

BITTER LANDS

The Making Of A Short Animated Film

Linda Vuorenvirta

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Aalto University
School of Arts, Design and Architecture
Department of Media
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Author	Linda Vuorenvirta	
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Abstract

My thesis is centred around the creation of a short animated film. My goals included solidifying the union of my background in 2D animation and my more recently acquired skills in 3D animation, and furthering a fictional universe which I had created in a novella. As an artist I naturally come up with visual depictions of any narratives that I create, so the transition from written word to moving image was very organic.

The animation depicts an exciting scene from early on in the timeline of my text. I imagine this short film could act as a “teaser trailer” for a hypothetical full-length animated film based on my novella. I chose a scene which I hope will leave viewers guessing and wanting to know more of the story, as teaser trailers attempt to do.

I used character designs and environmental sketches which I had previously made to start the animation process. The modelling, rigging, and animation was done in Autodesk Maya, using both motion capture data and animation done by hand. I first created the character models and environment, then directed an actor through the motion capture process. I imported the motion capture data into Maya, cleaned it up and supplemented it with additional shots which I created from scratch. I also used Mudbox during the animation process. Post-production was done in Photoshop, AfterEffects and Flash.

I rendered this animation entirely with toon shaders and included outlines around many elements, creating a look which is very similar to 2D. Using this technique, I retain what I consider the best parts of both disciplines: the charm and organic quality of 2D animation and the greatly simplified technical maneuvers, such as camera moves, of 3D animation.

Creating this animation has made me even more excited about exploring the world which I have created in my narrative. I have also discovered a style of animation which greatly appeals to me by rendering my 3D work to look two dimensional. I hope that my experiment with this technique inspires others in the animation industry to try it as well, and that my narrative inspires everyone to explore their own stories, no matter what medium they may tell them through.

Film: <https://vimeo.com/148096084>

Keywords animation, 3D animation, 2D animation, narrative, maya

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1. Introduction

It was clear to me from the beginning that my thesis would be centred around an artistic work, although the type of work remained to be determined. I realized then that throughout my life I have read, written, illustrated and all around immersed myself in stories. This lifelong immersion was the catalyst which launched my decision to go in a narrative direction.

I began to brainstorm different story concepts, aiming to select one and build it up as a first step. I juggled some story ideas, drew some sketches, and weighed the merit of these ideas. As is often the case with creative projects though, the concept which won out in the end was not one which I had consciously pushed myself to create, but one which spawned randomly from a stream-of-consciousness creativity session I had in my free time. I worked on this concept at first just for fun, but once I dived into some serious writing I decided to use it for my thesis.

The result of my work is an animated short film created in Maya, with rendering done to simulate 2D animation. My decision to utilize this technique involved both practical and stylistic reasoning. 3D tools such as Maya provide a wealth of technical possibilities which would be difficult or even impossible to replicate in a 2D program. On the other hand, 3D animation typically has a distinctive look to it, which may not suit the tastes of everyone or be appropriate for every story being told. These issues, I found, could be worked through by using elements from both 3D and 2D processes. The final film can be viewed here: <https://vimeo.com/148096084>

Although both mediums have their pitfalls when used alone, the combination of 3D animation technology and 2D-style rendering provides an excellent tool for thoughtfully portraying a scene from a novella with elements of sci-fi, fantasy and action-adventure.

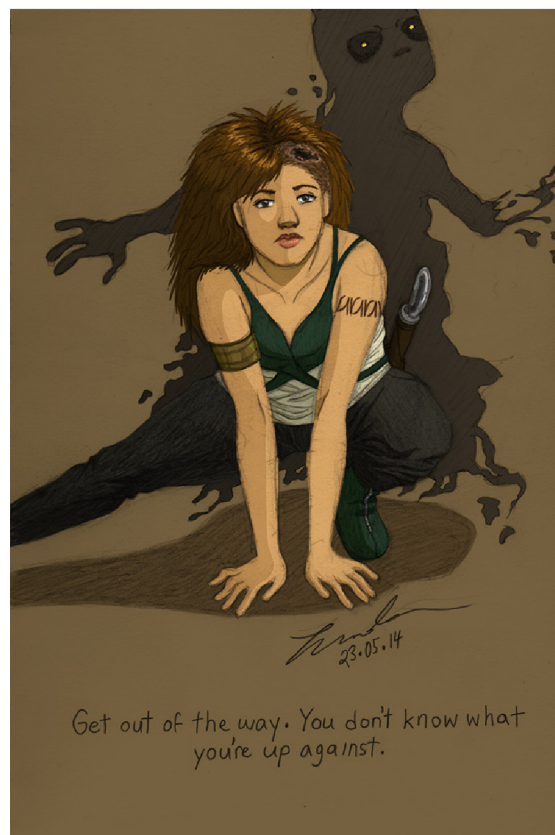
2. Developing Narrative

2.1 First Experiences

When I laid down the foundations for the story which became Bitter Lands, I was not expecting the narrative to grow into a full novella, let alone

a cornerstone of my thesis. Although I had at this point spent some time brainstorming narrative concepts with my thesis in mind, my first drawing of a then-unnamed young woman in a fighting stance (see fig. 1) was not intended to contribute to this purpose. Regardless of my original intentions though, the fighting stance I had drawn spurred the creation of a more fleshed-out character by inviting me to determine who she was, who or what she was fighting against, and why.

Figure 1



My love of fantastical narratives, as well as a pseudo-scientific paranormal documentary I had recently watched, were paramount in the early development of this character. I ended up drawing an amorphous, abstract monster with a vaguely human shape for her to fight. Eventually the character's name became Mira, and I began to make conscious decisions about her design, background and history. I ended up adding a quote below the drawing which was not yet based on any concrete narrative elements, it only sounded like something that Mira would say based on the personality I had begun creating for her.

My next step was to determine who Mira could have said "Get out of the way. You don't know what you're up against" to. Using the quote as a

loose guideline, I ended up creating the character Stephan, who is rescued by Mira after encountering one of the aforementioned monsters. I also theorized where the monsters could have come from, and I ended up on a science fiction inspired route which had them being the result of a failed science experiment by someone who was studying the supernatural.

2.2 Alternate Universes

This idea spawned the choice to use alternate universes as an important story element, allowing me to both create a new universe where such an experiment is feasible, and to retain the rules and boundaries of our own universe when this was preferable. ‘World building’ is one of the most difficult things to do convincingly as a writer, especially when your fictional universe involves elements like futuristic technology or the supernatural, which we cannot comprehend in our own, real universe. Since the general populace has little to no knowledge about these things even in theory, and has nothing to compare them to, an author has to write an extensive amount of information purely about this new technology or supernatural power. They need to describe not only how it works and how it is used, but how it affects the entire societal fabric of the universe the story exists in. In addition to providing information about speculative technology, writers must also consider more mundane aspects of whatever world their story is set in, including infrastructure, social structure, popular culture and so forth. These ideas, among others related to worldbuilding, are expanded upon intelligently by Charlie Jane Anders in ‘7 Deadly Sins of World Building’ on IO9 (Anders, 2013).

To lessen my burden, I chose not to set the bulk of the story in my new fictional universe. Instead I brought these monsters I had imagined, as well as a human character named Tazek, from the new universe into ours through a tear in space-time. Being physically removed from Tazek’s universe allowed me to explore my narrative without paying so much attention to the aforementioned mundane aspects of it, since those same aspects do not need to be explained in our world - they simply exist and readers are expected to have knowledge of them. I did, of course, have to describe the supernatural aspects coming from this universe, since the story depends on the reader’s understanding of things such as how the monsters kill and how they can be defeated. Even so, only information relevant to the narrative occurring in our universe was strictly required, and any other enhancing tidbits could be

brought in by choice, not necessity.

2.3 Inspiration

Our known universe contains more than enough material to play with anyway, as evidenced by the paranormal documentary which inspired the setting of Bitter Lands. I watched the documentary as entertainment, and do not believe everything which is claimed and asserted within it. The ideas presented were enough to catch my interest though, and they provided a springboard for me to develop a similar setting for a fantasy/science fiction story. The documentary in question was an episode of 'Monsters and Mysteries in America', in which people who claim to have seen supernatural creatures and phenomena are interviewed about their experiences. These stories are generally taken with a grain of salt, including by myself, but one in particular managed to send a chill down my spine, regardless of whether it is true or not.

Each episode of Monsters and Mysteries in America focuses on a specific region of the country and its local stories. The episode I was inspired by is called 'Badlands', referring to the dry, rocky, desert-like terrain in the western portion of the country. Residents were interviewed about a particular stretch of highway in the area which is believed to be haunted or cursed. A semi truck driver spoke about his experience on the highway, and claimed that at some point a dark, shapeless mass of black fog appeared to follow him. It chased him down the highway and eventually enveloped his truck, trapping him inside for the night. This story influenced my design of the monsters as well, giving me a black, foggy mass as a starting point and allowing me to develop that into vaguely humanoid, sentient creatures.

2.4 Going Forward

At this point, I knew I had to get all of my ideas 'on paper'. I had grown to like this narrative which I was developing, and the amount of material which I was dreaming up warranted at least a short story. I began to write, and Bitter Lands became eleven chapters long, as well as several extra pages of snippets from the future of this universe, starting from an elapsed time of a few hours to an elapsed time of a couple of years.

When I started to write, I first entertained the idea of developing a thesis out of Bitter Lands, recalling my earlier decision to go a narrative route

with my thesis and seeing potential in this particular story. I considered a digital game at first, but then decided that I was more invested in telling a story than providing a rich, fleshed out gameplay experience. I did not believe that the breadth of material I had could be told effectively through something like cut scenes without making them so long and/or numerous that they lose the player's attention. Drawing on my experience with studying animation that emphasises narrative, I decided to create a short film.

3. Pre-Production/Planning

3.1 Project Format and Scope

My first task was to determine a scope for my animation project. My novella provided enough material for a feature length film, but it was clear that I could not create more than an hour of animated material myself, especially within the time frame which I was working with. One option was to create a short, self contained film which tells a story occurring within the Bitter Lands universe, but I was too invested in the characters and narrative which I had already developed to abandon it. I needed a short format, no longer than a couple of minutes, which was workable using the already existing characters.

The direction which seemed most plausible was to create a mock trailer for a hypothetical feature-length film. There are two types of trailers, namely teaser trailers and theatrical trailers. A theatrical trailer is more fleshed out than a teaser trailer, and in the film industry is typically created much closer to the release date of a film. Since theatrical trailers are usually created when film footage already exists, at least in an unedited form, the filmmaker has the opportunity to present a trailer as a sort of mini-movie which can almost exist on its own. Theatrical trailers usually feature scenes from many different points within the narrative of the film, presenting the clips in a loose three-act structure that mirrors the actual movie. Establishing shots from the beginning of the film come first, then more dramatic scenes from the middle of the film that hint at the climax. Even shots from the resolution of the film are used if they can be presented without 'spoilers'.

A teaser trailer is most often released far ahead of the release date of a film, and serves exactly the purpose which its name suggests. A teaser is

often relatively vague, presenting one scene or concept from the film which might not be self-contained when taken out of its larger narrative context. These trailers tease their viewers with this scant information, aiming to peak the viewer's interest enough to take notice of the film and perhaps follow its production. Teaser trailers can be created very early in the filmmaking process, using whatever footage is available, even footage which does not end up in the final cut of the film. Teaser trailers are often also shorter than theatrical trailers. While most theatrical trailers are approximately 2,5 minutes long as per the official standard of the Motion Picture Association of America (Advertising Administration Rules, 2012), teaser trailers tend to be no longer than 1,5 minutes.

Taking this knowledge into consideration, I decided to create a mock teaser trailer for Bitter Lands. Since I was creating this project outside of an actual film production, and had no bank of pre-existing footage to choose from, it seemed unrealistic to attempt to create a full theatrical trailer. I would have to approach the project as if I was creating a full length movie, planning and animating shots from the beginning to the end, aware that the chosen shots may not even work together after they are finished and compiled into a trailer. It was more realistic to focus on animating one important and interest-provoking scene from the text which I could devote all of my energy to. I would not have to worry about the scene being entirely self-contained, only visually appealing and fascinating enough for a viewer to want to learn more.

3.2 Scene Choice

The next step was choosing a scene from the text which would work well as a teaser trailer. I had to make the choice meaningful and riveting enough to keep a viewer's attention, while not 'spoiling' anything. Especially in the case of a story which incorporates action-adventure, fantasy and science fiction, choosing an action-packed scene is favourable. The action in Bitter Lands centres around fighting against the monsters brought from Tazek's dimension, so I quickly decided to feature these antagonists in the animation. I did not want to tell too much about them, but it had to be clear that they were dangerous or their appearance would not make an impact.

I also wanted to feature at least one main character in the chosen scene. The scene which I decided on was one from early on in the text, where Stephan is trying to run and hide from a monster which is pursuing him. At

this point in the narrative, Stephan is not yet aware of what the monsters are, or exactly what they can do, but he is instinctively afraid of the creature stalking him.

The chase scene is punctuated in the text by Stephan's thoughts, which would be running at a frantic pace due to the imminent danger present. A large chunk of the writing describes what is going on in Stephan's head, but the time span of the entire scene is less than the time one would take to read it. Since character's internal monologues are difficult to present on screen, at least in the same fashion and to the same extent as they exist in a written story, the action in the animation pauses only for a relatively short time. My advisor pushed me to stretch the time to the length it is currently, which turned out to be a very effective pacing choice. While the pause is still short compared to the written version, one naturally accepts the quicker pace of action due to film being a media which can replicate the pace of real life, while reading does not occur at the same speed. If one objectively observes the rate of action in the running sequences versus the seconds when Stephan rests, there is a distinct difference which I believe is efficient.

At the end of the teaser, I introduce Mira as a second character. She is seen only in the last seconds of the animation, but is immediately presented as important due to her entering the scene in order to save Stephan's life. The viewer does not know who she is, but is made aware from the start that she has the ability - and the necessary weapon - required to kill the monster which was terrorizing Stephan.

In choosing this scene to animate, I not only introduce two of the main characters in Bitter Lands, but the basis of the relationship between them as well. It is as of yet unknown how either will react upon being properly introduced to the other, but the seed of their relationship is planted through their first, and extraordinarily memorable, interaction.

A parallel one could make to an existing teaser trailer is the first one released for 'How To Train Your Dragon 2' (Dreamworks Animation, 2013). The entire teaser consists of one sequence in the film: a high-speed and stunt-heavy flight taken by Hiccup and Toothless through the clouds. After flying together, Hiccup convinces Toothless that he is ready to try a new stunt, and proceeds to purposely tumble off of his dragon before deploying a wingsuit which allows him to glide alongside the flying creature. They are in no apparent danger, having successfully pulled off the wingsuit stunt before landing, but the sequence still keeps the viewer on the edge of their seat with its action. With my Bitter Lands teaser, I attempted to do the same.

Another parallel comes at the very end of the HTTYD2 teaser, when Hiccup removes his flight helmet and mask for the first time. This being a sequel, the audience is already aware of the character's identity since he is seen flying Toothless, who is clearly visible. Regardless, this film is set five years later than the original film in the canon of the HTTYD universe, so seeing Hiccup as a 20 year old rather than a 15 year old is almost like seeing a new character. This could be likened to Mira's appearance, which comes only at the end of my animation.

In addition to seeing how Hiccup has aged, the audience will observe that the last shot is of him noticing something in the distance. He is looking out towards something which has caught his attention, although the viewer is not privy to what he has found. This was effective in creating buzz among fans, who wondered what could be causing this reaction from Hiccup. Similarly, I tried to leave unanswered questions at the end of the Bitter Lands teaser. Who is this woman? How did she kill the monster? How will the man who was rescued react to her?

3.3 Art Style - 2D vs. 3D

In regards to style, I aimed from the start to create a film which 'looked 2D' while being fully created in Maya. This solution is attractive to anyone who aims to embody the best qualities of both 2D and 3D animation in one film, as I do. The advantages of using a 3D animation program like Maya are comparatively clear-cut and centre mostly around technical advantages.

Anything involving a camera moving within a scene is difficult in traditional animation, even when produced digitally. Some convincing depth can be achieved by employing techniques such as parallax scrolling, where the background elements in a scene move slower across the field of view than mid- and foreground objects (Arandle, 01.03.2012). One can also create a believable 'dolly in/out' effect - bringing the camera closer to or further away from a subject. Using one point perspective, the animator would both zoom and move and scale objects in the scene as they are 'passed' by the camera in accordance with their relative position to the vanishing point (Arandle, 07.03.2012).

With large budgets and skilled animators, some high-profile animation studios have even done complex camera moves purely with frame-by-frame drawn animation. A great example is the ballroom scene from the 1991 Disney film 'Beauty and the Beast', which was created in an era when

computers were only beginning to be popular tools in the animation industry. The background is digitally created, but each frame of Belle and the Beast dancing is hand drawn as the camera swoops in on them from above and circles around them, all while the subjects themselves are spinning (Walt Disney Pictures, 2006). Understandably, shots like this were not so common until the advent of 3D animation, due to their high complexity. In the past, creating such a shot required an animator to not only be a great artist, but to have an immense understanding of perspective and physics.

With a 3D animation program like Maya, it is much easier to create camera movements and shots where the camera is at an unusual angle. One can easily move the camera in 3D space while seeing a live preview of how the shot would look from that angle, and camera moves are simply a matter of keyframing the camera a few times. This advent in technology has greatly reduced the amount of time and effort needed to create an eye-catching shot, and can be seen as an example of the old adage ‘work smarter, not harder’. We have gone from trying to simulate depth through the use of a huge multiplane camera (Marine, 2014) to composing a robust, cinematic camera move such as in the Beauty and the Beast ballroom scene with a few well thought out clicks of a mouse on a computer.

Of course, like many technological advents, this one is not without its consequences. One could make a claim that during the early days of 3D animation becoming mainstream, in the late 1990s and early 2000s, animated films suffered losses in their visual richness and charm. This has since improved by leaps and bounds, as seen in the very expressive and visually stunning work done by 3D studios like Pixar. Nevertheless, many who grew up watching 2D animation long to see more of it, and campaign for studios to re-introduce the style. There are even projects being done to combat the prevalence of 3D in the animation industry, such as the crowdfunded, steampunk themed ‘Hullabaloo’ project by James Lopez, a Disney veteran. Lopez and his team hope to “help preserve the dying art of 2D animation”, which “is a beautiful but dying art form that the animation studios have all but abandoned” (Lopez, n.d.) My generation, based on my own observation, as well as earlier generations, seem to be reluctant to let go of 2D animation.

Part of this desire for a reintroduction of 2D animation may stem from our psychological attachment to that which we found comfort and joy in as children. When this innate desire for our childhood favourites is combined with the widely shared opinion that early 3D films - as well as some of the lower quality ones today - visually lack the organic quality, natural flow and

warmth of good 2D films, we end up craving the latter. As Morgan Francis, Managing Director of Spider Eye Animation, claims, there will always be a place for “the visual simplicity and the unique human eccentricity” of 2D animation (Tauchmann and Francis, n.d.). Even if the larger studios ignore 2D in favour of current trends, there will always be independent studios who have the desire and opportunity to embrace this art.

As a compromise between my preferred aesthetics and exciting technical possibilities, I decided to create my film in Maya and use toon shaders to render it, creating a visual language similar to 2D animation. The result, while still visibly 3D, gains some of the charm and grittiness that I love in 2D through the use of cel shading and outlines.

3.4 Influence of Setting On Art Style

It is worth mentioning that the concept and setting of the narrative can and should also influence the art style of a film. A story which is set in a futuristic universe filled with clean, sharp lines and smooth metal surfaces could do well as a 3D animation, since the medium lends itself so well to producing mathematically accurate and precise structures, as well as textures like glass and chrome which are harder to achieve in 2D. Particularly if the filmmaker is working in a somewhat realistic style, 3D programs are a fantastic tool to use in achieving a believable environment.

Bitter Lands, at least the part of it which I chose to animate, is set in the badlands, a rugged landscape largely untouched by modern architecture and technology (see fig. 2). Had I used Maya’s ‘normal’ shaders, such as Lambert or Blinn, instead of toon shaders which simulate 2D, there would likely have been a disconnect between the subject matter and the medium used to portray it. Rough, organic lines carved by nature are suited to something entirely different than cosmopolitan skyscrapers in an ultra-modern city. Using the toon shaders, especially with outlines, harkens back to the imperfect handmade strokes made by animators in the past and lends itself well to my chosen setting.

As a reference one can consider the different settings and elements in the aforementioned ‘Hullabaloo’ project and the Disney film ‘Big Hero 6’. Hullabaloo is set in a steampunk world, which means the setting is largely inspired by true Victorian age technology, culture and aesthetics, but supplemented with imaginary versions of machines which perhaps are more modern than realistically possible for the era. To make these machines

Figure 2



a believable part of the setting, they are constructed out of Victorian era materials with mechanical power such as the titular steam power. For example, a ray gun which shoots what looks like a laser blast could be constructed of brass and rely heavily on gears and mechanical systems. *Big Hero 6* is set in the present day, but takes liberties with its interpretation of modern technology and its capabilities. These films, while they both employ aspects of science fiction, are well suited to different mediums.

Hullabaloo's steampunk setting is intrinsically tied to Victorian aesthetic, and conjures up images of leather, billowing skirts, wood, rust, and other organic elements. Despite the gears and machinery present, one does not get the same feeling from an environment like this as from a modern technological city. Thus, the choice to depict this story with 2D animation is an agreeable one. Since steampunk is essentially a fictionalized representation of a long ago era, it also fits to be representing it with a 'vintage' medium.

Big Hero 6's suitability for 3D comes not as much from its physical setting as from the technology imagined to exist within it. One of the main characters of the film is a robot with a high degree of artificial intelligence, and we are introduced to them in a laboratory/workshop setting teeming with science. The main human character has a large, very impressive and futuristic computer station to work at, where he builds super hero suits for himself, his robot and his human friends. The suits are slick, sharp-lined and shiny, qualities which are perfect for 3D animation. The plot of the film also heavily relies on showing the capabilities of millions of 'microbots' working together to form giant structures, ebbing and flowing smoothly like a single

entity. The amount of detail and kinetic quality in these shots would have been far more difficult to portray successfully in 2D. This film, with all of its technology, would not have packed quite the same punch had it been styled differently.

3.5 Inspiration

A particular work which helped convince me through example to pursue my planned rendering style is a short film called ‘Bet She’an’, created by students at the French computer graphics university Supinfocom (Creative Bloq, 2014). The style of this film, according to its creators, was inspired by graphic novels, and the final result is a lovely marriage of 3D and 2D. There are aspects of the film which would have been much more difficult to achieve via 2D animation techniques, such as the dramatic camera angles and lighting design. The literal bird’s eye view shots during some of the crows’ flights take advantage of 3D, as well as a shot where a character jumps off of a cliff, and instead of flying as he had hoped he plummets down, the camera following him. Also taking advantage of the 3D workflow are the beautiful light effects, such as a lantern gradually illuminating a scene as a character carrying it enters.

These dramatic shots celebrate the medium which the film was made in and show off the robust possibilities it gives an animator, while the graphic novel style rendering suits an ancient stone city with feathered inhabitants. This example of success in blending 2D and 3D gave me confidence as I was making the initial style choices for Bitter Lands.

3.6 Colour Palette

Like in any visual media, colour palettes are also a vital aspect of film and animation. In Bitter Lands, my colour choices were largely dictated by the landscape, which I coloured similarly to real-life badlands: earthy reddish browns, tans and warm oranges. The characters are coloured with the intent to stand out from the landscape, creating visual emphasis on them, but not so much that they become disconnected from their setting and look like they belong to another animation altogether. I did not use highly saturated colours in anything except Mira’s sword, which is an important focal point conceptually (it is also worth noting that the material which it is made of originates in Tazek’s universe, which has an overall colouration vastly

different from the part of ours in question). Even the blues and greens of Stephan's clothing are comparatively mellow and much warmer than the blue of Mira's sword.

The nature of the monsters naturally suggested a black colouration for them. Considering their physical forms' resemblance to a smoky mass, a grey or black seemed to be in order from the start. Visually, their black colouration helps them stand out amongst the colours of the landscape and other characters, even when they are only seen as a flash flickering across Stephan's field of view. Conceptually, black has always been seen as a colour representing death, decay and despair, making it a natural choice for a monster.

3.7 Compiling Inspirations

To keep myself grounded to my chosen visual style and provide inspiration as I worked, I collected images on a Pinterest board (Pinterest, 2015). I chose anything which was similar in colour, texture or overall visual wavelength to the style of Bitter Lands. The content ranges from photographs of actual locations to illustrations by other artists which in some way remind me of Bitter Lands and its characters.

4. Production

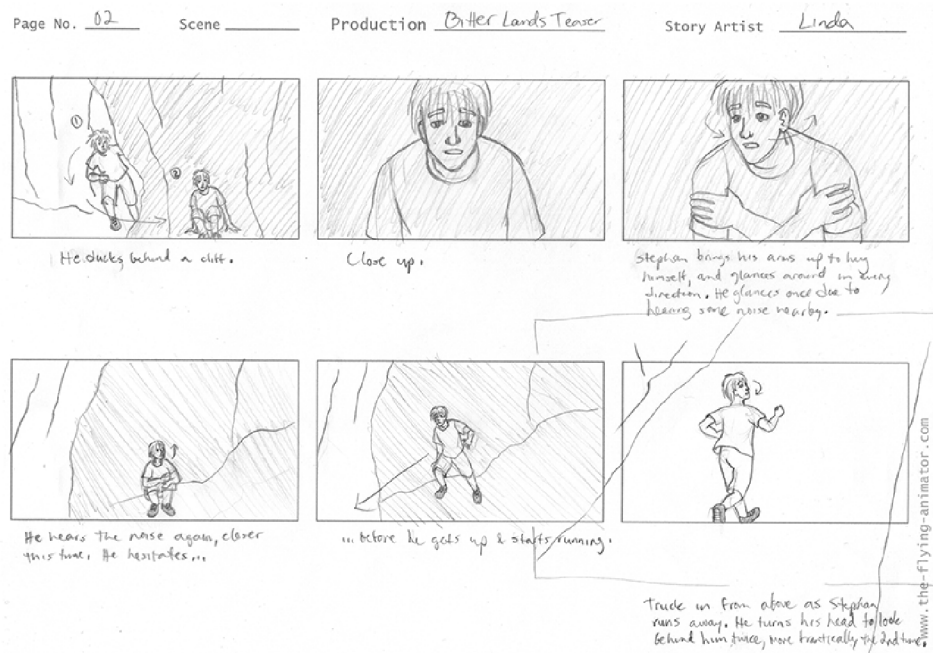
4.1 Storyboards and Turnaround Model Sheets

Like any other production, the first step in creating my animated short film was drawing a storyboard (see fig. 3). A storyboard acts as a reference for aspects of a film such as shot order and camera angle. Keeping in mind the degree of technical freedom that I had, I storyboarded several different styles of shots. Some were static, and some employed a moving camera. For example, a moving camera is used in the shot where Stephan is fleeing an impending attack after hiding among the rock formations. I also included some POV shots to allow the viewer to literally look through Stephan's eyes, watching the landscape pass by in the opening shot as he runs and seeing a monster descend upon the camera towards the end of the clip.

When storyboarding I am always flexible and open minded to changes, but in this case I was very confident about some shots already at the planning

phase. The final shots were particularly clear to me from the beginning, starting from the blackout and ending with Mira’s introduction. I was keen to show a shot of Mira’s sword cutting through blackness before the world fades back in. This is visually compelling and immediately focuses a viewer’s attention on the sword, framing the object as important. Stephan’s first clear picture of Mira is her warily checking their surroundings, then extending a hand towards him. I wanted Mira’s introduction shot to convey as much about her character as possible, so the first two things I made clear about her were her skill with a sword and her desire to help the monster’s victims. This communicates the idea that she is both altruistic and a force to be reckoned with.

Figure 3



Another shot about which I was confident from the beginning was the one where the monster descends on Stephan. Here I employed a POV camera in an attempt to coax a stronger reaction out of the viewer. As stated by Witney Seibold of CraveOnline.com’s ‘Free Film School’, when a POV shot is used the viewer “is invited to live in the head of the main character, or to more immediately experience what the main character is experiencing moment by moment.” (Seibold, 2013) If a viewer can place themselves in the position of a character, it is often easier and more natural to experience empathy and fear for them, since the viewer is essentially imagining the situation happening to themselves. By using a POV camera for this shot I place the viewer in Stephan’s position as literally as possible, so they can

tune into Stephan's emotional state as the screen goes dark.

The darkening which follows the POV shot is meant to communicate Stephan's giving up and accepting the fact that he is going to die, the world both figuratively and literally fading away. Later, a sword cuts through the blackness with no discernable bearer. This detachment from reality reflects Stephan's momentary disbelief that he is in fact being rescued, and gives the shot of the lone sword even more conceptual meaning.

For the most part, I followed the choices made during the storyboarding phase when it came to creating the final shots, with a few changes and additions. One of the changes that I made of my own accord was adjusting the camera angle during the scene where Stephan ducks into a crevice in the cliffs to hide. In the storyboard, I drew the scene head-on, but quickly realized that it looked more dynamic from an angle. I was also encouraged by my advisor to add a wobbly moving camera which tracks Stephan's footsteps to this scene, helping to give a sense of urgency to the situation. An even shakier camera is utilized in the series of shots of Stephan clutching his head as the monster bears down on him. Finally, I added a 'worm's eye' shot - a shot where the camera is on the ground looking up at the subject - of the moment when Stephan trips. This shot is placed directly before the shot which shows him falling from a side view. The camera angle emphasises the ground and Stephan's feet, making it clearer to a viewer that he is falling because he has tripped or stumbled. Other than these changes, the transition from storyboard to final animation was consistent.

After the storyboards were finished, I started the process of character modelling by drawing turnaround model sheets for Stephan and Mira (see fig. 4). These sheets are essential for modelling a specific character with distinct proportions and features. They help to keep your work consistent from all angles, with no wobbling or ambiguity in the representations of any body parts or clothing. As aptly summarized by comic artist and animator Jason Brubaker, when looking at a turnaround model sheet "you should be able to draw a horizontal line across any part in a turnaround and have the lines hit the same point of the character across the board." (Brubaker, 2010) If there are three head lengths between the waist and the knees of your character in a front view, there should also be three head lengths in a side or back view. Particularly in a 3D process, creating these turnaround model sheets is crucial as they serve as your primary reference while you do your modelling. Once I completed my turnaround model sheets, I started to build the characters in Maya.

Figure 4



4.2 Character Construction

I knew that I wanted to have the ability to manipulate the character's facial expressions - at least Stephan's, on account of his screen time and the saturation of strong emotions - so I paid special attention to the topology of the faces. Topology in 3D modelling refers to the flow and distribution of edge loops, vertices and faces so as to avoid stretching and distortion when deforming the model. Good facial topology mimics our actual facial muscles, at least in a simplified form. It generally includes loops of faces (polygons formed by connecting vertices and edges) around the eyes and mouth area, which are two of the most important areas in regards to facial expressions. I started by following a video tutorial (Banks, 2011), and kept a reference image of good topology on hand as I continued my work.

Modelling the bodies of my characters was more straightforward than modelling their faces, since whole-body or even limb movements are much broader and sweeping than the tiny, subtle movements involved in facial expressions. This is especially true in animation, where body movements tend to be exaggerated. Therefore, the body topology does not have to conform quite as strictly to guidelines as the facial topology. Nevertheless, I tried to keep the flow of edge loops and distribution of faces as uniform as possible.

I knew from the beginning that I wanted to build my character's skeletons from scratch, as opposed to using a pre-made skeleton and fitting it as closely as possible to a model. Using a pre-made skeleton has worked for

me before, but I wanted to push myself with this project and learn new skills, especially if those new skills would be beneficial to the end product. I saw creating a skeleton as similar to sewing one's own clothes instead of buying off-the-rack. The off-the-rack clothing may fit well enough, but it can never fully account for all of the individual characteristics of your body the way a custom-made piece can. This same full customization also helps in skeleton creation.

I created clothing and props as separate meshes from the bodies. The few 3D models which I had made in the past all had their clothing built into their main mesh, giving me less freedom to manipulate the garments and no possibility of considering fabric simulations. I wanted to avoid this pitfall when making this film, especially since I was going for a somewhat more realistic feel than my previous 3D animations. The art style of Bitter Lands is not as realistic as, for example, many modern video game animations, but elements such as body proportions and level of exaggeration lean towards the realistic side. The difference between my art styles is similar to the difference between Disney shorts from the 1930s and the studio's feature films (see fig. 5).

Figure 5

The Grocery Boy, 1932 (short)



Treasure Planet, 2002 (feature film)



Animating clothing presented somewhat of a problem, at least for Stephan. As I had suspected, Mira's skin-tight clothing functioned after simply binding it to her skeleton in the same fashion as skin, and it moved sufficiently well along with her body. Stephan's clothing was much looser, and realistically would sway and crease and drape as he moved. Especially considering that Stephan's role in this animation involves so much running, I decided that some cloth simulations would likely be the best thing to use.

Since I had never attempted to do a cloth simulation before, I was completely green as I dived into doing so. I encountered a series of issues,

the first of which being the immense number of simulation settings I was now presented with. I took advice from several online tutorials, but still experienced problems with my fabric drooping too much, tearing, intersecting with itself and moving about seemingly randomly. I suspect that my issues were not anything outside of the ordinary, but were simply things which I as a newcomer to the world of simulations was not equipped to deal with.

After fighting with the clothing simulations on Stephan's t-shirt and shorts for an unfortunately long time, I settled on a compromise. I worked with the fabric simulation on the t-shirt long enough to achieve a result which I considered satisfactory, and bound the shorts to Stephan's skeleton as I had done with Mira's clothing. The shorts were less baggy than the t-shirt, and made of a stiffer fabric which does not drape as much, so this solution was acceptable. There were still spots where the shorts did not cooperate, but these small glitches were fixable in post-production.

My experiments with hair simulations went a different route than the clothing simulations. I succeeded from the start in creating a hair simulation on Mira using spline curves, but felt a disconnect between the more realistic hair - similar to the style used in the aforementioned video game animations - and the less detailed body and face. I ultimately decided against the hair simulation and instead created more 'polygon-like' hair using several layers of choppy geometry. This hair geometry was bound to the character's skeletons just like Mira's clothing and Stephan's shorts.

I utilized Maya's blend shape system for facial expressions, although the actual expressions themselves were sculpted in Mudbox. My process involved bringing my Maya-made head geometry into Mudbox, sculpting expressions in the latter program, then bringing the new geometries back into Maya and making blend shapes out of them. I decided to use Mudbox due to its style of sculpting, which is more organic and less mathematical than Maya. It allows the sculptor to use brushstrokes as they would in a 2D program, sculpting according to the direction and strength of the brush strokes, and the specific tool in use.

I appreciate Maya's technical system when it comes to basic shapes and larger body parts, since it is easy to keep things symmetrical and clean with such a system. Small details are easy to keep control of even in a program like Mudbox, perhaps because it is possible to view your entire work area without shifting and panning around. Furthermore, facial expressions benefit from asymmetry, which can give the character more life and realism. Of course real

bodies have asymmetry in all parts as well, but these asymmetries are usually so small that they would not translate easily to animated characters. As a result, I find that the best course of action is usually to try and keep things like limb length and y-axis body symmetry as neat as possible unless the character has a visible deformity.

The monster model was the last one I made, and even after considering my options as I worked on Stephan and Mira, its creation still required some experimentation. I tried Maya's simulation tools at first, seeing what I could create with water and smoke simulations. I was able to create masses of black smoke, but I was keen to make them much more defined, as the story calls for the monsters to have human-like arms. I ended up creating a model from regular geometry and rigging it with a quick skeleton, leaving the eyes and nostrils on separate layers. I rendered each layer individually, and planned to apply some effects to the body layer in post production, such as blurriness and transparency.

4.3 Motion Capture

After the character models were complete, it was time to bring them to life. My plan had, from the beginning, involved the use of motion capture technology for a large part of Stephan's running/action shots. I was eager to experiment with this technology after getting a taste for it during a workshop course and realizing that it would be perfect for this film. Running has always been a difficult motion for me to animate believably, and especially with the added requirement of showing the effect of Stephan's mental state on his running, I was hesitant to approach hand animating the sequence.

Motion capture technology has gone through robust development during its short lifetime, and it was not always as slick of a tool as it is today. In the words of Steve Dent, Associate Editor at *engadget.com*, "new technology like motion capture (mocap) can be... *awkward* [emphasis in original] in its youth" (Dent, 2014). Consequently, the choice to utilize motion capture in an animated film has historically been a hit-or-miss choice for filmmakers. Early motion capture films had the tendency to wander into the uncanny valley, since the movements generated by actors and applied to 3D characters were almost lifelike but not quite, and ended up looking uncomfortable and unsettling. The technology has matured though, and when used sparingly to supplement a small-scale production, it is definitely developed enough to use.

Keeping these thoughts in mind, I was confident that motion capture would help my cause instead of hindering it. The motion I was capturing was restricted to relatively large movements such as the arcs and angles of the legs, arms and torso, and this data would be significantly smoothed out and modified afterwards. Furthermore, I was working with a model which was nowhere near photorealistic, which would further soften any potential awkwardness. My options were to either risk presenting a shoddy manually animated run, or risk the potential downsides to motion capture. I chose to take the latter risk, and I believe it paid off.

My actor was a pleasure to work with, and he added the necessary emotional projection that hand animation might have lacked in this case. The process went smoothly, with the only issue I remember being the lack of floor space in the motion capture studio. I had originally planned for Stephan to run straight ahead the entire time, both before and after ducking into a crevice to hide.

With the limited floor space, there was not room enough for my actor to run into the scene, sit and run out convincingly. We wanted to save a long stretch of floor space for the running after the pause, since I had planned for that running sequence to be longer than the first. Consequently, we had to save the largest area of floor space for the end of the captured sequence. We gained some length by having my actor run from corner to corner instead of straight across the space, but we still needed more. We tried a few different solutions, and in the end settled on what you can now see in the animation: Stephan enters from the side, makes a sharp turn, then sees the crevice where he sits down. This was the best option in my mind, since there was room for my actor to get into the rhythm of a convincing run before sitting down. It worked on a conceptual level as well, as being distressed and frightened could certainly cause one to be indecisive about which direction to turn.

4.4 Manual Cleanup and Animation

Editing the motion capture data was surprisingly straightforward and easy, due perhaps in large part to the initial clean up which the motion capture studio's manager did for me. My task after receiving the cleaned up data was to apply it to my model of Stephan. I started by simplifying the curves, which removes some frames at regular intervals. Motion capture data is very heavy and dense, with keyframes on almost every frame of raw data, which is unnecessary for animation which is not hyper realistic. Removing

a large chunk of ‘in betweens’ (transitional frames between the start and end of an action) from the motion capture data does not negatively affect the quality of the motion, but it does make it significantly easier to edit the remaining frames.

I added some details of my own and removed things like jittering and sudden jerky motions by applying animation layers to the motion capture data. Some details had to be added manually, such as finger animations, since they were so small that capturing them in the studio with an actor would have been unnecessarily cumbersome. The motion capture data which I received had information on the positions of the hands as whole units, but no finger positions. Some shots in the animation, such as when Stephan is sitting down in his hiding place and clutching his knees to his chest, featured his hands heavily. For these shots, I manually added animation to the fingers.

The shots which are built with motion capture data start from the second shot, in which Stephan first runs into frame, and end with the shot of him running away after hiding for a short time. Other than the quick shots featuring monsters which are cut into the footage of Stephan, all of the animation between these two points started out as motion capture. After that point, everything is animated by hand, although I did use reference video for actions such as collapsing to the ground and curling into a ball. This is something which animators do at every stage of their career, whether they are just starting out or working at an internationally known animation studio. Just like a painter working from a live model, starting from reality and adding onto that base is the best method for capturing something lifelike. In that sense, all of Stephan’s movement in this film is somehow based on real footage, whether that footage was mathematically applied through motion capture or referenced by eye.

4.5 Lighting

For lighting, I started with a typical three-point lighting setup, using a key light, a fill light and a back light. I eventually added a second fill light, finding that this was the best way to achieve the lighting effect which I was looking for. To push the lighting more in the direction of a mid-afternoon scene in a sunny, hot setting full of warm earthy tones, I adjusted the colour of the lights from the default pale yellow to a warmer orange-pink. I made sure that the key light was casting shadows, as I wanted very visible shadows in this animation. They helped in setting the mood, as seen in the shot where

Stephan is hiding in the crevice and being overcast by the looming shadow of the cliff wall to his side. They also played a technical role, helping to ‘ground’ him and connect him to his environment, giving the model a feeling of solidness. With the shadows, one more easily believes that Stephan is truly standing there in the sand.

4.6 Rendering

For the final phase, rendering, I looked back to a toon shader experiment which I had done for the ‘Advanced Rendering Techniques’ course (see fig. 6). This experiment was done with SoftImage instead of Maya, but the workflow between the two Autodesk programs was alike enough that I was able to achieve a similar effect in Maya, with the added help of some online tips. The character and environment that I had to work with in the Advanced Rendering Techniques course were quite different from those in Bitter Lands, but the toon shaders worked just as well for both.

Figure 6



Some of the geometries, such as Stephan’s t-shirt and hair, simply have two-tone light angle shaders with shades of a base colour applied. For the geometries with some detail, such as the character’s faces, the seams on Mira’s leather top and the pockets on Stephan’s shorts, I utilized a two-tone light angle shader with an applied texture. The textures were created in Photoshop with the help of UV layouts exported from the UV Editor. I aimed to include as little fine detail as possible, thinking that a high level of detail might easily betray the 3D quality of the models. Since I was attempting to

emulate 2D animation, I considered what kind of details would have been included in a hand-drawn film. Extraneous details such as seams and buttons are often left out of 2D animation unless there is a specific narrative need for them, since including unnecessary small details would use up much precious time and other resources in a production.

I added 'toon outlines' on many geometries, including the character's bodies and hair. I opted out of including them in some pieces of clothing, such as Stephan's t-shirt, as they had a tendency to get messy on surfaces which were being controlled by cloth simulation. To enhance the 'organic' feel of the lines, I applied a charcoal brush and adjusted the settings to make the effect slightly subtler. The goal was to get a certain degree of imperfection in the lines while avoiding a messy and broken line which could result from a chalk or similar brush. I was attempting to emulate more of a soft pencil or other fine dry media, as opposed to a blunt chalk or pastel.

Digging deeper into the reasons behind my choice of rendering style, I believe I may have also been influenced by other factors besides a desire for a traditionally animated look. The toon outlines in particular were a feature which I could have easily omitted, but I was confident from the beginning that I definitely wanted to include them. I stand by this decision and like the result the outlines have produced, but my choice to use them in the first place is most likely more deeply rooted in my subconscious than I had acknowledged at the time. A simple explanation would be that I am very used to outlines, since I use them in practically all of my illustrations. Another contributing factor may be a subconscious desire to emulate a classic comic book style, with its dynamically inked outlines. Classic comic books are often full of action and fantasy, making it easy to imagine Bitter Lands being represented in their art style. This comic art style contrasts sharply with the "lineless", vector-esque style used in many animated series in the 2000s. I am a fan of this style as well, so I could just as well have drawn inspiration from that direction. In the end, I am satisfied that the style chosen is effective in representing the setting and narrative in question.

5. Post-Production

5.1 Photoshop

The most fundamental part of post-production was the editing of

Maya-generated frames in Photoshop. The largest issue was Stephan's clothing, since both the t-shirt and shorts intersected with the body geometry at certain points in the animation, creating a gaping 'hole' in the fabric. As detailed in the 'Production' section, I worked with the cloth simulation of the t-shirt and the skeleton binding of the shorts extensively to avoid as many of these glitches as possible, but settled on leaving some uncooperative spots to be fixed in post-production.

The process of cleaning up these problem frames in Photoshop involved simply painting over the areas to be fixed with the brush tool on a new layer. Since the entire animation was rendered with two-tone light angle shaders, and any textures applied were flat and sparsely detailed, it was possible to simply pick up colours from the image with the eyedropper and fill in the problem areas with large blocks of colour. Since the images I had exported from Maya were .tifs, I was able to safely save my work with the same file name without losing my layer information.

About 90% of my Maya-generated frames required editing in Photoshop. At some points during the editing process, I ran into issues which I had not seen until I started reviewing the frames one by one. If the issues were major enough, I returned to Maya to fix them before re-exporting frames for Photoshop editing. An example of such an issue was Stephan's arm's geometry intersecting almost completely with a leg while he was sitting and curling himself into a closed off position. I adjusted the arm's position during the affected frames with Maya, then did the remaining editing in Photoshop.

A specific issue which required a creative fix was Stephan's head intersecting with his shirt's fabric while in the position described above, especially when he dipped his head down. Painting over the affected areas would have been difficult in Photoshop due to the detail in those areas. The solution which I came up with involved detaching Stephan's shirt momentarily, leaving him shirtless, and exporting shirtless versions of the frames in question from Maya with new filenames. I then copied Stephan's head and neck from these versions in Photoshop, and pasted them in place in the original frames where the shirt remained. I cleaned this up and was left with frames where both the shirt and the head were sufficiently visible (see fig. 7).

All of this editing was tiresome and at times grueling, but there was a silver lining to it. Since I worked so extensively in Photoshop with my Maya-generated frames, it felt even more like I was producing a 2D film. The simple

blocks of colour resulting from the use of toon shaders made further editing in Photoshop easy, which really allowed me to integrate the use of this 2D software into my 3D filmmaking process.

Figure 7



5.2 AfterEffects

The majority of the remaining post-production work was done in AfterEffects. I first added a background layer to the transparent frames I had imported, settling on a dull greenish hue which contrasted nicely with the stark reds and oranges of the set. I also added some blurry reddish shapes around the vanishing point on the running shots to fill in the landscape.

The monsters were also finished in AfterEffects. I applied blurriness and transparency to their bodies, taking advantage of having rendered the body layer separately from the eyes and nostrils, which remained solid and opaque. I also applied a ‘fractal noise’ effect, and worked with the settings of this effect until I achieved a result resembling swirling, pulsating, bulging masses of smoke.

The animation ends with a title card fading into view over the image of Mira’s outstretched hand; another effect achieved in AfterEffects. A Bitter Lands logo which I had previously drawn (see fig. 8) is used. The logo uses the free font ‘Alégre Sans’, which has the solid, tidy but not delicate type of feel I was after. I used Photoshop to mask some lines over the words, curving the lines to resemble the ubiquitous hills and canyons of the badlands.

Figure 8

BITTER LANDS

5.3 Flash

In the last scene, after Mira swings her sword and kills the monster attacking Stephan, bits of the monster's mass are left as the being evaporates, eventually dissipating themselves. This is in line with the way the monsters are said to die in the text. These bits were drawn and animated in Flash, since this program is more straightforward in its approach to drawing 2D animation than something like Photoshop, which is not built specifically for the purpose. Flash has a very convenient and easy to use onion skinning system, as well as the ability to play back your work immediately, making it easy to keep consistent and check your progress periodically. Especially since I was working from reference material and trying to keep the behaviour of the gaseous bits realistic, I found this very beneficial. From Flash I exported this animation as an image series and brought it into AfterEffects. There I applied the same effects to these bits as I had to the whole monsters.

5.4 Sound

Once the visual aspects of my film were finished, my hands-on work in the production was through. It was time to add a soundtrack, which was a task that I could not accomplish on my own due to having little knowledge of and no experience with music composition. Luckily my department has many talented musicians and sound artists, one of whom graciously volunteered to work with me.

I gave Yakov the reins fully when it came to composing a soundtrack for the film. I had not thought about the specifics of my film's audio, only that I wanted a feeling of suspense and a sense of fear and uncertainty, echoing Stephan's situation. The details, including sounds made by the monsters, were up to him. I had been asked by my advisor earlier in the process whether the monsters made sounds, and what the sounds might be like. I could not answer him at the time, but Yakov's contribution fills in that gap. The soundtrack really ties everything together, as they often do in films, by igniting one more sense in the viewer and drawing them further into the action.

The only changes I made after receiving the soundtrack were adding a filter to the entire film and adding some laboured breaths to the animation to match what Yakov had included in the sound effects. The breaths were a smart addition to the sound, as they help to further convey Stephan's

physical and mental tiredness as he hides in the cliffs.

6. Further Work

6.1 Realistic Goals

The realistic scope I planned for my project involved my thesis film, the novella it is based on, and supplementary materials which I generated during the filmmaking process. These supplementary materials include character drawings, storyboards, the 3D models, and so forth. The writing of the novella took several months, followed by approximately a year of filmmaking. Looking to the future, I will without a doubt continue to draw these characters, and I am open to exploring new creative projects with them.

Other relevant materials include the hard copy version of Bitter Lands which I have had printed and the website which I have created for the project. The hard copy version was created at lulu.com, an independent publishing platform which allows anyone to design and order books and other goods. The Bitter Lands website (Vuorenvirta, 2016) is a very simple page which introduces the project, includes links to different parts of it, profiles the main characters, and makes use of some simple illustrations to spruce things up. From the website one can access the novella digitally, go to lulu.com to buy a physical copy, watch the animated film, read this thesis text and see Bitter Lands art on my portfolio website.

6.2 Dream Goals

Were I to be presented with the opportunity, I would be delighted to pitch the concept of a full length Bitter Lands animated film to a studio. Since a full length animated film is well beyond the scope of one person's capability, cooperation with a studio would be essential. If given the opportunity to realize this film, I would be keen to participate in the production as much as possible. Nevertheless, I am open to any ideas and other viewpoints concerning any aspect of production, including plot, character development and stylistic choices.

An independent animation studio would likely be the best fit for Bitter Lands, since such studios are more likely to be interested in producing something which looks different from the mainstream. In this case, the

difference is the 2D rendering style. Regardless of the size and reputation of the studio though, it is difficult to get one's idea heard as an outsider. The easiest and most secure route is to employ an agent, since most studio contact details have fine print reading 'no unsolicited submissions'. Even without an agent, though, some professionals in the industry recommend sending studios a query letter anyway. Query letters let a studio know that you have a script or a story idea, and should they be so inclined, they can request for you to send them what you have. The worst possible outcome of sending a query letter is having the letter go right in the bin at the studio, but should your stars align that day, you might pique the interest of the right person at the studio who will read your submission regardless of the company's official policy (Hay, 2011).

In addition to having an agent, it is always a plus to have a good reputation in the industry. For someone like myself, who is only a student and hobbyist, this is understandably a difficult thing to accomplish. Submitting your film to festivals is one good way to try to build a reputation, since being included in a festival is a great accolade. I have submitted Bitter Lands to the 2016 Animatricks festival, Finland's only film festival solely for animation.

7. Conclusion

This project was the most ambitious animated film I have ever set out to create on my own. It was my first attempt at using motion capture technology, fabric simulation and toon shaders, which in hindsight was quite an undertaking since all of these techniques were completely new to me. Overall, I am pleased with the results I have achieved, so thankfully this gamble seems to have paid off. All of the aforementioned techniques add positively to my film, and I cannot imagine that my results would have been as good had I omitted any of them.

Reviewing my own work critically, there are some areas which could have been done better as well, although I do not believe they bring the production down significantly. I do wish that I had been able to get a firmer grasp of simulations other than fabric, which may have been an effective method for creating the monsters. The chosen method - using rigged geometry and effects applied in post production - is satisfactory, but perhaps using a complex fluid simulation could have resembled a semi-solid mass

of smoke even more. The environment could also have used some more variation, such as different sizes in the hills and rock formations. Some sparse vegetation could also have been added. In regards to the animation itself, some movements, such as Mira extending her arm in the last shot, could have been made even more robust and slightly less stiff. I do not see these criticisms as failures, but rather as opportunities for growth which I can learn from for my next production.

When I defined the format and scope for my animated film, my goal was to create a mock teaser trailer which would generate interest in Bitter Lands and leave a viewer wanting to learn more. Watching the finished product, I believe I have successfully accomplished this goal. A more specific success which I am proud of is how well my 2D drawings of Mira and Stephan have been translated into 3D models. Especially with the toon shaders for rendering, the characters look 'on model', or recognizable as the characters which appear on a production's initial model sheets. These areas which worked well give me confidence in my ability to grow and learn even more as I continue to animate and tell stories.

In conclusion, I have learned many techniques and had many learning experiences, all of which will certainly contribute to future projects. I feel I have also come out of this process a better storyteller, and I will no doubt hold a love for these characters and their world for a long time to come, regardless of what I do with them in the future. Furthermore, if any other storytellers working in any medium were to gain inspiration from my experiments in narrative animation, that would be a prize of equal importance.

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