 2013)

figure 3.5 Enterprise interior (Abrams, Burk, Lindelof, Kurtzman & Orci, 2013)

figure 3.6 Engine room (Abrams, Burk, Lindelof, Kurtzman, Orci & 2013)

Interview

Chambliss states that the design process is intuitive as storytelling is about interpretation which partly comes from our emotional sensibilities. Yet, designers should be warned not to confuse intuitive design with design based on personal taste. The design should always be driven by the storyline.

Collaboration is very important in the work of the production designer. With this he means collaborating on different levels, firstly, collaboration with the director and other heads of departments. It is important to follow the director's intention with the story. This also means that he will not take a job is his and the director's point of view are too far apart. Secondly, collaboration with and within the art department is fundamental for his job, as he is the leader of the team.

The aspect of horror is often part of science fiction stories. Using grand-scaled environments are especially effective in this case. He uses the example of the future as a totalitarian state. As explanation for the use of material in science fiction, he states that science fiction itself is about the man-made. Though, when he names examples of films, he names films that have not done that and calls these films seminal for the science fiction genre. The examples he uses are 2001: A Space Odyssey and Solaris. The same happens when asking him about the futuristic architecture in science fiction films. He states that architecture is a very important ingredient of science-fiction design. And yet, he names exceptions where the architecture was not necessarily futuristic or otherworldly like Brazil and Her. Concluding, he says that there is not one solution for designing science fiction worlds. In the end, it all depends on the story.

In Tommorowland, he used architectural references of Santiago Calatrava and Zaha Hadid, because their way of thinking fitted the idea behind Tomorrowland. Calatrava was inspired by nature and Hadid used the 'what if' approach a lot in her work. Finding the style of Tommorowland was about the coming together of diverse minds and embodying what their manifestation stood for.

Star Trek was carefully approached because in this case he was designing a franchise. He and director J.J. Abrams wanted to find a new approach in which they would not follow nor conflict with

previous Star Trek films. Inspiration for the design came from mid-century designers like Pierre Cardin and Eero Saarinen. These designers had a positive outlook on the future, in which technology would lead to a better future. This opposes the contemporary ideas in which we think of the future as a dystopia.

The conformity between the design approaches of both films is that Chambliss tried to imagine where the builders of the worlds to be designed would seek inspiration from and draw his own inspiration for the design of the film from these original sources.

3.2 Sean Haworth / Production Designer

Sean Haworth a production designer from Los Angeles. Before working as a production designer, he worked his way up in the art department having worked as an art department assistant, set designer and art director. He apprenticed under famous production designers Bo Welch and Ken Adam. His credits as a production designer include Ender's Game (2013) and Deadpool (2016). His art director credits include Avatar (2009), Tron: Legacy (2010) and Thor (2011).

For this research Avatar (2009) and Ender's Game (2013) were analysed. On Avatar, Haworth worked as an art director and for Ender's Game he was responsible for the production design together with Ben Procter.
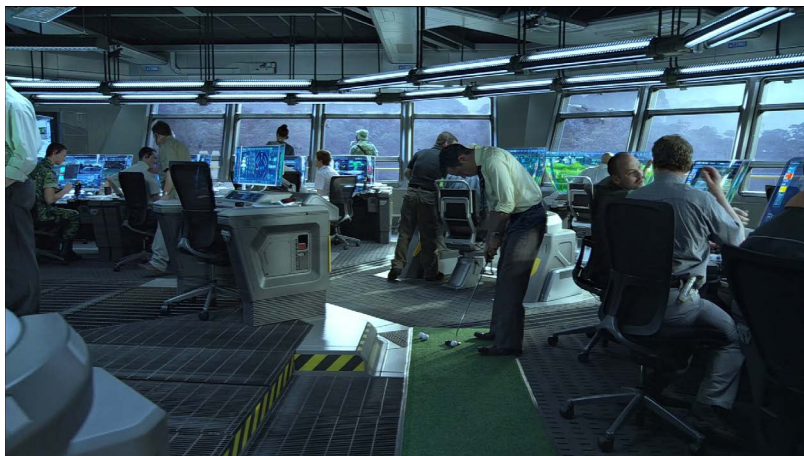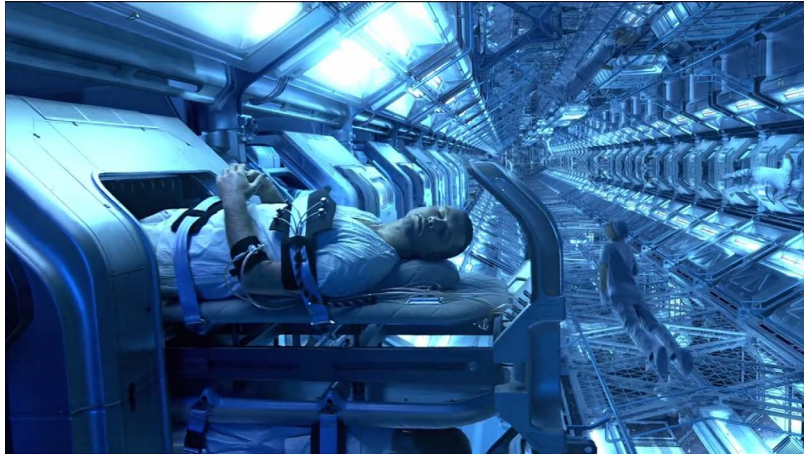
Film analysis

Avatar (2009)

When his brother is killed, former marine Jake Sully replaces him on a mission on the distant planet of Pandora. As part of the program, he uses an avatar identity to attempt to infiltrate the native Na'vi people. But after falling for beautiful Na'vi Neytiri, he discovers the true intention of the mission and finds himself right between humans, led by the evil Parker Selfridge, and the Na'vi. This leads to an epic battle between the natives and human invaders (Cameron & Landau, 2009). As Sean Haworth was part of the art department that designed the human interior space on Pandora, this analysis focuses on these spaces.

What comes apparent when seeing all the different interiors designed, is the variety in forms the spaces come in. Every space has a different geometrical form. The space where the main character wakes up after traveling for six years is a diamond form in section. On Pandora, the spaces show forms like circles, octagons and rectangles, making each space have its own identity. The octagon is orientated more outward, with windows on most sides, while the circular space works more inward. The container where the main characters reside in the last hour of the film is much smaller and more closed in. As they live more outside during these scenes, it is a very basic space that is not about the quality of life that is lived inside the cube.

The spaces in which the humans reside on Pandora look very earthlike and familiar. Apart from the digital layer of screens and holograms that is added, the architecture does not necessarily suggest that the story takes place in some high-tech far future. Keeping the pods this familiar, increases the contrast with what is outside on Pandora, which is a big unfamiliar world with nature and technology that is nothing like earth. The use of familiar earthlike architecture could also suggest a longing among the characters for something familiar that reminds them of earth and makes them feel at home on this other planet.

figure 3.7 Cryo vault (Cameron & Landau, 2009)

figure 3.8 Link room (Cameron & Landau, 2009)

figure 3.9 Ops center (Cameron & Landau, 2009)

Ender's Game (2013)

Fifty years after earth has been ravaged by a technologically superior alien race called the Formics, humankind bands together to prevent recurrence of destruction. When Ender Wiggin is recruited for battle school in space, he is separated from his beloved sister and ghastly brother. With his brilliance, he may become saviour of the human race and will be tested and honed into an empathetic killer who begins to despise what he does as he learns to fight in hopes of saving Earth and his family (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013). Sean Haworth was responsible for the production design of this film. But since two other designers that worked on Ender's Game were also interviewed, this part only analyses the parts that they did not design.

Battle school has spaces with many different forms. Long corridors connect the dorms, showers, canteen, battle room and many more rooms we see in the film. The use of details like grates, buttons and handles, give the spaces a rich feel, without looking overly functional. For the material metal is used mostly throughout the design. This gives the space a very cold and almost uninviting appearance and makes the contrast with home even bigger. The metal used has different appearances, keeping the spaces visually interesting, while using only one material. Sometimes, the metal is polished, other times it looks matte or used as a grate. Relief is also used to make the spaces visually interesting. A relief of horizontal lines strengthens the perspective and accentuate the lengthiness of the corridors.

The architecture of the Formics looks unfamiliar. It combines free-flowing, wavy architecture with aggressive pointy forms, complementing the storyline in which Ender both has to fight against and feels empathy towards the Formics. When seeing their environment as a whole, a certain pattern or texture can be seen, suggesting that this is an architecture that works, yet the viewer is not able to describe what kind of material and technique the Formics use in their architecture. As the Formics are technologically superior to humans, their world is clearly based on techniques that we can not yet understand.

figure 3.10 Battle school corridor (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

figure 3.11 Battle school corridor (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

figure 3.12 Formics planet (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

Interview

For Sean Haworth, an important part of the design is the collaboration. When he first gets a story, it is very important that it speaks to him. Also, the director is in charge of the storytelling so he and the director should have a like-mindedness towards the story. As head of the art department he channels people's energies and visions. It is important for him to find collaborators that essentially see the things he sees. Then, as a team they can work together in service of the story. He prefers his team to work together in the same physical space, because if people go off on their own too much, the end result will not be a cohesive whole. References and mood boards are also tool to keep everyone on the same page and remind everyone of the bigger picture.

A lot of the design depends on the director. Some directors are very visually driven, while others are more character driven. When Haworth was working on Avatar under director James Cameron, Cameron had written not only the script, but also a treatment about how the world of Avatar worked. Haworth describes it as almost a technical paper. Cameron was very pragmatic about the design decisions because he could reason exactly why something would or would not work.

In Ender's Game, director Gavin Hood was more character driven. His ideas about the design were all based on the emotional journey of the characters. And they even deviated from the original description in the book in service of this emotional journey. In the book, the battle room was described as a closed box, with no windows, no sense of up and down. In the film, this was changed to a spherical glass space, from where you could see the earth and could see what the characters were fighting for.

When it comes to design, it has to be grounded in some kind of reality and based on something that people can relate to. This does not mean that it has to be realistic, but Haworth sets up a set of rules for the story and world he is designing for. He lets his imagination run free and apply that in a logical manner. His inspiration he can get from almost anywhere. He names personal experience, other art forms and nature. He says that you can almost take anything you

see around you as long as you form it into the logic of the world you are creating. If you give your design a solid logic or backstory, the audience will believe it more easily.

3.3 Tom Frohling / Art director & Set Designer

Tom Frohling is an art director and set designer. His credits as an art director include *X-Men First Class* (2011), *Transcendence* (2014) and *Fantastic Four* (2015). He has also worked as a digital set designer on many productions. As a digital set designer, he has been responsible for the art direction is the computer generated sets. His credits as a digital set designer include *After Earth* (2013), *Ender's Game* (2013) and most recently *Live by Night* (2016).

For this research the films *Ender's Game* (2013) and *Fantastic Four* (2015) have been analysed. For Ender's Game he worked as a digital set designer, while for Fantastic Four he worked as a supervising art director.
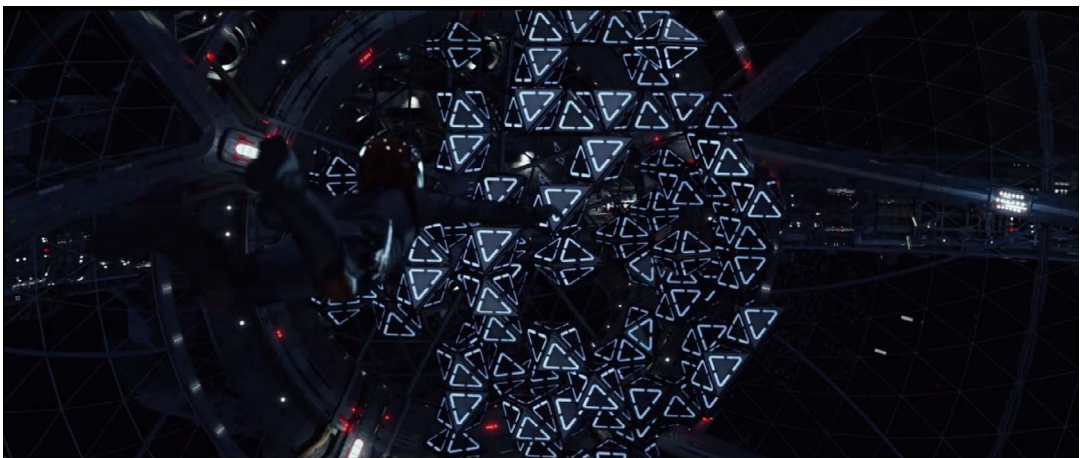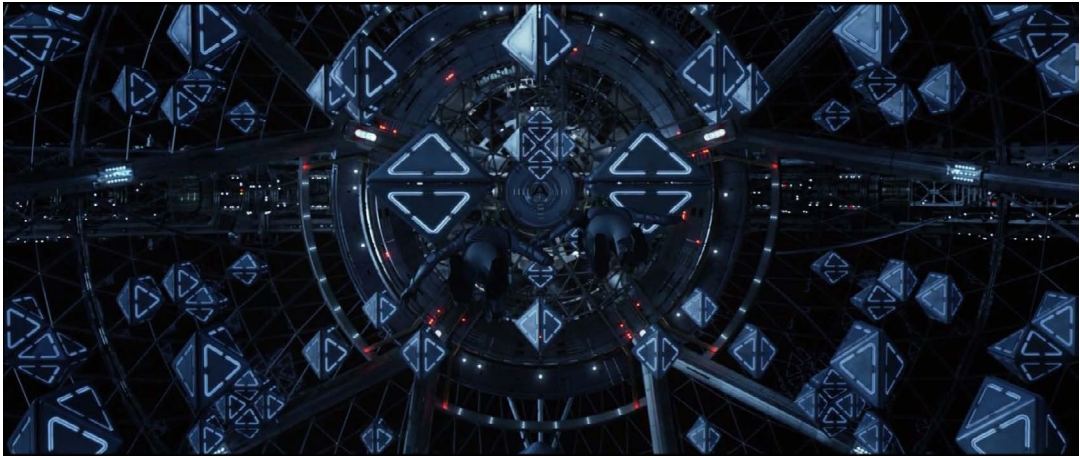
Film analysis

Ender's Game (2013)

For description of the plot of Ender's Game, see Ender's Game in paragraph 3.2.

The battle room is the place where Ender and his peers learn combat as they fight each other in teams. The sphere is made of transparent material so that the earth can be seen as a backdrop. This large, spherical space forms the centre of the spaceship. Inside the space, there are floating cubes that can serve as cover during combat. These cubes form a different composition during every match. This gives the battle room different look in the several scenes that take place here.

The big sphere shows a Buckminster Fuller-like construction. The triangular construction fits with the rest of the production design. Triangles are seen also in the cubes that the students use for cover during matches. Triangles can also be found in other locations in the spaceship, mainly in the graphic design. This could be a constant reminder for the viewer, that these children are here for battle.

figure 3.13 Battle room interior (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

figure 3.14 Battle room entrance (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

figure 3.15 Battle room interior (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)
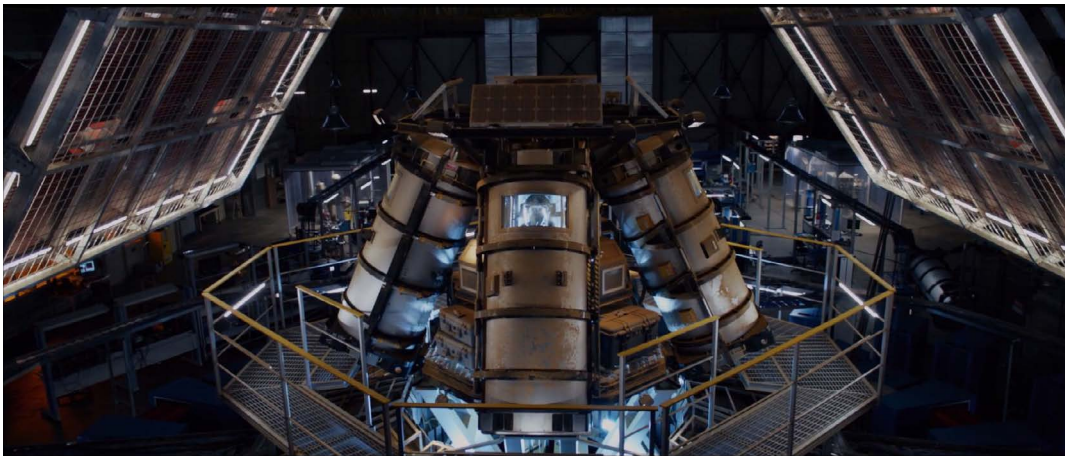
Fantastic Four (2015)

After designing and building a teleportation machine, four friends teleport to an alternate and dangerous universe which changes their bodies in shocking ways. They must learn to control their new physical capabilities and work together to save earth from a former friend turned enemy (Goodman, Kinberg, Kulzer, Parker, Vaughn & Trank, 2015). In this film, the teleportation room is the only fictional architectural space seen. This analysis focuses on this location.

The large computer cabinets around the teleportation capsules suggest the amount of calculation power that is needed. The large plates above the capsules emit some kind of electricity or other form of energy when the process of teleportation is set into action. This suggests that there is loads of energy needed for this kind of process, giving the audience a sense of thought behind the physics of the teleportation process.

The design of a concept as unfamiliar as teleportation gets grounded because of the space it resides in. All the equipment needed for teleportation is found in a large warehouse, a sight that the audience probably is familiar with. The monumental feel this space complements the importance of this space in the story. The plot of the film is mainly about the process of designing, building and eventually using the teleportation machine. Especially in the first half of the film, most of the scenes take place in the teleportation room, or this room can be seen in the background.

figure 3.16 Teleportation platform (Goodman, Kinberg, Kulzer, Parker, Vaughn & Trank, 2015)

figure 3.17 Teleportation pods (Goodman, Kinberg, Kulzer, Parker, Vaughn & Trank, 2015)

figure 3.18 Warehouse interior (Goodman, Kinberg, Kulzer, Parker, Vaughn & Trank, 2015)

Interview

In his design process, Frohling talks a lot about dealing with the director and getting on the same page with him. The most important thing to keep in mind though, is that the design should always go back to the script and facilitate the actions described in it. About collaborating with directors he also tells that when he believes that a design solution other than what the director might want, he tries to push as far as he can go, until he feels that he goes too far. The same counts for the production designer who he works under. As an art directir, he stands between the production designer and set designers and construction. In this, he tries to find ways to make the production designer's vision come to life. He tries to push the boundaries as much as he can, until the limit from either time or budget.

For science fiction, Frohling can draw inspiration from anywhere. He grounds his design in research. The information and inspiration ion can come from anywhere, but research is always key to a good design. He does not believe that all designs are based on research or memories that one has seen in the past. Nothing is ever completely new; everything is a redo of something else. What is new is the combination from old images. With combining the images, he uses different techniques. He uses drawing, collage technique and CAD. What is most important is that while using these techniques is that there is left room for error. In this, he finds working with a computer too precise sometimes. With leaving room for error, unexpected design solutions can be found.

Design should be story driven. The actions described in the script have to be facilitated by the environment and the space should help the audience empathise with the characters. A design is based on reality but some aspects can be emphasised to make it emotionally stronger. This balance between emotion and realism is very important and differs per story and director. When using unrealistic design parts, they should have a storytelling quality to them. If the whole design looks unrealistic, nothing will stand out anymore, so it should be used very purposefully in order to tell the story better. About futuristic architecture in science fiction films, he says that this mostly is used so that the audience does not have to be reminded

constantly that a story is set in the future. He thinks that sometimes this also just happens because a designer gets on his high horse.

3.4 Aaron Haye / Art Director

Aaron Haye is an art director for Hollywood productions. Before working in the art department, he worked in the visual effects department for years as a model maker. Because of his knowledge of both visual effects and art direction, he can combine these two disciplines into his work seamlessly. His visual effects credits include *The Fountain* (2006) and *Angels & Demons* (2009) and his art director credits include *Man of Steel* (2013) and *Dawn of the Planet of the Apes* (2014).

For this research *Battleship* (2012) and *Terminator Genisys* (2015) were analysed.
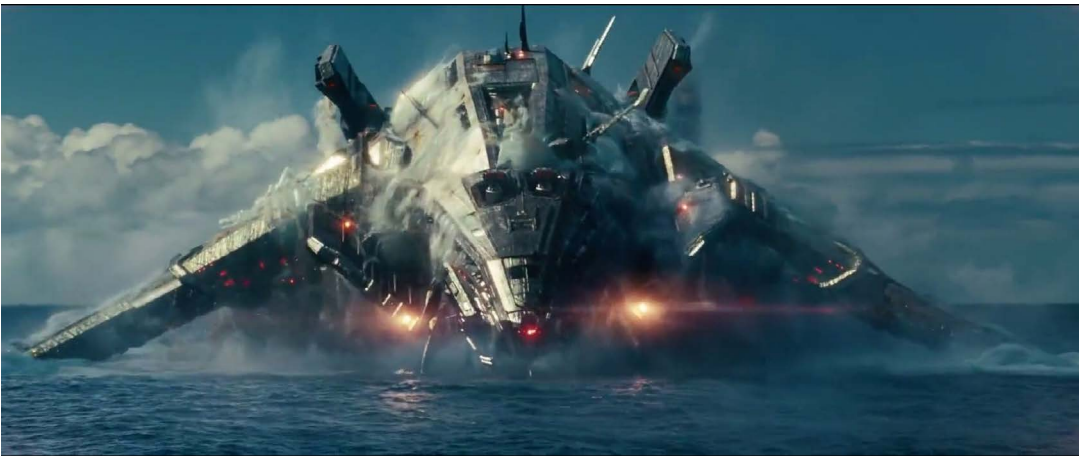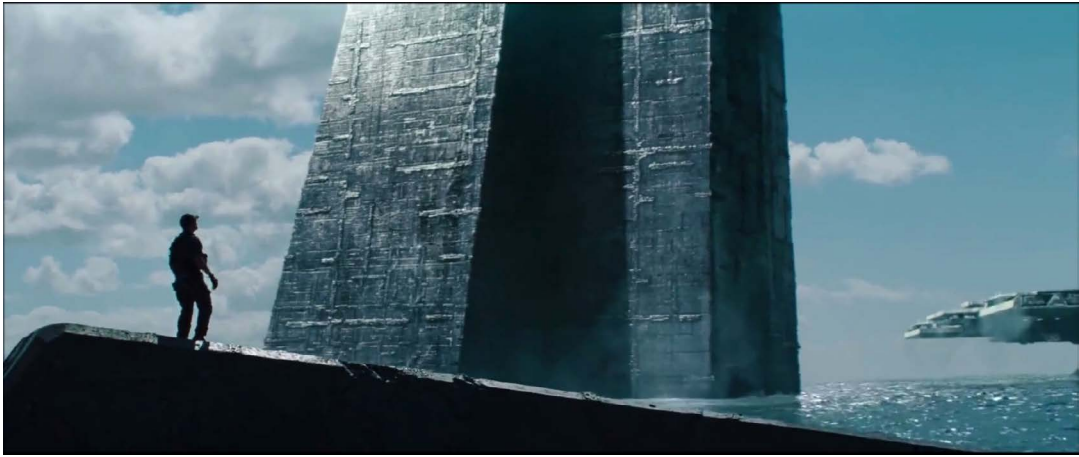
Film analysis

Battleship (2012)

Battleship is an adaptation of the classic board game in which the narrative has been given an extra-terrestrial twist. When Lieutenant Alex Hopper and his brother Commander Stone Hopper set out on a quest with their war fleet, they investigate a mysterious structure that has been found by the coast of Hawaii. But all goes wrong when they ascend the structure and hostile aliens are awakened. This is the start of an alien war that will threaten mankind (Aubrey, Berg, Goldner, Henderson, Schnier & Stuber, 2012).

The mysterious structure found in sea has a very abstract look from afar. This lures the main character in to come closer as he wants to examine the structure further. The massive form communicates that it is something bigger and stronger than humans and has an almost Mayan-like texture to it. This might suggest that the structure was made by a technologically advanced species.

Battleship shows extra-terrestrial life that looks similar to life on earth. The alien ship looks like a giant bug or beast. Apart from the scale of the alien ship, it does not necessarily look otherworldly. Although the aliens have the technology reach other planets, their ammunition looks quite conventional, as the ships have guns and explosives they use in the fights. The extra-terrestrial elements can be recognised by their aggressive and frightening look, with sharp forms and red lighting.

figure 3.19 Alien structure (Aubrey, Berg, Goldner, Henderson, Schnier & Stuber, 2012)

figure 3.20 Alien ship (Aubrey, Berg, Goldner, Henderson, Schnier & Stuber, 2012)

figure 3.21 Alien ship (Aubrey, Berg, Goldner, Henderson, Schnier & Stuber, 2012)
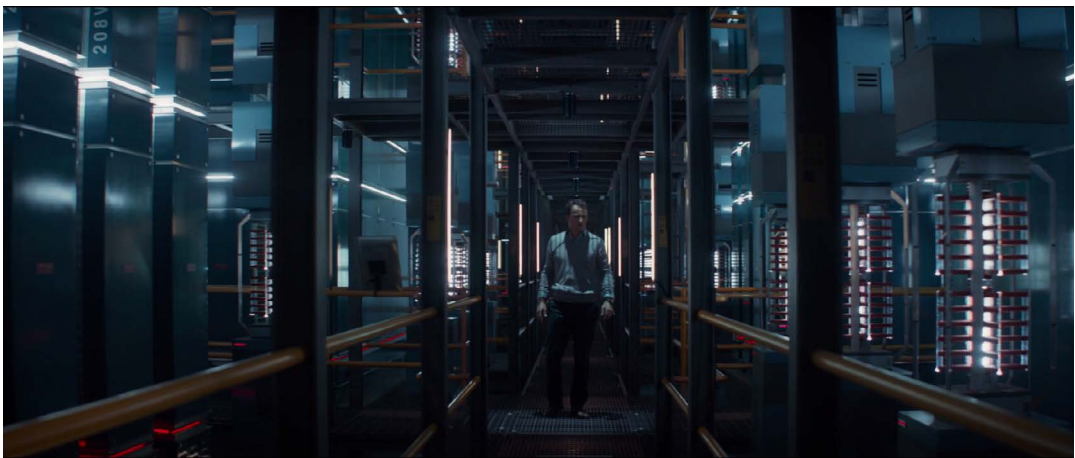
Terminator Genisys (2015)

When leader of the human resistance John Connor sends Kyle Reese back to 1984 to protect his mother Sarah Connor and so safeguard the future, an unexpected turn of events creates a disrupted timeline. Reese finds himself in a different version of the past, where he is faced with an unexpected new mission, resetting the future. Kyle, Sarah and her guardian Terminator set out on a mission to prevent Cyberdyne from launching Skynet (Ellison, Goldberg & Taylor, 2015).

The most important space of the whole film is probably the time travel room at Cyberdyne. This space forms the narrative thread of the story where the most important scenes take place. The form of the space reminds of the way wormholes are often schematically drawn. To make this room, with its eccentric form, believable as an architectural space, smaller elements, like railings, stairs, and cladding panels have been added and give the space a human scale.

The design of the rest of Cyberdyne looks very much of this time. It shows all the elements an audience would expect in a building of a large tech corporation. As the story is set in 2017, this might be a good way of portraying such a company. The headquarters consists of a group of uniform buildings, made of the classic science fiction materials, steel and glass. As Cyberdyne is a powerful company, the building's dimensions are bigger than any other building seen in its surroundings. Extra layers of big screens and holograms have been added to support the sci-fi look.

figure 3.22 Cyberdyne interior time machine (Ellison, Goldberg & Taylor, 2015)

figure 3.23 Cyberdyne exterior (Ellison, Goldberg & Taylor, 2015)

figure 3.24 Cyberdyne data room (Ellison, Goldberg & Taylor, 2015)

Interview

Haye calls the process of designing for film a very collaborative process. As an art director, he takes on the role as a 'design manager' and stands between the production designers and the rest of the team that is responsible for designing the sets. Besides working as an art director he also has experience in the visual effects department and has fulfilled many different roles in the art department, like art department assistant, set designer and also production designer.

When Haye gets a script, he breaks it down into scenes and gives storyboard images together with references to the set designers, so they can start designing the needed spaces. Design researchers come in early on in the process and help inspire him for his designs. Also intuition plays an important role in his design. Sometimes, his first instinct ends up to be the best design solution in his opinion.

A good example of collaboration is the design of the time travel room in Terminator Genisys. His team had difficulties with coming up with a good design solution for the space. When he drew a hyperbola, one of his set designers made a 3D model of the shape and that ended up to be close to what the final design looked like.
In his interview, he keeps coming back to the idea of a backstory. He grounds his design in research and always tries to add a backstory to the design. Thinking of the history of a place or the reasons why certain designs look like they do makes a design stronger in his opinion. Yet, the whole backstory should not be communicated to the audience, because then, they would not have anything to imagine anymore. But when you apply a certain logic to the way thinks look and stay consistent with that, the design becomes much better.

Haye has a lot of critique on how science fiction is often designed. He thinks that science fiction often has a quite monotonous style because it is a shorthand for communication. Certain visual cues, like scifi-lines, give the audience the immediate impression that you are in a science fiction world. The art director dislikes popular trends that are used repeatedly to make a design look futuristic like holograms, parametric architecture and architecture with moving parts, calling them overused and thinks that these designs look very much like the world now, and not necessarily like the future. He finds

the science fiction of the past much better and is fond of taking the past and pushing that into a different future. Here he talks about the importance of having a backstory again. Designing otherworldly science fiction environments is very much about what kind of future you want to create. In his opinion, the backstory, together with the script, forms the base of the design.

3.5 Anshuman Prasad / Set Designer

Anshuman Prasad is an architect and Hollywood set designer. He was originally trained as an architect at the Manipal Institute of Technology, but after a few years of architectural practice he decided to pursue a career as a set designer. His credits as a set designer include *Captain America: The Winter Soldier* (2014), *Batman versus Superman: Dawn of Justice* (2016) and *Passengers* (2016).

For this research *Total Recall* (2012) and *Ender's Game* (2013) were analysed.

Film analysis

Ender's Game (2013)

For description of the plot of Ender's Game, see Ender's Game in paragraph 3.2.

When Ender is recruited for battle school, he leaves earth with a small space shuttle. The scene shot inside the shuttle shows a small space where Ender and his peers sit. Upon leaving the atmosphere, there is a shift towards zero-gravity which the students experience for the very first time. Colonel Graff enters the room and discusses the sense of zero-gravity.

The interior of the space shuttle resembles much of that of the interior of an airplane, with a corridor in the middle and seats along the sides. The curved plastic walls complement this look. Even though the subject of this scene is zero-gravity, the architecture does not suggest this. All architectural elements are orientated on the horizontal plane that the audience experiences as the floor. Apart from the upside down camera angle, floating objects and the floating colonel Graff, the notion of zero-gravity is not communicated through the architecture.

figure 3.25 Space shuttle interior (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

figure 3.26 Space shuttle interior (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

figure 3.27 Space shuttle interior (Card, Chartoff, Hendee, Kurtzman, McDonough, Orci, Pritzker, Ulbrich & Hood, 2013)

Total Recall (2012)

At the end of the 21st century, earth is devastated by chemical warfare. The only two habitable regions left on earth are the Colony and the United Federation of Britain (UFB). Colony-citizen Douglas Quaid discovers that his life is a fabrication based on false memories implanted into his brain by the government. After finding out that his probable true identity is that of a wanted secret agent, he follows a trail of clues to gradually recover more suppressed memories and resumes his original vocation (Jaffe, Moritz & Wiseman, 2012). Prasad was responsible for the design of the interior of the Fall, the only possible way of transportation between the Colony and the UFB, through the earth.

In the beginning of the film, we see Quaid making his daily commute using the Fall. The Fall is designed as a bullet that falls through earth. From the outside it looks huge. This is due to the fact that it has to transport a lot of people every day. In the beginning of the film we follow the daily commute of the main character from the Colony to the UFB. The interior is of a much more relatable scale. To make the scale more human, the interior is divided into many different layers. It almost is designed as the interior of a skyscraper, with an atrium in the middle, corridors along it and adjacent rooms on each floor. The use of white plastic surfaces with smooth edges gives the design the same feel that the interior of an airplane has.

The transportation pods also have references to the interior of an airplane, whereas the chairs look more like those from rollercoasters. This is because of the shift of gravity that is made when the Fall passes the core of the earth. In the commuting scene, this is shown with the turning interior of the transportation pods. The cinematography is also used here. The camera turns and shows the space upside down, making this shift of gravity even clearer for the audience.

figure 3.28 Fall interior corridors (Jaffe, Moritz & Wiseman, 2012)

figure 3.29 Fall interior atrium (Jaffe, Moritz & Wiseman, 2012)

figure 3.30 Transortation pods (Jaffe, Moritz & Wiseman, 2012)

As the Fall has to be used with gravity in both directions, every floor also serves as a floor and vice versa. This is cleverly used in one of the final fighting sequences that takes place inside the Fall. Because floor, ceiling and sometimes even walls are used by the actors, this complements the dynamic feel that this sequence has.

Interview

As a set designer, Prasad works on sets to be actually built. He translates conceptual designs into real built environments. This conceptual nature of the design is decided and communicated by the production designer and director. In his work, both research and intuition play big roles. He thinks that there is a fine balance between the two. Strong research helps him to design better and lets the audience connect to the story. By adding elements to the design with which the audience can identify, the story becomes more believable. On the other hand, intuition lets him create weird and fantastical designs.

Prasad takes inspiration from everywhere, especially when it comes to science fiction films. What is important here is developing the skill of careful observation to see how things work. Sometimes draws inspiration from things that are completely unrelated to the design he is working. That helps him to stimulate the brain. The references he uses in his design are sometimes almost copied, and sometimes just used as a starting point for inspiration.

The most important and effective tool for him is sketching. He also uses the computer software for both 2D and 3D drawings, but finds that this can be too restrictive when designing. Sometimes, the computer will lead him too much into a certain design direction, so he uses the software more to visualize ideas rather than actually design with it.

In his opinion, science fiction has been given its style, due to the fact of what the audience associates with it. Science fiction plays on our fear of losing control and is about fictional science. Because science is manmade, the design uses manmade materials. Designing futuristic environments depends on what kind of future should be portrayed. In this, he often bases his designs on popular trends.

As a trained architect, scale and proportion are some of the most important aspects in his designs. Where science fiction uses a lot of big scaled elements, he still finds it important for his designs to be of a human scale. As an example he uses The Fall from Total Recall. From the outside The Fall looks like a huge tube, but from the inside there is some sort of relatability because of the smaller scale and references of airplane interiors that have been used.

Prasad has designed several environments where there are different laws of gravity. While designing this, he keeps in mind very much the technical and practical nature that the sets should have. For instance, how the actors will be suspended in the set, or how the camera should be able to move within the set.

3.6 Roland IJzermans / Lead Concept Artist

Roland IJzermans is the Lead Concept Artist at Guerrilla Games, a Dutch game developing company. IJzermans was originally trained as an industrial designer at Delft University of Technology, but immediately started working at Guerrilla Games after graduating. He worked on the first three Killzone games as a concept artist before becoming the lead concept artist for *Killzone Shadow Fall*.

For this research, the game *Killzone Shadow Fall* was analysed.

Game analysis

Killzone Shadow Fall (2013)

Killzone Shadow Fall is a first-person shooter video game. The game is set in on planet Vekta in the year 2370. On this planet, the native ISA Vektans and refugee Helghans live separated by an immense wall. The game starts at the height of an ongoing feud between the two communities and is played through the eyes of Vektan Lucas Kellan who works as a Shadow Marshal for ISA. After being set out on a mission on the Helghan side of the city to retrieve classified data, things do not go according to plan. This leads to a chain of missions on both the ISA and Helghan side of the wall (Guerrilla Games, 2013).

Vekta city shows extreme contrasts between both sides of the wall. The narrative of utopia against dystopia forms the base of the design. On the utopian ISA side, buildings have the typical futuristic look in the style of Zaha Hadid and Calatrava with lots of glass. The amount of high rises makes the city look very dense. This supports the story line of ISA giving up part of their city to make room for the Helghans. Yet, there is room for recreation. Between the white buildings, the player encounters plazas with greenery and fountains.

New Helghan is a much grimmer place. The architecture has a machine-like character. Sharp forms are used to gives the buildings an aggressive character. This together with the materialisation of dark grimy metal and red lighting shows a hazardous place. The buildings are of a massive scale, communicating the suppression that the inhabitants of New Helghan feel. The interiors show unfinished surfaces with pipes and power cables sticking out and walking through the buildings is almost experienced as walking through a maze.

figure 3.31 ISA side of Vekta
(Guerrilla Games, 2013)

figure 3.32 Helghast side of Vekta
(Guerilla Games, 2013)

"IT STARTS WITH A SCRIPT OR EVEN AN IDEA"
/ AARON HAYE

"THE SCRIPT WILL GUIDE ME"
/ ANSHUMAN PRASAD

"YOUR WORK EVENTUALLY IS NOT JUST SERVICING THE STORY, BUT EXPANDING ON WHAT IS WRITTEN"
/ SEAN HAWORTH

"IMAGERY AND LITERATURE WILL FORM THE FOUNDATION"
/ SCOTT CHAMBLISS

"WE BORROWED A LOT FROM EXISTING THINGS TO INCREASE THE BELIEVABILITY"
/ ROLAND IJZERMANS

3.7 Interview learnings

Story
The story is the start of the design. Without a story there is no design. This does not necessarily mean an exact script, but could also mean the story of the world you are designing for. The design has to be justified by what the story is. From the script the designers extract the actions, emotions and context of the story. It will be there job to facilitate these three facets within their design. The script is the guide throughout the whole design process and is referred back to often times. It is a dynamic process in which they go back and forth between the script and the design. Prasad said that the script guides him through what parts of the design should be more realistic and what parts can be more fantastical.

Backstory
What might be just as important as the literal story described in a script is the backstory. Through design a backstory can be communicated to the audience, helping to evoke certain emotions. If there is thought of why certain design elements were placed there, it will make the storytelling richer. You can communicate much more, without having the actors to actually act it out. The designers gave the concept of the backstory different names, but meant the same. It could be imagining a culture of the society you are designing for. But also setting up rules for the biology or physics, like what was done for Avatar.

Research / references
Research forms the base of the design and helps the design base in some kind of reality. With research the designers often mean visual references. They collect imagery of architecture, art, nature, etc., from which they can start designing. From the visual references, they make up mood boards. Though, research is not solely visual references, literature is also a source of references used often. Especially when constructing a backstory, the designers look up information about history, philosophy, physics or biology in order to construct a set of rules of how created world works.

Inspiration

Inspiration can be taken from almost anywhere, which of course depends on the production. The designers named art, personal experience, machines, nature, architecture and literature as sources of inspiration. Some designers like to take inspiration from things that seem completely unrelated to the subject of design in order to give the design a new and innovative feel. Production designer Sean Haworth said that a designer can basically take any element and adjust it to the rules of the created world to make a new design.

Tools

In the design process, the designers use an array of different tools. They mix these tools in their process. They named drawing or sketching, but also making physical models, computer models, Photoshop. Mixing those tools helps them coming up with new ideas. Mood boards are a great communication tool in art department. It helps the designers come up with different designs that together will be a coherent whole. When designing with the computer, designers should be careful because a computer can be too restrictive sometimes, especially early on in the process. On the other hand, working in a computer allows the designer the work in 3D and be able to move around a design like a camera would.

Science fiction style

The ideas on the design of science fiction differed quite between the designers. Especially the art directors had some heavy critique on the monotonous look of science fiction environments. Production designers Chambliss and Haworth and set designer Prasad thought quite pragmatically of it. They agreed that the concept of science fiction is about the manmade and with that the materialization should also be. They also blamed the practical side of set building which gives limitations to the design. Using large scales has to do with the aspects of horror that is often involved in sci-fi stories.

Art directors Haye and Frohling called the typical science fiction style boring and overused. They had critique on the same futuristic trends, like holograms, parametric architecture or designs with moving parts that are used repeatedly. Both Haye and Frohling called using the same visual cues repeatedly a shorthand to communicate that the

"YOU CAN DRAW INSPIRATION FROM JUST ABOUT ANYTHING AROUND YOU"
/ SEAN HAWORTH

"BEING OBSERVANT, SEEING HOW THINGS WORK, MACHINES, BEES, PLANTS, ALL THINGS"
/ ANSHUMAN PRASAD

"EVERY COMMUNICATION TOOL IS FAIR GAME IN THE PROCESS"
/ SCOTT CHAMBLISS

"A COMPUTER CAN BE TOO PRECISE"
/ TOM FROHLING

"ALL SCIENCE IS MANMADE, HENCE THE ASSOCIATION"
/ ANSHUMAN PRASAD

"I FIND IT ALL PRETTY BORING"
/ TOM FROHLING

"JUST LOOK WHERE WE ARE AND PROJECT IT FORWARD"
/ SEAN HAWORTH

"IT ALSO HAS A LOT TO DO WITH THE SPECIFIC TIM IN WHICH SOMETHING WAS DESIGNED"
/ AARON HAYE

story takes place in a sci-fi environment.

Futurism
Futuristic environments can be created by looking at where society is right now and projecting this forward. Designers take trends that the audience already associates with futurism, like touch screens, holograms or flying cars and add these to the design. This they do in exaggeration so the audience does not constantly have to be reminded that the story takes place in the future. Futuristic design is very much grounded in the time the design was made. If we look at films from the seventies or eighties, they will look very different from the future we predict today.

4. NOTION OF SCIENCE FICTION

The design of science fiction environments uses certain themes that come back in most films. Although designers say that they draw inspiration from almost anywhere, there is somehow often a quite uniform look when it comes to the design of sci-fi environments. The inspiration might be translated to fit into one or multiple of these science fiction design themes. Here are some examples of science fiction notions seen throughout the research. This does not mean that these are true for all films or that there are not more sci-fi design themes that frequent the science fiction environment.

4.1 Futuristic trends

There are certain futuristic styles and trends that the audience associates with science fiction. Elements like holograms, parametric architecture, smart materials etc. are used frequently in science fiction films. This is not necessarily because the designers think that this is the way we could or should design in the future, but it is done in order to engage the audience. As the audience already associates these trends with futurism, using them makes telling a story much easier.

4.2 Scale

Another thing that is seen in the films is that the buildings are of a huge inhumane scale. Megastructures dominate the science fiction cities. Several designers explain it as an embodiment for the sense of horror that often is sought for in science fiction stories. People do not have control over technology anymore, so the machine takes over their lives. The use of big intimidating architecture is one of the ways this is communicated through design.

4.3 Material

What is possibly the most uniform in all the science fiction stories that are set in a built environment, is the use of material in the architecture. It is always the same materials that we see. The typical manmade materials like steel, concrete and glass dominate the palette of the design. Barely used are natural materials like wood, stone or clay. Production designer Scott Chambliss explained this stating that "science fiction itself is manmade".

4.4 Defying the laws of physics

A theme that comes back in a lot of science fiction stories is about physics that are not or are not yet possible. In the films analysed, themes like teleportation, zero-gravity, and time travel play big roles in its storyline. These of course are classic science fiction themes. But what makes design for these interesting, is that the designer can freely imagine what unfamiliar physics could look like, as the audience does not yet know what it should look like. This makes that there is no singular way of how this is designed.

5. CONCLUSION

Although the design processes of the interviewees might be different in some ways, there can be seen a similar design process that all of the designers go through. This is an observation made based on the outcome of the interviews in which their design process is decomposed into different steps.

The story or script is the start of the design process. It forms a guide throughout the whole process and is referred back to very often. A backstory goes beyond the dialogue and actions literally written in the script and gives more depth to a story. The backstory can especially be communicated through the design. The production designer needs to expand on what is written in the script. Using a backstory in a design can communicate the origin of a world or a history or personality of a character.

From the story and backstory the designers extract the context, actions and emotions that are described in the script and can be seen as the requirements of a design. The context holds information of a setting. It describes the geographical place, time and culture in which the story is set. The environment designed needs to facilitate the actions that are described in a script and make them visually interesting when captured through photography. While watching a film, the viewer goes on an emotional journey with the main characters. Design can emphasize the emotions felt by the characters.

The next step is to find references that match these contexts, actions and emotions. These references can be taken from anywhere. This step can be seen as the most intuitive part of the design process. In this phase, the designer takes references that he associates with the notions of the story and references that he assumes the audience associates with the notions of the story. These references are not solely visual, but can also be references from nature, scientific theories, or whatever the designer might associate with the story. Grounding the design with references from the real world increases the believability and relatability of a story. The collection of

references is the basis from which the designers start creating their own imagery. In their drawings, models and collages, they combine different references to come up with new concepts.

All these steps do not solely count for the science-fiction environment, but can also be applied to other fictional and even realistic environments. The notions of science fiction described in chapter four are components that come back in almost every science-fiction story and might be the design elements that give the viewer the idea that the story is indeed set in a science-fiction world. In order for the design to be a science-fiction design concept, a translation has to be made that evolves a regular design into a science-fiction design. This translation has been given the term *scification*.

The scheme on the next page shows a summary of the design process in which written science fiction is translated into sci-fi design concepts.
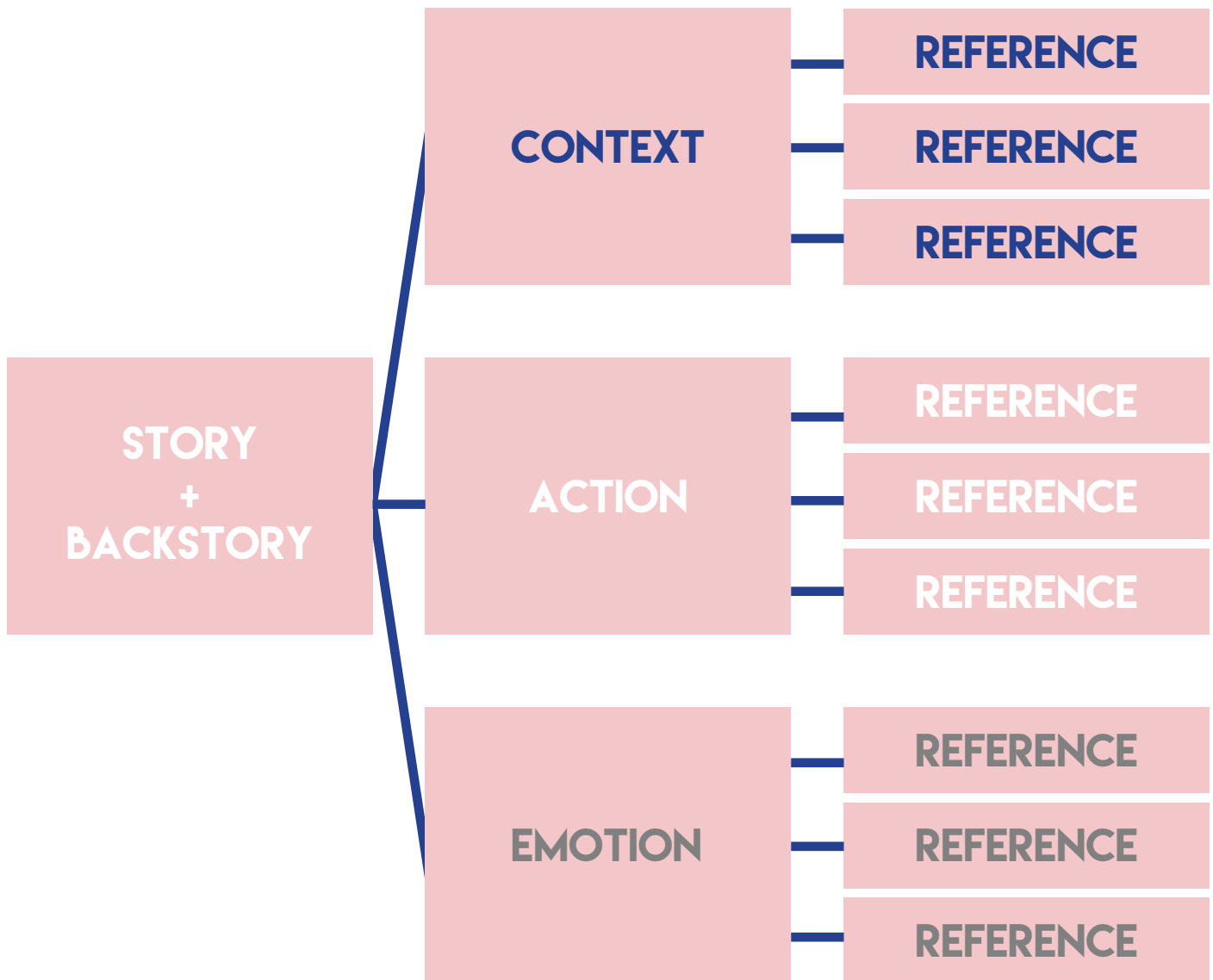
figure 5.1 Scheme of the sci-fi design process

REFERENCE

REFERENCE

REFERENCE

SCIENCE-FICTION DESIGN CONCEPT

REFERENCE

REFERENCE

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SCIFICATION

SCIENCE-FICTION DESIGN CONCEPT

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SCIENCE-FICTION DESIGN CONCEPT
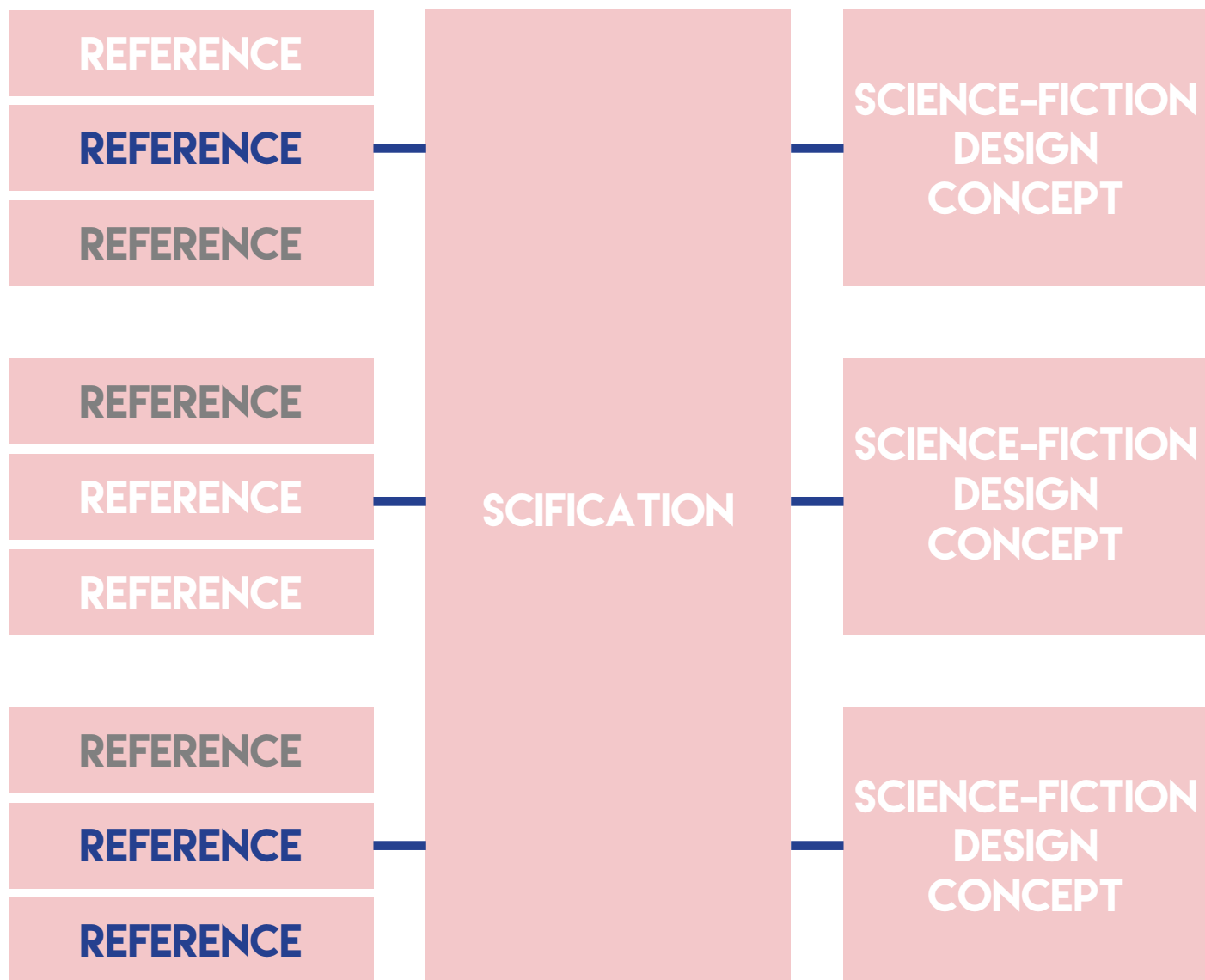
PART TWO

Part two of this paper describes the design process as learned from the interviews with the designers put into pratice. This description follows the process of moving from written story to design concept. The order of steps is written in chronological sequence. As the design process is a dynamic process, this does not mean that one step was fully completed before moving onto the next one.

After the description of the design process, a conclusion is made on how this design process was experienced, using the learnings of the designers. There can be evaluated if the design process found in part one is helpful and if the interviews have been interpreted correctly.

1. READY PLAYER ONE

The story chosen for the design project is *Ready Player One* by Ernest Cline (2011). This novel was chosen because it includes a lot of components that are often seen in science fiction. The story is set in the future, the main character lands different planets and the story involves technology and physics that are unfamiliar but have a great influence on society.

1.1 Novel

Ready Player One is set in the year 2044. The world has become an ugly place. There have been several energy crises and people live in poverty. In the stacks, on the outskirts of Kansas City lives Wade Watts. He is an orphan who lives with his cold-hearted aunt in one of the many stacked trailers. Like the majority of the people, he spends most of his time in the OASIS. This is a virtual universe which he enters through is virtual reality glasses. Inside the OASIS, Wade goes to school and meets up with his friends under his avatar's name Parzival. This way, he escapes his own miserable life in the real world.

When OASIS founder James Halliday dies without any heirs, his will states that the winner of a heist he has set out inside the OASIS will win his fortune. This includes a controlling share of Gregorius Games Simulations, the company that owns the OASIS. Halliday has hidden three keys that unlock three gates that lead to the Easter egg. The first avatar to find the Easter egg will be the winner of the contest. Many avatars start hunting for the egg, but this appears to be harder than thought at first. Then, years after the announcement of the contest, Parzival finds the first key.

On the location of the first key, Parzival meets Art3mis. He has had a crush on her for many years, through reading her blog. After their first meeting they end up spending more and more time together, while falling for each other.

One company that will do everything in their power to win the contest is Innovative Online Industries (IOI). They are a multinational corporation planning on monetizing the OASIS after winning the contest. This will have a great effect on society, as entering the OASIS has always been free, so that even the poorest people can use this place as an escape. IOI's employees or nicknamed the Sixers. Many gunters, as the Easter egg hunters are called, have made it a true sport hunting down Sixers, as they will do everything to keep them from winning the contest.

Parzival and Art3mis have become prestigious gunters after being the first avatars to find a key. IOI has done several attempts to bribe and threaten them into working together with them. But because they have always refused this, they are now wanted by IOI. Parzival and Art3mis continue their quest carefully in order not to be found by the Sixers.

1.2 Storyboard

The scene chosen to design is halfway through the book. When Parzival and Art3mis get invited by Ogden Morrow, a co-creator of the OASIS, they cannot refuse this invitation, even though they know it will be dangerous to go out in public because they are hunted down by the Sixers. The next pages show a storyboard that illustrates the events of the scene designed for this project.

Parzival lands on Neonoir and finds himself in an unfamilier cyberpunk-themed world.

At the intersection of the boulevard and the avenue he encounters the Distracted Hlobe, a giant floating blue spehere that houses the night club where the party is.

Together with thousands of other avatars, he enters the Distracted Globe, by a magical staircase.
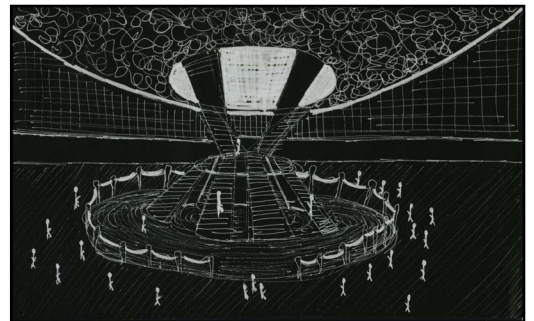
Inside the Distracted Globe, Parzival finds that the laws of physics are different. On the inner surface the avatars are walking, while in the middle people are floating and dancing around. He goes to the bar to meet Art3mis.
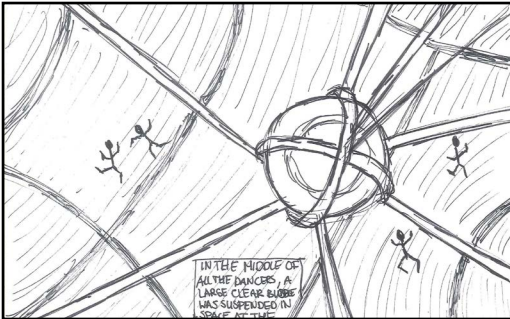
Parzival and Art3mis go dancing together.
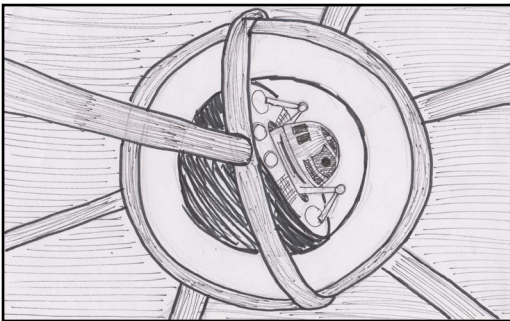
The dj, R2-D2, is playing several eigthies tunes with his robotic arms.
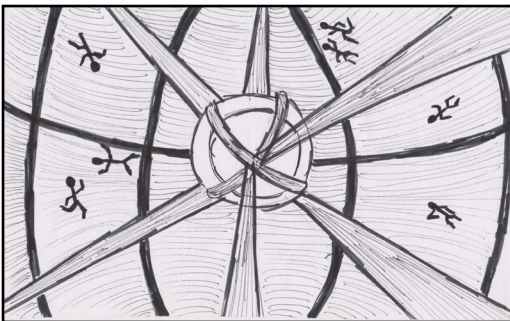
At first, Parziival and Art3mis seem very much in love, but they end up fighting over the contest.

Then everything goes wrong. There is a loud boom. The Sixers have busted themselves in. They have come to hunt down Parzival and Art3mis.

2. SCRIPT COMPONENTS

As described in the conclusion of part one, the designers extract the actions, emotions and context that are told in the script. Then they search for the right references to go with these descriptions. Here a collection of descriptions of the actions, emotions and context described in the chapter and references that could go with them. All these decriptions are derived from the novel by Cline (2011).
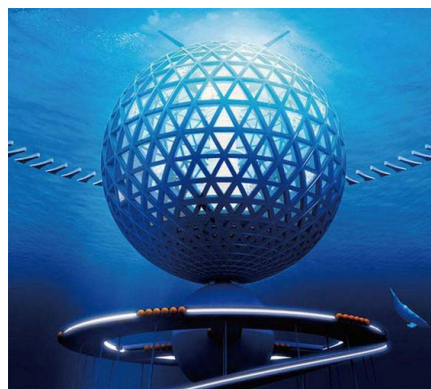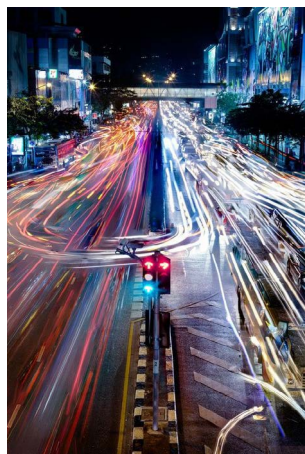
2.1 Context

The writer has visually described the world Parzival finds himself in. The world of Neonoir is described as a cyberpunk-themed world. The cyberpunk theme suggests a classic science fiction look of a city at nighttime filled with bright neon lights.

Neonoir is a planet in sector sixteen where it is always night. The city on planet Neonoir is a grid of skyscrapers with streams of flying vehicles and streets filled with avatars. This suggests a layered texture, with layers of different types of traffic moving over and under each other.

The Distracted Globe is located on the intersection of the boulevard and the avenue. The Distracted Globe is illustrated as an enormous cobalt blue sphere, floating thirty metres off the ground. At the bottom of the sphere is a crystal staircase leading up to the entrance.

The writer describes a sequences of spaces that Parzival encounters on his journey through the Distracted Globe. The interior of the Distracted Globe has different physical laws than what the character is familiar with. The inner surface has some kind of gravity. Avatars can walk on this surface. But when jumping off the ground, the avatars can float weightlessly in the center of the globe which serves as the dance floor.

On the inner surface, the club's amenities are located, like the bar where Parzival meets Art3mis, and lounge areas. The bar has not been described any further into detail. In the centre of the club is a bubble suspended in the air. This is where the DJ booth is. This booth is described to be a clear bubble, through which the avatars can see the DJ booth.

figures from left to right, top down

figure 2.1 cyberpunk artwork (no source)

figure 2.2 Cyberpunk artwork (Andrade, 2012)

figure 2.3 Cyberpunk artwork (Whitehead, 2012)

figure 2.4 Sony center, Berlin (Tile, N.D.)

figure 2.5 Bangkok streets (Burban, 2012)

figure 2.6 Akihabara (no source)

figure 2.7 cyberpunk artwork (Mendoza, 2015)

figure 2.8 Deep-sea city concept (Shimizu Corporation, 2014)
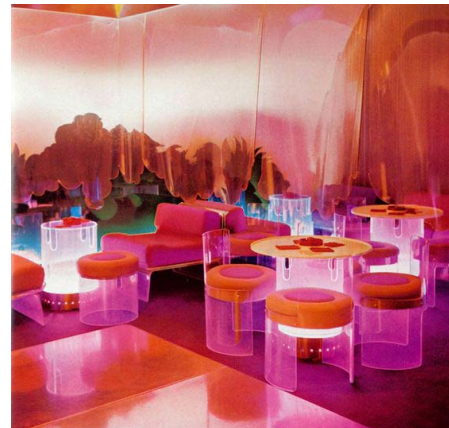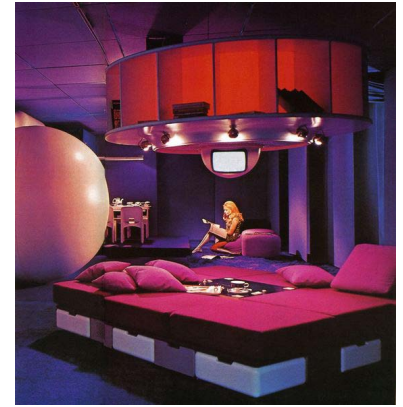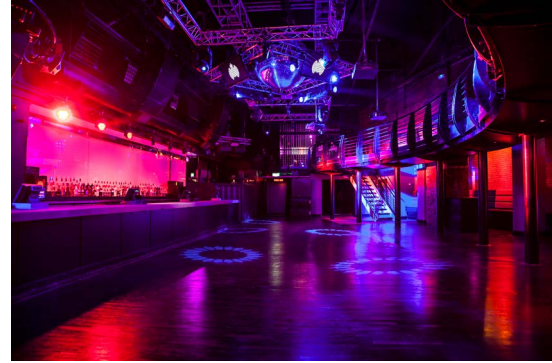
2.2 Action

During the scene, many different actions are described within the interior of the Distracted Globe.

First of all, the entrance should be able to handle thousands of avatars. This might suggest that there are several entrances or that the entrance is very large. The party held is very exclusive, so the entrance should be built in a way that not anybody is able to enter but one has to go through some kind op checkpoint. In the scene Parzival goes through this checkpoint where he shows a cyborg doorman his invitation.

On the interior surface, Parzival sees avatars walking. This might suggest paths on the surface. The surface also houses be one or more bars where Parzival can order his drink and there multiple lounge areas. So there should be areas and objects to facilitate this.

The dancing in the center of the club needs open space in order for the avatars to float around freely, without bumping into objects or each other constantly. In the centre of the dance floor is the DJ booth. The booth houses the DJ equipment and the DJ should be able to spin around, with or without equipment.

The shooting scene might ask for object behind which the opponents can hide for cover. During this scene, Ogden Morrow bursts out of the DJ booth, while in the ending of the scene, he moves back into it, suggesting that it did not have to be broken in order to burst open. At the end of this sequence Art3mis flies out through the hole that was blasted into the top part of the globe.

figures from left to right, top down

figure 2.9 Sensation Dubai (no source)

figure 2.10 Ministry of Sound London (Ministry of Sound London, N.D.)

figure 2.11 Net blow-up (numen/for use, 2013)

figure 2.12 LED hoop (Howeler + Yoon Architecture, 2014)

figure 2.13 Joe Colombo interior (no source)

figure 2.14 Discover Night Club Trinidad (Broadbridge, N.D.)

figure 2.15 Nightclub Il Grifoncino (Casati, 1968)
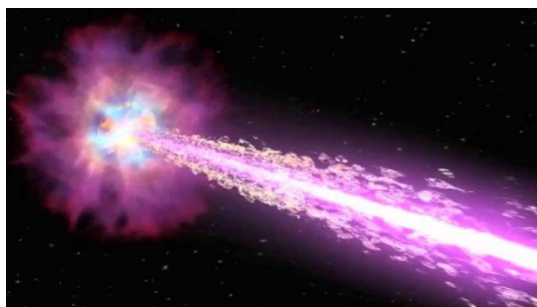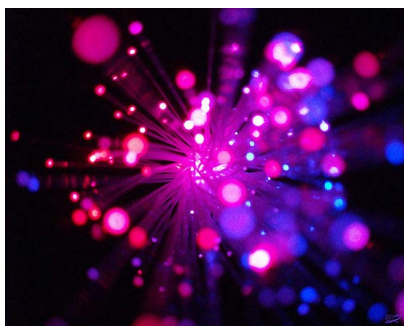
2.3 Emotion

Parzival goes through quite a lot of different emotion throughout the scene.

When landing on Neonoir, Parzival finds himself in an unfamiliar cyberpunk city. The writer describes the city in a very dynamic way. Parzival encounters "impossibly large skyscrapers, continuous streams of flying vehicles whirring through the vertical cityscapes and the streets below teemed with leather-clad NPCs and mirror-shaded avatars." (bron). This might suggest a sense of wonder in the main character.

Upon entering the Distracted Globe Parzival feels disoriented. He sees avatars around him walking on the interior surface and floating around dancing in the center of the sphere. Entering the Distracted Globe could therefor be a both a dizzying and magical experience. It should be almost like entering a different universe.

When Parzival meets Art3mis at the bar, he is very happy to see her. The following sequence has a romantic feel. In their dialogue and actions, Parzival and Art3mis flirt and dance together. A happy and dreamy feel matches this sequence.

But then everything goes wrong. Parzival and Art3mis get in a fight about the contest and Art3mis tells Parzival that she wants to break up with him. At the height of their argument, the Sixers bust in. There is a sense of danger and Parzival gets scared as he realizes that the Sixers have come in to hunt down him and Art3mis. When he reaches the point that it seem inevitable that they will lose the battle, Ogden Morrow takes action. With eliminating the Sixers, he leaves Parzival and the other avatars awestruck. While the other avatar dance happily again, Parzival feels sorrow as Art3mis drifts away

Overall the scene goes from Parzival feeling full of wonder and in love with Art3mis to him being scared and feeling sorrow. In the design, these feelings could be impleted using using lighting of different colour, or by giving the part of the globe where the Sixers bust in, an agressive form.

figures from left to right, top down

figure 2.16 James Turrell artwork (Kujda, 2004)

figure 2.17 light beam (no source)

figure 2.18 Barbie Shanghai Flagship store (Slade Architecture, 2009)

figure 2.19 disco ball (no source)

figure 2.20 sparkles (no source)

figure 2.21 coloured bubbles (no source)

figure 2.22 glass shatter (no source)

figure 2.23 gamma-ray burst (no source)

3. FIRST CONCEPTIONS

3.1 First impressions

The storyboard combined with the first references found, resulted in these first visual conceptions of the scene.

Starting the design, there seeked an organization of the interior of the globe. The inspiration for these structures came from the concept of the playground. With OASIS actually being a game, the design sought for the feeling of a playground for adults. Three concepts were created for the structure.

3.2 Arena

The concept of the arena is where the globe would be divided into layers, with each layers having different functions. The structure has the form of two mirrored amphitheatres stacked on top of each other. There can be walked on the layers due to the gravity that is simulated from the turning of the globe. The layers are connected by stairs and bridges. The division into layers gives the avatars a better feel of orientation.

This concept might not fit well because in the chapter, the interior is illustrated as if it is oriented towards all sides. The layering would give the space a more horizontal orientation. This also gives the space a sense of up and down, contradicting the feel one would have while being weightless.
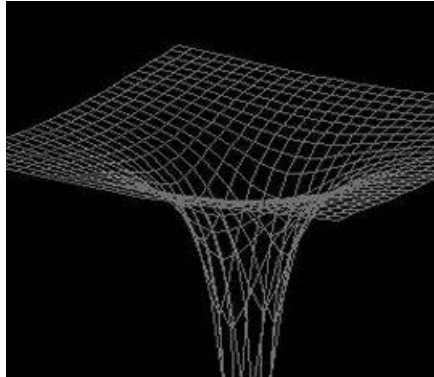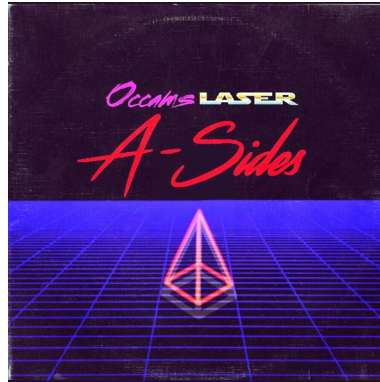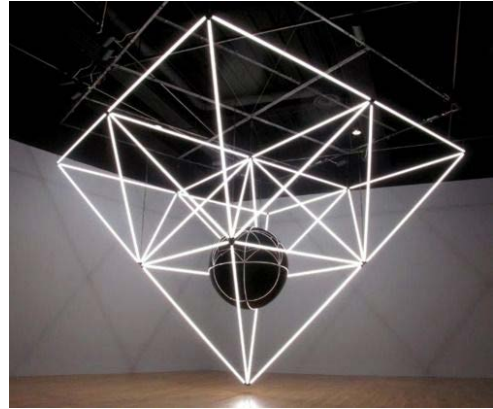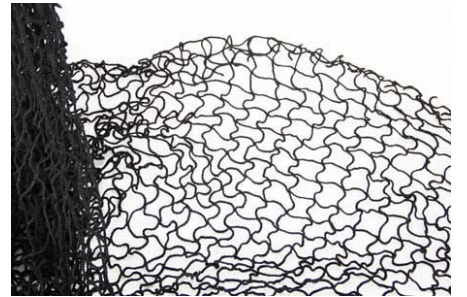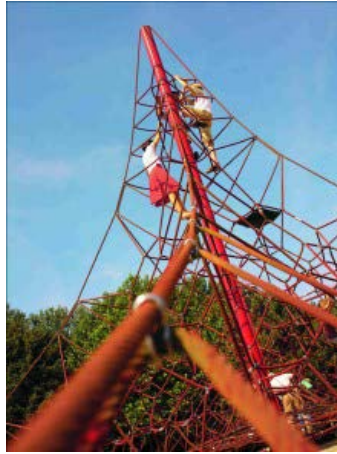
3.3 Climbing frame

This organization of the globe has some clear references to the real world. The interior surface is cladded with the frame we know from classic climbing frames. This structure is a well-known form spherical constructions. The geometrical look, suggests that this is a space that can be easily calculated. The lines of the grid are used as pathways, while the deeper lying parts house the functions of the club, almost dividing the interior surface into rooms. There are several bar and lounge rooms. While being in one room an avatar does not necessarily feel that he stands on a curved plane. Only from seeing the opposite side, an avatar can detect that he finds himself in a spherical space.

This concept might be too conventional for a world as distant as the virtual universe in 2044. The use of this spherical construction might not look as advanced as one would suspect in a world as technologically advanced as a cyberpunk world.
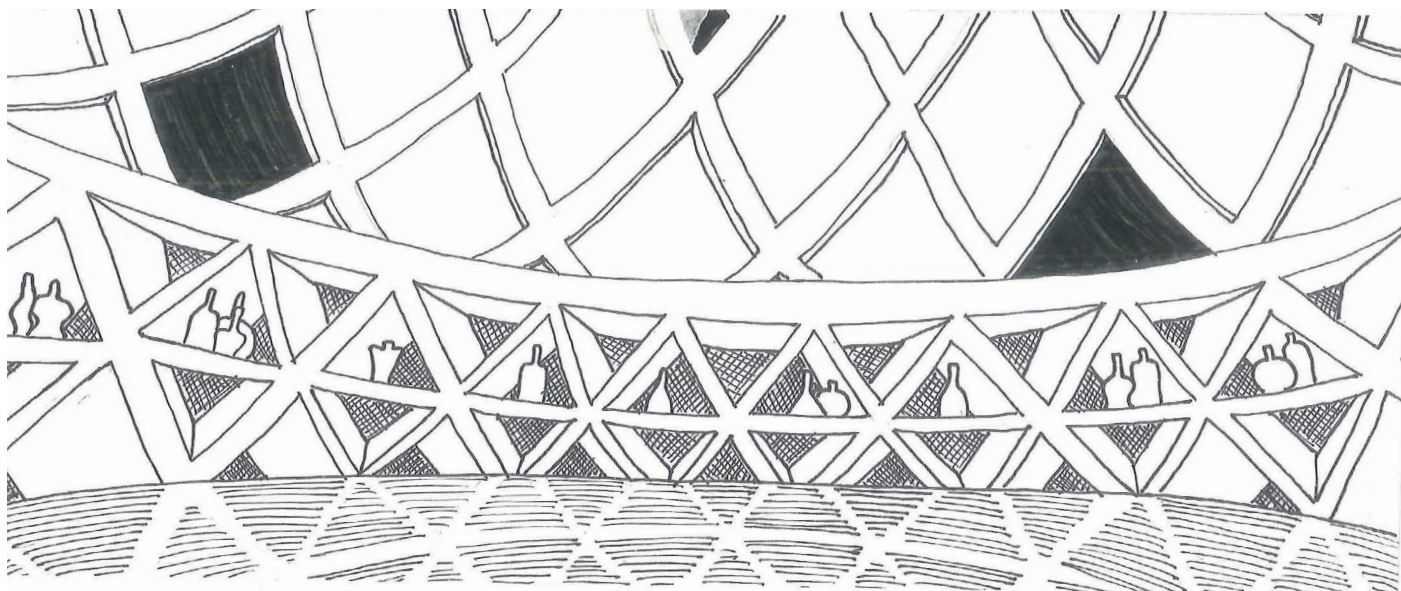
3.4 Safety net

The concept of the safety net is the most dynamic variant of the three concepts. This concept is derived from the idea of nets that children can climb in on playgrounds. The net structure of the surface looks like an organic structure. It seems to be very lightweight and elastic and suggests a bounciness. From the elastic nets, several forms can be made to house the functions of the night club. With coloured bioluminscent lighting, the atmosphere of a club can be captured.

The concept of the net seemed to be most fitting with the story and also the most visually interesting. It stood farther away from reality than the first two concepts and suited the narrative of the virtual utopia of 2044 best. For the next steps, I built forward on this concept.

4. BACKSTORY

With a base for a design, there was sought for a logic or bigger idea behind the design, a logic in which the digital, the virtual, futurism, cyberpunk and biology would coincide. For this, the theories of technoromanticism and biopunk were used.

4.1 Technoromanticism

Technoromanticism concerns digital narratives that will provide mankind the ideals of a utopian virtual future. It describes a reality in which a shift from the physical to the digital is an enrichment to the lives of individuals. In *Technoromanticism*, Coyne (1999) has described several romantic digital narratives. Information technology creates transcendental realities which will set the mind free from the body. A state of ecstasy is reached by immersion in data streams through electronic communications. The virtual world creates new possibilities as individuals have immediate access to any place in data space. Its digital communities induce an egalitarian social order in which individuals are not measured by their occurrence in the real world. All these narratives result in a unified digital society (Coyne, 1999).

The world of Ready Player One can be seen as a technoromantic world in which its inhabitants are granted freedom by using the data sphere to set themselves free and live the life they dream of. Being enrichment to individuals' lives, the OASIS creates a wholesome community rather than the raptured society of the real world and its users are not constrained by the limitations of reality, like geography, physicality, or status.

figures on right page from left to right, top down
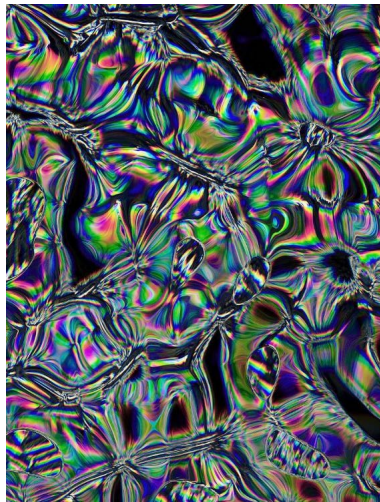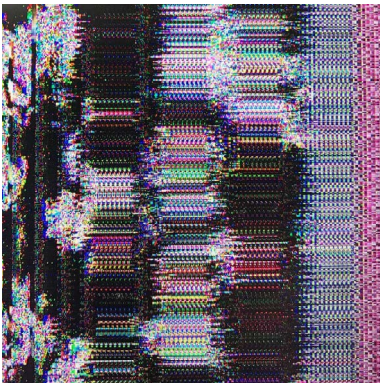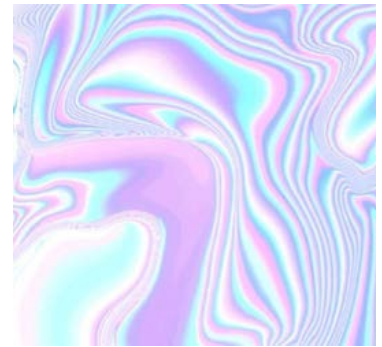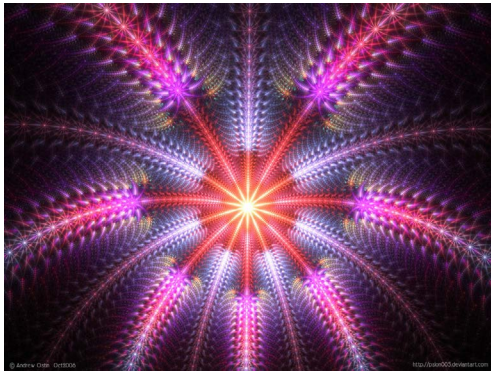
figure 4.1 fractal art (no source)

figure 4.2 painting in digital colours (Van Liefland, 2014)

figure 4.3 digital iridescence (no source)

figure 4.4 glichy palette (McLeod, 2017)

figure 4.5 digital artwork (McLeod, 2017)

figure 4.6 fractal art (Ball, N.D.)

4.2 Biopunk

Biopunk is a sub-genre of cyberpunk. Cyberpunk is a term that is hard to summarize in a single definition. It finds it origin in the 1980s postmodern science fiction and explores the technological developments in an extrapolated near-future society. Cyberpunk civilization has a softened differentiation between the natural and the artificial (Cavallaro, 2000). In contrast to the science-fiction genre as a whole, in which the contradiction of the natural and artificial is problematized, cyberpunk is about the cybernetic society enhanced by technology (Hollinger, 1990). In the biopunk world, the cybernetic advances have been evolved into genetic advances. The emphasis lies on bio technology rather than information technology. Biopunk narratives are driven by biological innovation, especially genetic engineering (Schmeink, 2014).

For the narrative of the backstory the universe of the OASIS is built on the theories of biopunk. After a destruction of the real world, mankind gets the chance to redesign its world and takes inspiration from the clever design solutions of nature. This results in a world where the architecture has an organic feel, with using algorithms found in nature as main component of the code this virtual utopia is built from.

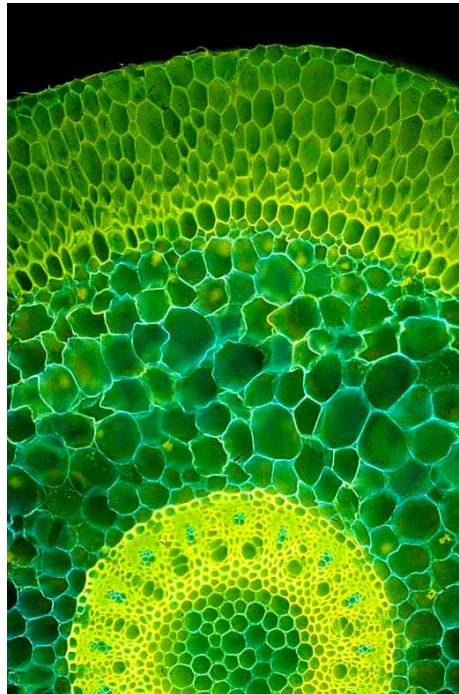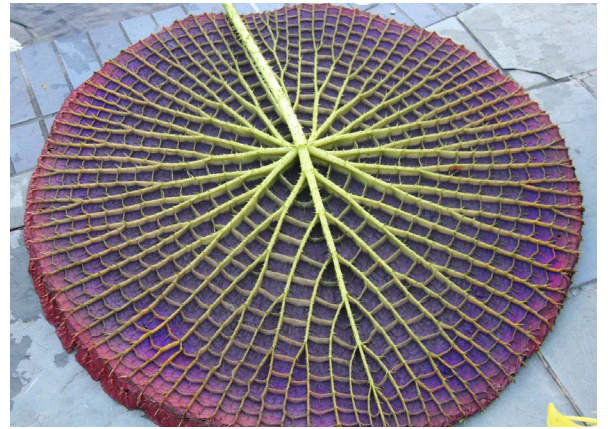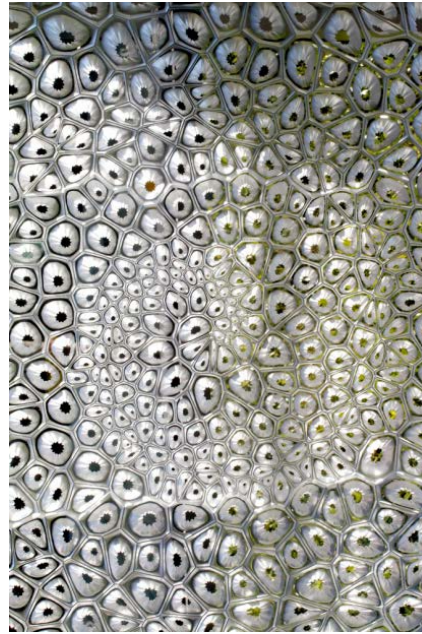figures on right page from left to right, top down

figure 4.7 leaf (no source)

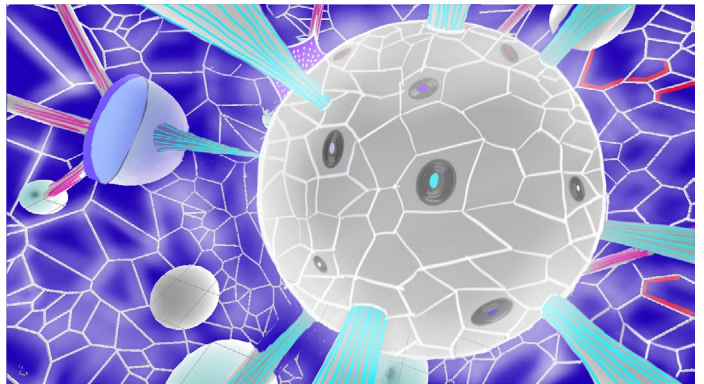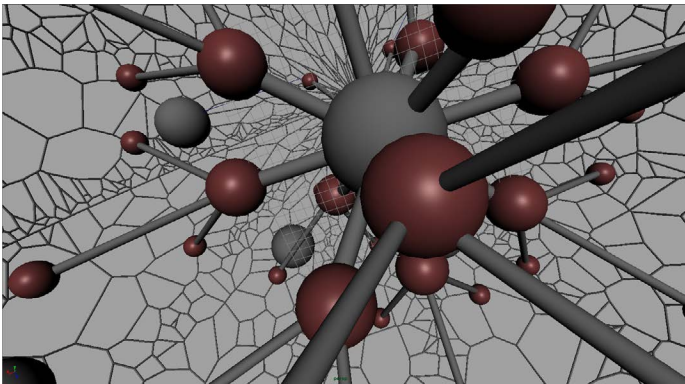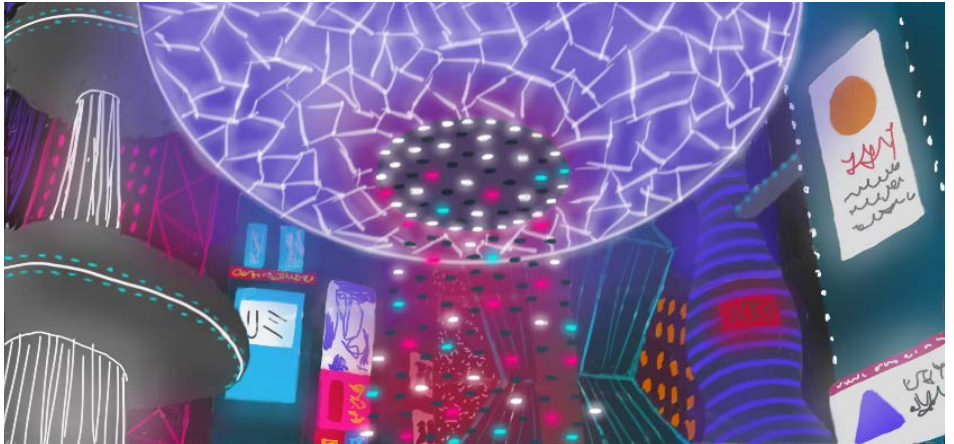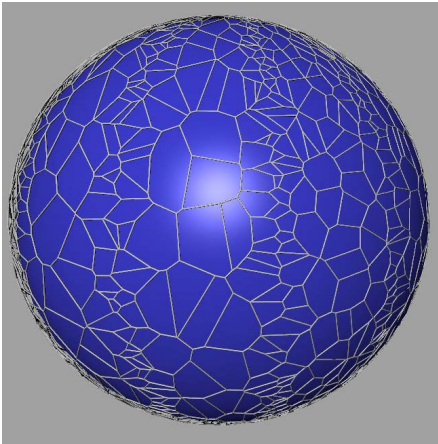figure 4.8 Fibonacci's Mashrabiya framework (Oxman, 2009)

figure 4.9 Amazonian water lily (no source)

figure 4.10 diatom (no source)

figure 4.11 microscopic orchid (Gates, N.D.)

figure 4.12 voronoi facade (no source)

5. DESIGN CONCEPT

The combination of the first conceptions and the backstory added to this, has resulted in the following design concept. This design concept is in not final.

The Distracted Globe is an unfamiliar world whose builders take their inspiration from nature. The past has led to crises and disaster. In order to prevent this from happening again, people seek ways to come up with smarter design solutions and with this take inspiration from nature. Yet, because the OASIS is a digital universe, this means that all the designs made, cannot be solely organic but have some kind of mathematical base, everything can be calculated by a computer. So the design is based on algorithms that can be found in nature.

This led to the idea of using a Voronoi diagram as the base of the globe. This diagram is found a lot in nature. Some examples are the wings of insects, the structure of leaves or the growth of columnal basalt. Yet, this diagram can be calculated completely mathematical.

For the structure of the interior functions, there was looked into fractal patterns. The interior is layered into several zones. The zones closer to the center and dj booth house more exclusive functions, while the functions on the shell are more public. Because the exclusive functions come in smaller numbers than the public functions, this lead to the idea of using a fractal pattern that divides itself into more pieces, as it goes further from the center.

figures on left page from left to right, top down

figure 5.1 facade exterior

figure 5.2 entrance staircase

figure 5.3 interior structure

figure 5.4 dj booth

6. CONCLUSION

The design process might not be as linear as concluded in the first part of this paper. This could be because the personal design process was different than the way the interviewed designers work, but is caused more likely by the interpretation of the interviews. It would seem logic that the designers communicate their stories in a linear way to convey it as clearly as possible. Their processes in truth probably have a more dynamic form when put into practice, than their interview answers might suggest.

The scheme on the next page shows the personal design process in moving from written script to design concept. The starting point still is the story and backstory derived from this. The interviewees all made it very clear that this is where the design process starts, and does not differ from the conclusion drawn from part one. The next step, like concluded earlier, is deriving the actions, emotions and context illustrated in the script. Using these script components as a base for references has been found very helpful as a starting point for the actual designing. After this, the first drawings of the scene could be made. These drawings can be seen as design conclusions. From these conclusions, new ideas arise that ask for new references. Opposite to what the process scheme from part one suggests, this was the first cycle in many more design cycles before reaching the design concept described in chapter five of part two. As the design phase is not over yet, more cycles will be made before reaching a final design concept.

Contrary to what the designers suggested in the interviews, the backstory was only used after already two design cycles. The use of a backstory from the start of the design process probably would have sped up the process. An explanation for the belated use is that the design conclusions after the second cycle brought up the idea for the backstory. So design conclusions might result in the addition of extra layers to the backstory.

References have formed the base of the design for creating an unfamiliar environment, as it is built upon the world that we know.

The combination of completely unrelated references is what makes the environment look fictional. Stories that are set in a more realistic environment might not ask for these crazy combinations. Combining elements in a familiar way makes a design more relatable and realistic. This does not mean that the designer of a realistic story cannot take their inspiration from anywhere, but suggests that science-fiction designers should aim for a broader spectrum of sources.

What sets science-fiction design apart from other fictional genres like fantasy is the story line. The story will ask for the right references that the public associates with the notion of science fiction. The subjects of technology, science and futurism are inherent to the science fiction genre. The script directly asks for references that fit these subjects. This is in contrast to the scheme of part one in which the typical science-fiction look is seen as an added layer. With using science-fiction references already at the start of the process of combining the references into new design, a design will automatically look science fictional.

A design process scheme for only science fiction or any fictional environment could not be made. The design process is not what sets design of the fictional environment apart from the non-fictional environment. The fictional appearance relies on the nature of the material. Design of the fictional environment asks for a broader scope of reference material. An architect reacts to the existing environment and might look closer to the site in order to come up with the right design solution. For the designer of the science fiction environment the possibilities of sources seem endless. An architect would not refer to the surrounding architectural styles and vegetation as references, but these essentially are the same type of building blocks that the science-fiction designer uses. Using references from a broader scope asks for a more imaginative approach than conventional architecture and results in a design that will leave the viewer full of wonder.
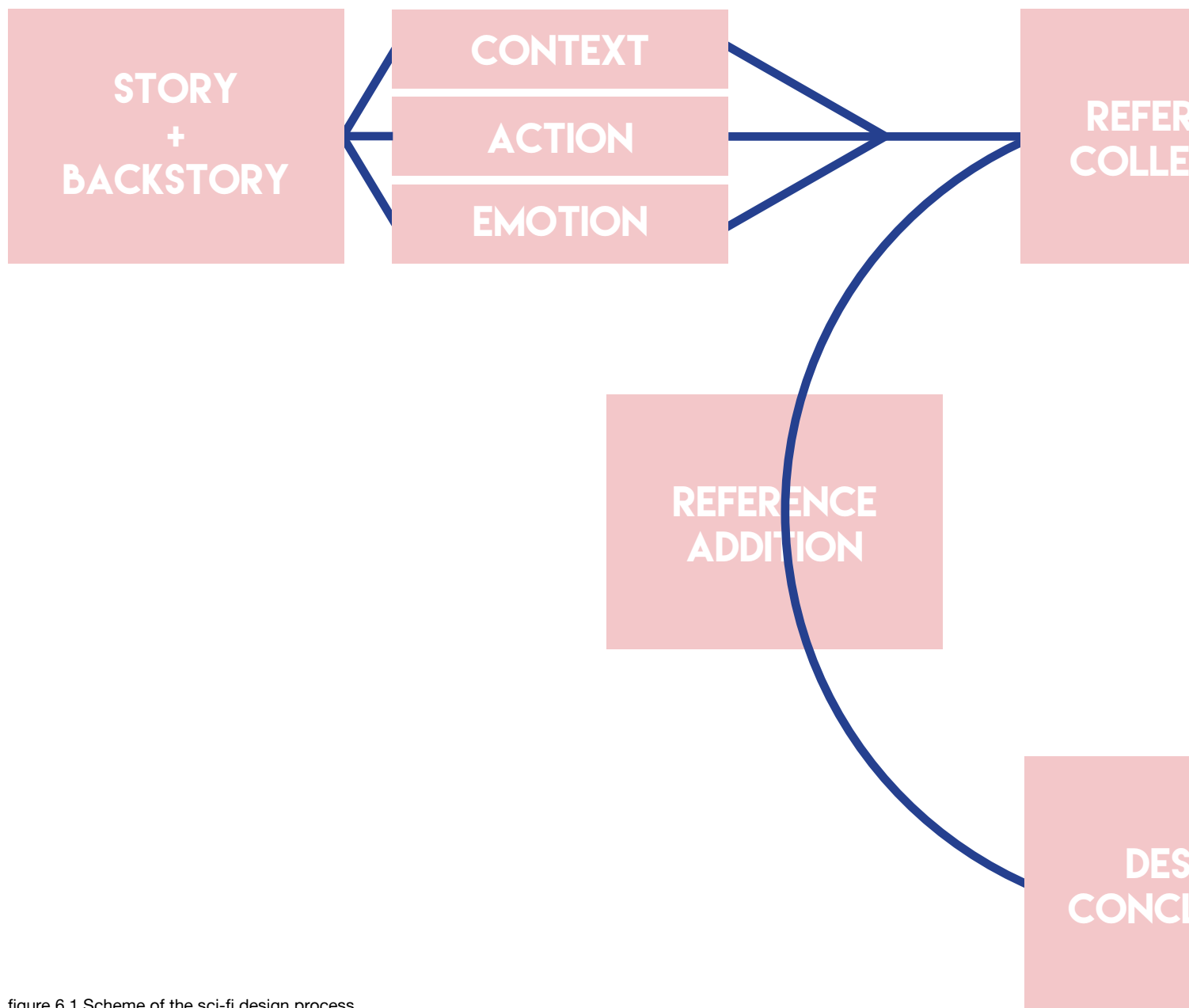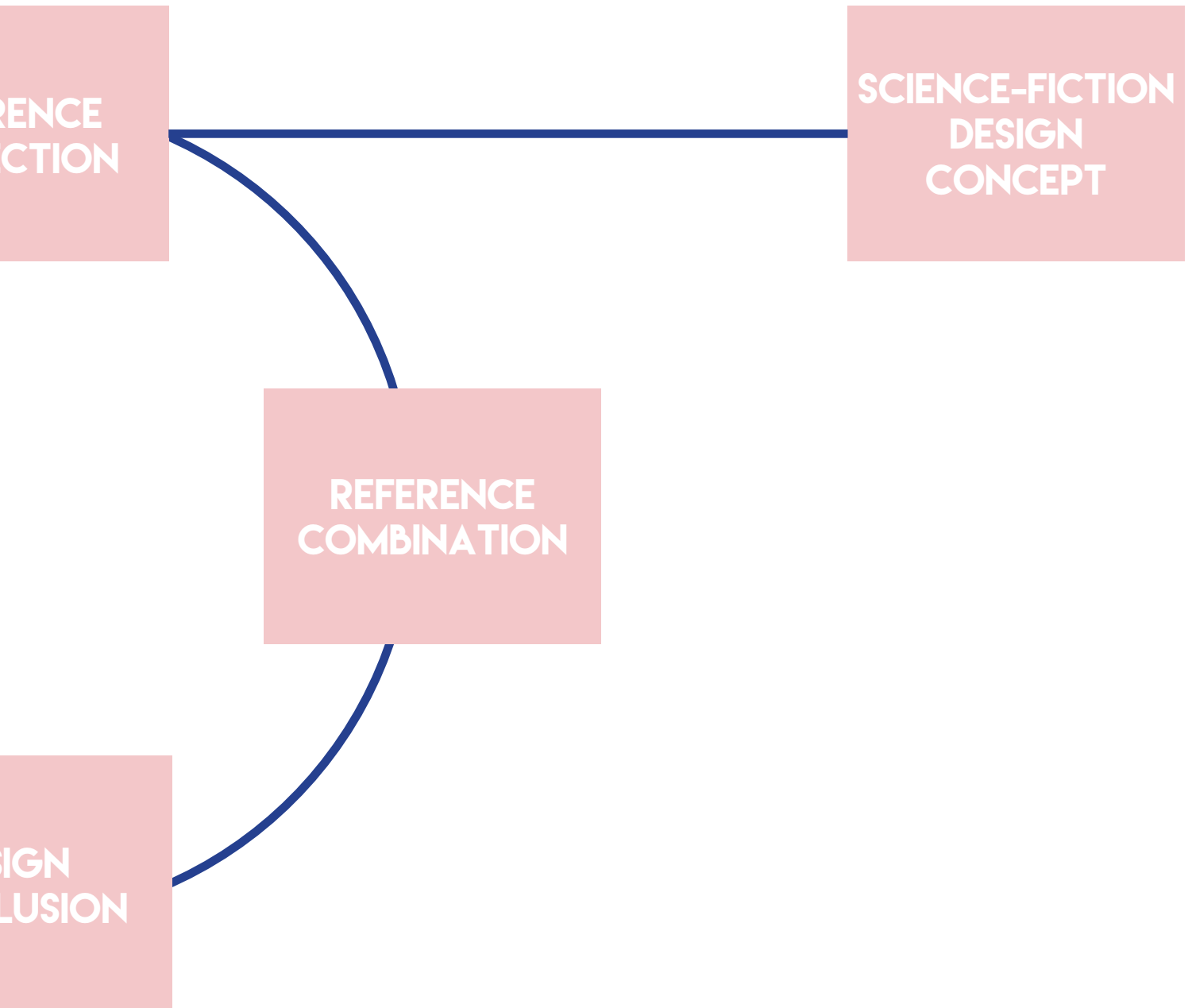
STORY + BACKSTORY

CONTEXT

ACTION

EMOTION

REFER COLLE

REFERENCE ADDITION

DES CONC

figure 6.1 Scheme of the sci-fi design process

RENCE
CTION

SCIENCE-FICTION
DESIGN
CONCEPT

REFERENCE
COMBINATION

SIGN
LUSION

REFERENCES

Abrams, J.J., Burk, B., Lindelof, D., Kurtzman, A., & Orci, R. (Producers), & Abrams, J.J. (Director). (2013). *Star Trek Into Darkness* [Motion Picture]. United States: Paramount Pictures.

Aubrey, S., Berg, P., Goldner, B., Henderson, D., Schneir, B., & Stuber, S. (Producers), & Berg, P. (Director). (2012). *Battleship* [Motion Picture]. United States: Universal Pictures.

Bird, B., Chernov, J., & Lindelof, D. (Producers), & Bird, B. (Director). (2015). *Tomorrowland* [Motion Picture]. United States: Walt Disney Studios.

Cameron, J., & Landau, J. (Producers), & Cameron, J. (Director). (2009). *Avatar* [Motion Picture]. United States: 20th Century Fox.

Card, O., Chartoff, R., Hendee, L., Kurtzman, A., McDonough, L., Pritzker, G., Orci, R., & Ulbrich, E. (Producers), & Hood, G. (Director). (2013). *Ender's Game* [Motion Picture]. United States: Summit Entertainment & Lionsgate Films.

Cavallaro, D. (2000). *Cyberpunk & Cyberculture: Science Fiction and the Work of William Gibson*. A&C Black.

Cline, E. (2011). *Ready Player One:* Random House.

Coyne, R. (1999). *Technoromanticism: digital narrative, holism, and the romance of the real*. MIT Press.

Ellison, D., & Goldberg, D. (Producers), & Taylor, A. (Director). (2015). *Terminator Genisys* [Motion Picture]. United States: Paramount Pictures.

Fortin, D. T. (2011). *Architecure and Science-fiction Film: Philip K. Dick and the Spectacle of Home*: Ashgate Pub.

Goodman, G., Kinberg, S., Kulzer, R., Parker, H., & Vaughn, M.

(Producers), & Trank, J. (Director). (2015). *Fantastic Four* [Motion Picture]. United States: 20th Century Fox.

Guerrilla Games. (2013). *Killzone Shadow Fall* [Video game]. Europe: Sony Computer Entertainment.

Hillier, B., & Leaman, A. (1974). How is design possible?. *Journal of Architectural Research*, 4-11.

Hollinger, V. (1990). Cybernetic deconstructions: Cyberpunk and postmodernism.

Jaffe, T., & Moritz, N. (Producers), & Wiseman, L. (Director). (2012). *Total Recall* [Motion Picture]. United States: Columbia Pictures.

Lawson, B. (2014). *How Designers Think: The Design Process Demystified:* Elsevier Science.

LoBrutto, V. (2002). *The Filmmaker's Guide to Production Design*: Allworth Press.

Neumann, D., Albrecht, D., & Gallery, D. W. B. (1999). *Film Architecture: Set Designs from Metropolis to Blade Runner*.: Prestel

Schmeink, L. Biopunk 101.

Vidler, A. (1993). The explosion of space: Architecture and the filmic imaginary. *Assemblage*, (21), 45-59.