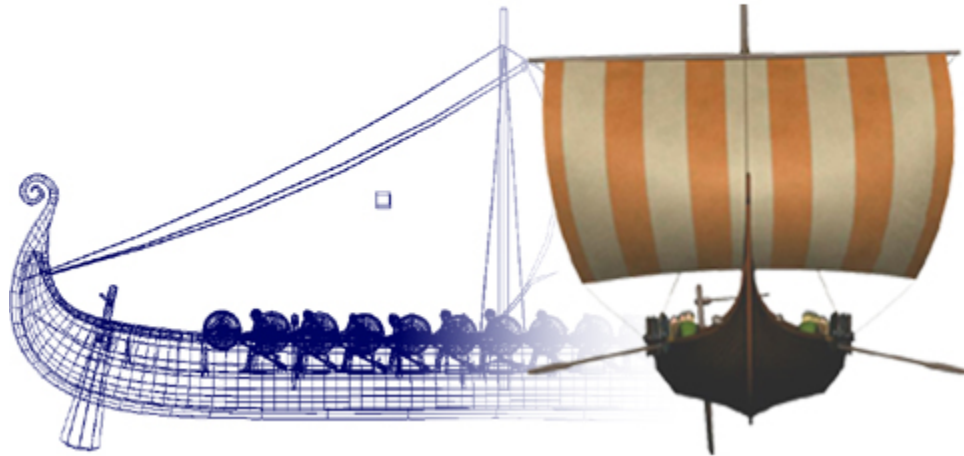


The Viking Story

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Animation

Aalborg Universitet i Esbjerg
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Abstract

This project includes our animated movie, called “the Viking Story” and the rapport, which largely acts as our written documentation for the production of the movie.

The start of the rapport refers to some of the definitions of animation in the animation community.

We use these definitions and other arguments to substantiate our own definition, which follows in the tradition of all good animators in that it is kept to the broadest sense of the word:

“Any object that through movement and/or expression can give the impression of life.”

We then go straight to the procedure of designing our movie and producing it in Maya. This including the storyboard (in the appendix) and the animatics on the CD.

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Inserted in cover one CD with:

Rapport: Animation01.
 3D images used in rapport for better viewing.
 “The Viking Story”

1. Introduction

The purpose of this course has been to introduce us to animation. Through literature and animated films, we should gain knowledge about animation in general, animation techniques and also be able to give our own definition of animation. This leads to our assignment, which is to create a 1 – 5 minute long animated movie, using AliasWavefronts 3D software Maya5.

Part of the assignment is to write this report, which contains theory referring to animation, our own definition of animation, and a description of the whole creative process from idea to film.

1.1 Project Idea

We want to create an animated movie about Vikings partly inspired by a historical novel written by Frans G. Bengtsson called Røde Orm. It is our goal to keep the movie, as true to real life at the time modeling by using artifacts excavated from the Viking age as models. Artifacts from both Scandinavia as from the British Isles.

1.2 Goals and Inspiration:

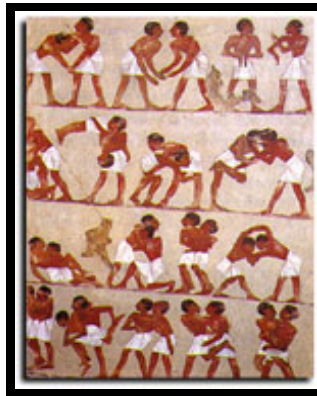
1.2.1 Goals:

The main goal for us with this project is to learn how to 3D -model and -animate by using AliaWaveFront's Maya5 and thus produce the movie we are aspiring to hand in as our examens project. The purpose of the rapport will be to document the project, as seen in any animated project come movie.

2. Animation

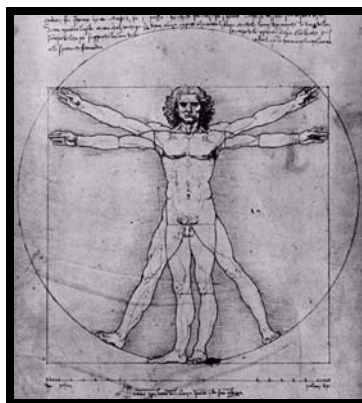
2.1 History of Animation:

Most people would think that animation is something of newer date, but the forerunner to today's animations can be seen on a Egyptian wall decoration from circa 2000 B.C, depicting wrestlers in different positions during a match.¹:



*Figur 1:
Egyptian animation*

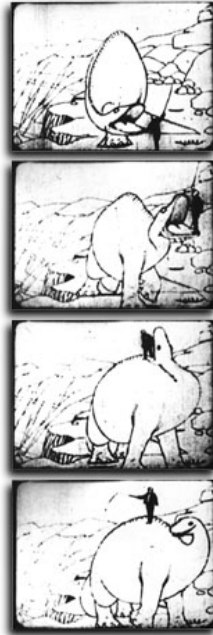
One of the most famous historic animated illustrations is Leonardo da Vinci's illustration of the different positions of the limbs on the body, known as the old logo for Manpower:



Figur 2: Animated man

¹ <http://www-viz.tamu.edu/courses/viza615/97spring/pjames/history/main.html>

One of the first animated cartoons in the west was “Gertie the Dinosaur” by Winsor McCay, which premiered at the Palace Theatre in Chicago in 1914²:



Figur 3: Gertie the Dinosaur

The largest quantum leap within animations happened in the period from 1930 to 1940, where the 12 principles of animation were developed, mainly at the Disney studio, applying to any frame-by-frame technique, be it classic cel animation, paper cut-outs, stop-motion puppets, or computer generated images.

2.2 The 12 Principles of Animation³:

- Squash and Stretch. (Shape distortion to accentuate movement)
- Anticipation. (A reverse movement to accent a forward movement)
- Staging. (The camera viewpoint to best show the action)
- Straight-ahead vs. Pose-to-pose action. (Two basic procedures)

² vegalleries.com/gertieart.html

³ Frank Thomas' and Ollie Johnston's landmark book, Disney Animation, “The Illusion of Life”

- Follow-through and Overlapping action. (Nothing stops abruptly!)
- Slow-in and Slow-out. (Smoothing starts and stops by spacing)
- Arcs. (Planning the path of actions)
- Secondary Actions. (A head might wag while the legs walk!)
- Timing. (Time relations within actions for the illusion of life!)
- Exaggeration. (Caricature of actions and timing)
- Solid drawing. (Learn good drawing to be a good animator!)
- Appeal. (If our characters are not appealing, then all is lost!)

If I may quibble, I would add⁴:

- Mass and weight. (and preserve volume!)
- Character acting. (Thinking of the character as a real actor)

3. Definitions:

3.1 The Broadest Definition of Animation:

Even experienced animators are weary of giving a set definition of what animation is, so we will just mention some of the definitions that are out there in the animation community:

Animation derives from the Latin word, *anima* meaning: “*The breath of life*”⁵, this is the broadest definition Gene Deitch⁶ gives in his book: “*How to Succeed in Animation*”⁷ as he refers to frame-

⁴ Ref.: How To Succeed in Animation by Gene Deitch 2001 - genedeitch.awn.com

⁵ <http://genedeitch.awn.com/index.php3?ltype=chapter&chapter=2>

⁶ Gene Deitch is one of the last surviving members of the original Hollywood UPA studio of 1946.

⁷ <http://genedeitch.awn.com/index.php3?ltype=cover>

to-frame⁸ animation. But if forced to give a definition basing it on the above latin derivation and his practice of animation [i.e. CINEMATIC ANIMATION] it would be as follows:

["CINEMATIC ANIMATION: The recording of individually created phases of imagined action in such a way as to achieve the illusion of motion when shown at a constant, predetermined rate, exceeding that of human persistence of vision."]

He doesn't presume to want to go into a technical definition of animation thus omitting reference to any particular technique, medium, or technology.

3.2 Animation in a Technical Sense⁹:

A sequence of frames that, when played in order at sufficient speed, presents a smoothly moving image like a film or video. An animation can be a digitized video, a computer-generated graphics, or a combination.

3.3 Animation in the Sense of Perception:

(*n.*) The act of animating, or giving life or spirit; the state of being animate or alive.(*n.*) The state of being lively, brisk, or full of spirit and vigour; vivacity; spiritedness; as, he recited the story with great animation.

3.4 Our Definition of Animation

As mentioned above animation is often defined as creating life or bringing life to an inanimate being. The question is then, what is life? Life, according to Merriam-Websters Collegiate Dictionary¹⁰, is amongst 15 other definitions: "Animate activity and movement <stirrings of *life*>". If we compare this to the definition of animation: "The state of being [animate or] alive", and tie

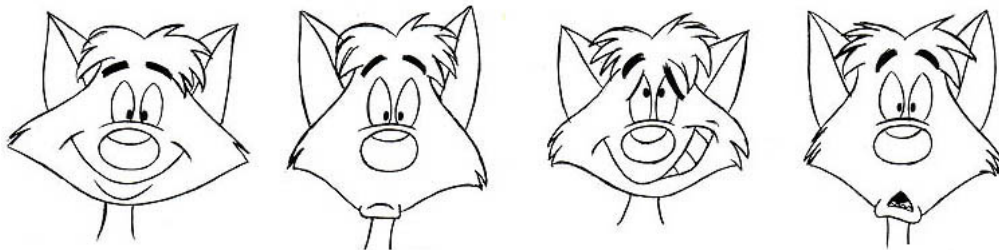
⁸ Frame-by-frame animation: classic cel animation, paper cut-outs, stop-motion puppets, computer generated images.

⁹ www.brainydictionary.com/words... (same reference for 3.3.)

¹⁰ <http://63.240.197.92/cgi-bin/mwdictaj?Life> (16b)

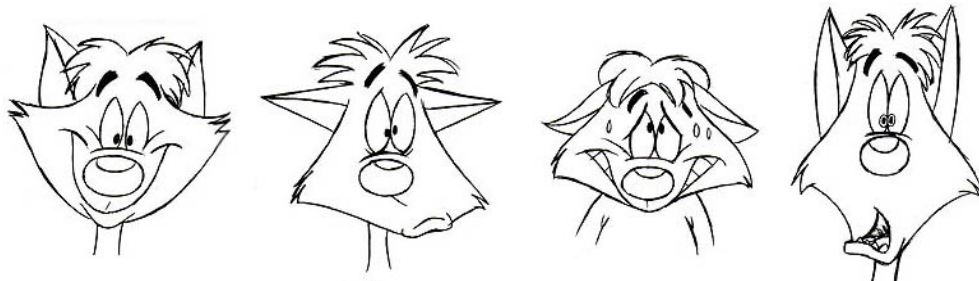
them together we get the definition: “Live activity and movement”. But this is inadequate, when applied to animation, as we can perceive movement without actual movement, because we as human beings fill in the blanks, when we read a cartoon cel by cel.

In class, life was defined as being connected with movement, evolving over time or to be more accurate “frame-by-frame” What is movement? Can there be life without movement? Can an inanimate being seem or appear to be alive without movement? We would like to think that it can, especially if we use one or all of the 12/14 principles developed by Disney Studios, as a guideline to our animation. The “inanimate” portrait of a cat¹¹, can be interpreted as being in a specific mood by the different facial expressions, thus we perceive the cat as being animated; i.e. we personify the cat, by giving it human characteristics and emotions:



Figur 4: Facial expressions - ordinary

The same cat can by “tweaking,” or “pushing,” it’s facial features, be added extra energy and vitality thus by exadurating it’s facial expressions get the message across to the reader/viewer:



Figur 5: Facial expressions - exaggerated

¹¹ http://mag.awn.com/index.php?ltype=pageone&article_no=1405

A sense of life has been brought to the character by applying principle #1 on these four illustrations, without actual physical movement, but when looking at them we perceive life. This can also be applied to clay. A lump of clay could hardly be accused of being alive, but model it with different expressions and movements, shooting it frame-by-frame and you will perceive life.

3.4.1 Where is the Animation Created?

Outputting the above (clay) frame-by-frame as a film containing a storyline of some sort and you will have the impression of an otherwise inanimate being having life. Thus as mentioned earlier, creating or bringing life to something through the technique of animation. The question is then how much life does one need to bring to an object for it to be perceived as animate or to understand the story. For example the film “Songbird”, by Hee Holmen, is an animation using images without any real-time flow. Here it’s left up to the viewer to fill in the missing images or gaps and somehow create a real-time film in their imaginations using these images. The interesting detail is: how little visual animation is really needed for the observer to understand the film. Where is the line drawn between it being a film or just a sequence of images? If Hee Holmen had used a lot more images and therefore made a more real-time flow, would it be considered an animated film?

We often create our own little films or pictures in our minds eye. Take for example, when we read a book. A lot of people have read “The Lord of The Rings”, conjuring up their own images of what the different characters and environments look like. How much can be left up to the imagination and our own storytelling mind? Is it not really up to the viewer, who is being entertained, what the storyline is? Different people will perceive different twists in the same story and this is really the proof that storytelling is subject to the mind of the receiver and not a set entity or controlled by the storyteller.

It has always been the animators wish to keep the definition very broad, as it keeps the creative flow free. A definition will very often cause restrictions. We will then keep ours very broad and still try to define animation:

“Any object that through movement and/or expression can give the impression of life.”

4. Creative process, *From Idea to Film*”:

4.1 Idea

When we were given this assignment, we thought a lot about what could make an interesting and challenging project. We all wanted to do something that really interested us, and not just make a senseless animation for the sake of animating. After giving it some thought and discussing it back and forth, we decided to make a story about Vikings. Taking our inspiration from Røde Orm, we set out to do some research amongst the rich resources available from that time-period in our own country.

4.2 Sources of Inspiration:

4.2.1 Røde Orm

4.2.1.1 The Readers Digest Version:

“The main character in the book is Orm Tostesson, who is abducted from his home in Skåne and is taken aboard a viking ship, where he is treated, as everyone else. He befriends Toke, who is sitting closest to him rowing the boat. They both take part in many adventures in Spain and end up staying longer than first anticipated. When Orm finally does manage to get back to Sweden, he weds the Kings daughter Ylva, and settles down as a very rich man under the name Røde Orm¹² or Orm den Vittfarne. But before growing too old he travels eastward in search of his dead brothers treasure.”

¹² Please refer to translation under footnote 2

4.2.1.2 Biography:

Here a short biography of the author of Røde Orm¹³ to substantiate his validity as a source of inspiration:

Frans G Bengtsson was a highly intelligent person even at the tender age of 6 years old. He never thought, he needed to do his homework for school, as he thought he knew it all, but soon became driven by the fact that he would get a good beating by his teacher if he failed to hand it in. The secondary prize from it was that he became very fond of reading and soon devoured any book he could get his hands on. Thus managing to complete highschool by the age of nine. He then continued his studies in Lund, where he majored in history and literature. He started writing poetry, but due to poor health he had to interrupt his studies and go back home [Rössjöholm]. He went back to Lund and authoring, as soon as he was well enough. Contrary to his peers he chose to write about anything but his own era, because he felt the present was a failure. He wrote about past heros and despised the present. In 1920 he became a Candidate in Philosophy majoring in English, Religious History and Philosophy. His most famous book was Røde Orm¹⁴, translated into 20 languages. He took inspiration from the Islandic Sagas and great pride in keeping the story true to the historic age of the Vikings, in all details.

¹³ members.tripod.com/mariasund/

¹⁴ Red Worm (freely translated)

4.2.2 Viking Ship Museum in Roskilde

We have visited the Viking Ship Museum in Roskilde, where a substantial amount of artifacts are kept, thus giving us a real life impression of how things looked and what reality was like. We have also used our own knowledge from our history lessons in secondary school, as this era was part of our childhood curriculum.

4.2.3 “Walking with Dinosaurs¹⁵”

We have also used BBC’s documentaries on the subject of pre-historic times; especially “Walking with Dinosaurs” as the type of animation we wanted to lend inspiration from, as they have chosen 3D animation to translate these pre-historic creatures from the past into the present. They, as us, have used excavated artifacts, but in the form of fossils, as the basis for their “characters”.

Apart from the above stated reasons, we also wanted to create something, which contained some elements of action, so it seemed to be a perfect combination using archeological facts and the myths surrounding the Vikings, as being raiders and pirates.

4.3 Intension:

We as Frans G. Bengtsson find this era in our history very interesting, because it is part of our heritage, and that’s why we want to tell a tale with our movie giving an impression of the days of the Vikings. We have also used illustrated books¹⁶ with detailed illustrations to image our character, Viking ship and environment so all appear as true to the real McCoy¹⁷ as possible.

Our intension was then to try to make a reconstruction of a Viking community. We wanted to illustrate, how it may have looked like at the given time. The style we have chosen is “*realism*”, meaning that we wanted our movie to be as close to reality as we could. We wanted to take a part of

¹⁵ www.bbc.co.uk/dinosaurs/

¹⁶ **Vikingen** from Boghandlerforlaget.

¹⁷ Something that is neither a imitation nor a substitute

history, and bring it to life again. In order to do this in a convincing way, we have used the various illustrations, to get the right proportions of our characters and models.

4.4 Developing the Story:

Once settled for an idea, it was time to develop our storyline. We had a time frame for the film that said between 1-5 minutes length, so it had to be kept rather short. We talked about what the story should contain, where it should take place, what kind of scenes there should be etc. Then we made a storyboard¹⁸, in order to visualize, what we were talking about. The storyboard got further developed, scenes were added and deleted, and some were put in different order. This was done until we felt we had a story that actually made sense, and was built up chronologically.

4.5 Storyline for “the Viking Story” Movie

“A Viking ship has been looting a village and has just disembarked to open sea. The Vikings think they’re home safe, but suddenly two enemy ships appear out of the mist. The two enemy ships are sailing towards the ship, getting closer and closer. The leader of the ship has to make a decision. Does he take up the battle with the enemy ships, or try to flee as quickly as possible. All of a sudden a storm in the distance catches his attention, and he makes a decision. He forces his ship straight into the eye of the storm, beyond the point of no return. The ship faces gail force winds, rain and gigantic waves. The leader ends up being washed overboard, and drowns.”

¹⁸ See appendix page

5. Visualization

5.1 Character design:

When our storyline was complete, it was time to look closer at our characters in the story. We had all given some thought to the characters by picturing them in our minds eye as the story developed, but now we had to become more precise and detailed.

The next step in the process would be to create a series of character sketches so one would have a clear vision of exactly what the character model should look like. But none of us are good at drawing, so we used mainly characters illustrated in books and models found on the internet, one example is as found below:



*Figur 6:
Model*



*Figur 7:
Sketched reconstruction¹⁹*

¹⁹ Viking from



Figur 8: Our 3D Model as Modeled in Maya5

In order to make our characters look realistic, it was important for the character designer to have some fundamental knowledge of the human anatomy. When drawing or modeling our character, we needed to know the proportions of the human body, what the muscles look like, how they bend etc. Otherwise it could prove difficult to produce a convincing end result. It's no use trying to portray a well proportioned person by building a giant with short arms and legs

The body is one thing, but facial expressions is a complete other ballgame, demanding a great deal of effort on the character designers part. Facial expressions as stated earlier tell something about a persons mood, feelings etc., these are especially important to get right in the close-up shots/scenes, as these are the ones revealing the main-characters moods and intentions.



Figur 9

Laughter

Fear

Sad

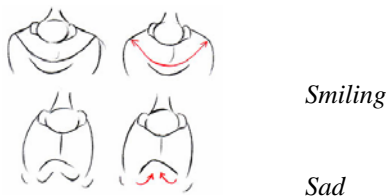
Anger

Happy

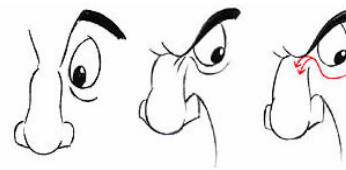
The viewer then perceive these moods from experience, because this is something everyone have been taught through infancy. Other species will communicate with the same facial expressions, but

with it's interpretation being completely different. If one bares ones teeth to a K9 it will percieve it as a sign of aggression. If one opens ones mouth and shows ones teeth to a chimp it will percieve it as a sign of submission. So when we personify an animal in a cartoon we would use human facial expressions, unless we are wanting to portray the animal in it's natural form.

So we do have to know the anatomi of the facial muscles in order to tweak expressions in the right way. Example: Where does one tweak the corners of the mouth to make the face look natural when the character is smiling, seemingly sad or angry?



Figur 10²⁰



Figur 11²¹
Anger

Finally when modeling our character in a 3D software program like Maya, it's important that the character suits ones intensions with it. There is no need to make a high poly character, if there is no need for it. This also when taking the size of the final file into consideration, because of the rendering time. We also have both high and low poly characters, according to what functions they have in the story. It's important that ones character fits it's purpose, and that they are easy to work with, but more about this later.

5.1.1 The Viking Chief²²:

Our main character is the Viking Chief. We have strived to give him a realistic look, by following reconstructions of Vikings. Since he is a chief, it's important for us to try to portray him with a certain amount of charisma, courage and initiative. Further more his clothes have a quality

²⁰ http://mag.awn.com/index.php?ltype=pageone&article_no=1412

²¹ http://mag.awn.com/index.php?ltype=pageone&article_no=1412&page=2

²² Ref.: page 13

indicating his position. His sword and cloak is also of such a nature that it indicates a certain status and rank.

5.1.1.1 Model in General

Although our model is made up of polygons he actually started his life as a nurbs model. The reason we started to model him in nurbs was that it seemed more intuitive and one could see the result instantly. But as we progressed we could see that a polygon model would be easier to work with, both for modeling and texturing. So we converted the nurbs model to polygons. This made it easier to apply texture and make changes to him.

5.1.1.2 The Head

In our movie, we have several close-up shots of the chief. These shots are important for the story, because they reveal mood, state of mind, and anticipates his intentions. Because of that, it was especially important for us to work on his facial expressions with the above things in mind.



Figur12: Blendshapes

We have made 5 different facial expressions using blend shapes:



*Figur 13:
Contempt*



*Figur 14:
Decisive*



*Figur 15:
Ooh*



*Figur 16
Thoughtful*



*Figur 17:
Yell*

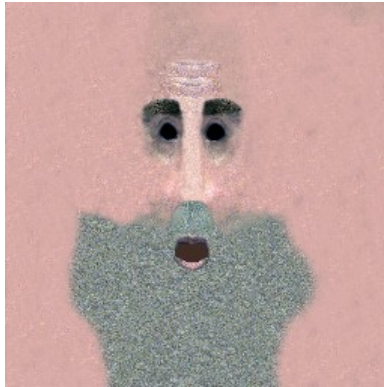
*5 Facial expressions of our
3D modeled chief created
with blend shapes.*

5.1.1.3 Texturing

Because of the realistic look we had to apply life like texture to the model.

On the torsos of the Viking Chief we have placed a texture, resembling golden broidery around the edges. His belt also has a texture giving the look of a crafted leather belt. The cloak pin and belt buckle have also been applied a texture so they look authentic.

It was also important that for the close-ups his head appeared real. For this we made a UV-map (see *Figure 18*) which was wrapped around his head using cylindrical mapping. The rest of the Viking Chief consists of different shaders and in-Maya textures.



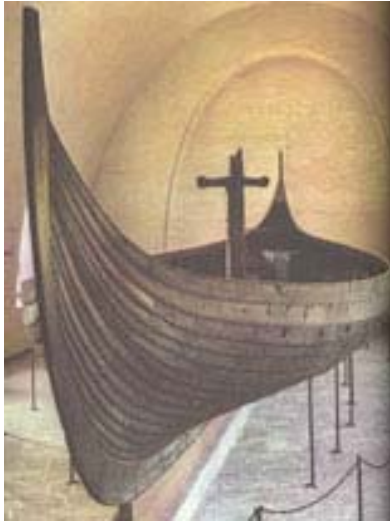
Figur 18: UV - map

5.1.2 The Stage; The Viking Ship:

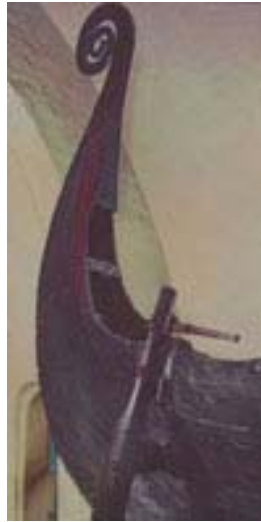
The Viking ship is the most important of our models. The ship functions as the stage on, which the actual story transpires, thus where most of the animation happens. Events surrounding the ship have a direct impact on the ship and thereby affecting the story.

5.1.2.1 Model in General

Having our goals in mind, the ship is a perfect example of how far we have come with Maya, both realism and modeling wise. The ship is copy of the Gokstad longship, and our model is nearly true to the original in proportions and detail. The ship consists of a mixture of nurbs and polygons.



Figur 19: Gokstadship²³

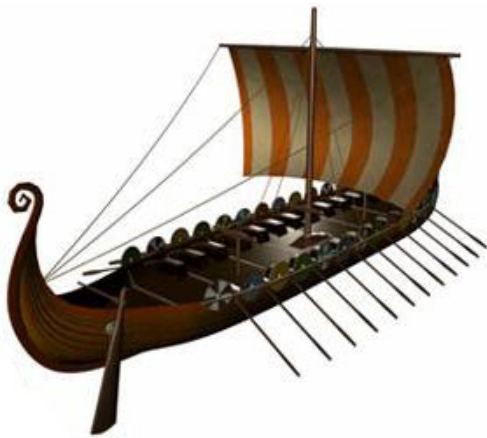


Figur 20: Gokstadship



Figur 21: Gokstadship

5.1.2.2 Our 3D Model of the Ship as Modeled in Maya5

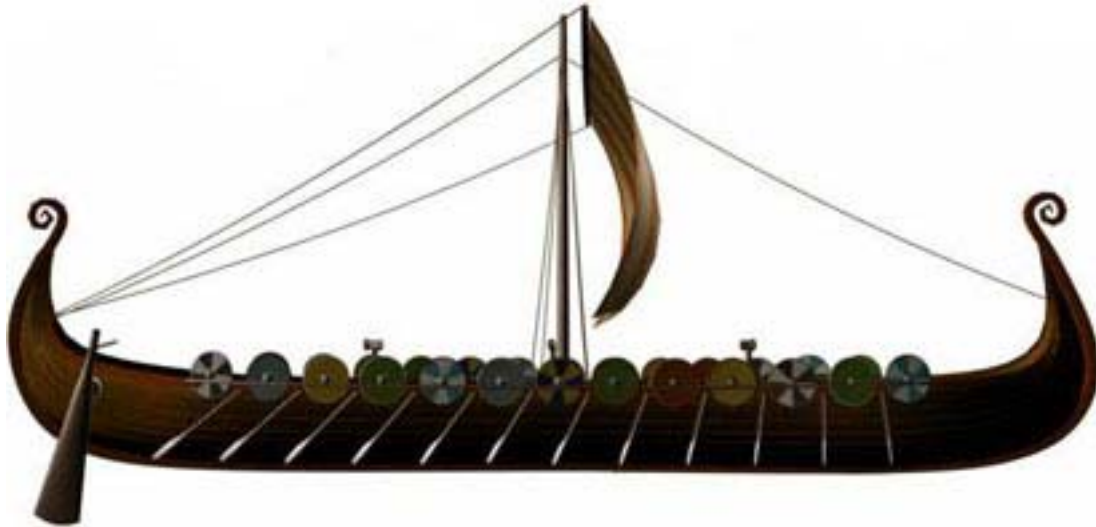


Figur 22:
45° view



Figur 23:
Front view

²³ *Real life preserved viking longship. Vikingen* from Boghandlerforlaget



*Figur 24:
Side view*

5.1.2.3 Texturing

The ship has been applied with different wood textures and afterwards we've added some dirt, so it appears to have been used. On the shields and sail we've applied Mayas own materials which have given a great result.

5.1.3 Setting: The Strom, Ocean and Enemy Island

The set of our story, takes place on the open sea with a burning village in the horizon. Due to that we have used several fluid effects such as water, wakes and mist. We have also created a storm with wind, rain, lightning etc. We have chosen to use pre-produced sound effects, and as the creation of these are not our main purpose in this project, we chose to purchase these and use our time with the animated side of the project.

5.1.3.1 The Storm

- *About the scenery*

This scene shows the viking ship during the storm, which they choose to sail into instead of confronting the enemy.

The thing we wanted to do with this scene was to create a realistic looking stormy ocean, that really shows the dynamic force and animation of the water and other phenomenon that occur during storms. For inspiration to this scene we saw the film “Perfect Storm”, which also used Alias Wavefront’s Maya for the animation of the storm with a very realistic result.

In the scene we wanted to capture the Viking ship in the storm from various camera angles to give a more dramatic feel. The idea is to give the observer a first hand feel of what it’s like being in the middle of a stormy ocean.

- *How it’s done*

The scene contains three elements, the Viking ship, an ocean and the fog.

Since the Viking ship is already described we’ll concentrate about the creation of the ocean and the fog. The storm scene is created using Maya’s dynamic Fluid effects. The fluid effects are included in the Maya package and through this you can create oceans or ponds and emitters to make fog for example.

5.1.3.2 The Ocean

Using Maya fluids we created an ocean. The ocean is dynamic with a lot of attributes connected to it such as, wave height, and turbulence, shading and so forth, which each influence the motion of the ocean.

It became quite a task to toggle the many attributes to create the desired effect.

- *The fog*

The fog in the storm scene was also created using Maya fluids, but here it was a little more complicated. The fog was made by creating a 3D fluid container and painting in the fog density,

where after different attributes were toggled and an expression to determine the speed of the fog in a certain direction.



Figur 25:

A photo of the atlantic at Peggy's Cove, Nova Scotia



Figur 26:

3D Ocean

5.1.3.3 Enemy Island and Village

a. About the scenery

This scenery is used in several scenes and therefore it was important, that the visualization of the island looked realistic. In the scenery we also have a burning village and here we strived to create a smoke and fire that had the same depth and mass as in real life. The terrain of the island is fictive. The village was made on the basis of real reconstructed buildings.

b. How it's done

The scenery contains six elements, which are described below.

- *The landscape*

The enemy island landscape was first made out from a NURBS plain whereby using the Sculpt Tool the terrain was made by pushing and pulling on the vertexes. Here after the island was converted to polygons and by pulling in some vertexes the crude edges for the rock terrain was created.

For the texturing of the island a grass/soil texture was found and for the rocky terrain we created our own shader within Maya.



Figur 27: Enemy Island

- *The Ocean around the Island*

The ocean around the island is made with Maya Fluids and attributes for the ocean were toggled to create the right feel of a calm ocean.

- *The Village*

The village which is placed on the enemy island is made from polygons. For these objects we used our research to construct the buildings as true to life as possible. A good example of this is the longhouse in the village which actually is based on a real longhouse called Trelleborg.



Figur 28: Real life reconstruction of longhouse



Figur 29: Our 3D model of the longhouse



Figur 30: Village in which the longhouse is situated and that ends up burning

- *Smoke and fire*

For the make of the burning village we used Maya Particle Dynamics. The fire was fairly easy to make in that Maya has a fire dynamic and by adjusting the attributes the right flames were created. On the other hand the smoke was a little trickier. First we created a particle emitter, which emitted particles formed as clouds and by using ramps we could control color, size, spread and life of the particle. Also here the attributes were toggled to give the right effect.

- *The Sky*

The sky behind the island is a sky picture found at 1000skies.com.

5.1.3.4 The Seagulls

Around the island there are several birds that fly around. These birds are made in polygons were after they were rigged and the wing cycle was keyed. Each bird follows a motion path curve.



Figur 31: Seagull

5.1.4 Props:

In the movie we use a lot of props like helmets, shields and a sword. All these props are constructed out from real viking artifacts. Again we strived after realism. We wanted the props to show wear, so for example the helmet and the shields have dents and a dirty kind of texturing. The props are made in polygons.



*Figur 32:
Real life reconstructed models of battle dressed vikings*



*Figur 33:
Our 3D shield*



Figur 34: Oar



Figur 35: Helmet

5.1.5 Extras:

5.1.5.1 Oarsmen

The intention with the oarsman was to create a character, which would be light and easy to move around. This is because of the amount of oarsmen that would have to be on the Viking ship. In all there are 24 oarsmen. The oarsman character is a low polygon model with a reduced rig from the Viking chief except that it doesn't have the leg joints.

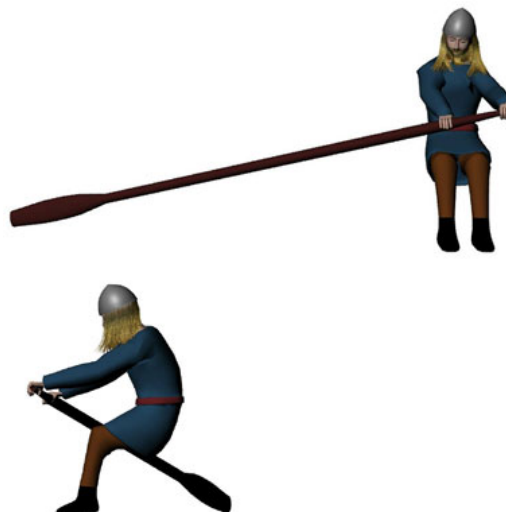
The oarsman is parented to an oar that has a rowing cycle. The cycle is a keyed animation.

Each oarsman has some attributes connected to the head such as nod and turn. This is done to give the oarsmen a little bit of character and not making it so monotonous when they sit together down the ship.

All the oarsmen are connected to the ship by point constrains and each oarsmans oar cycle differs a little. Also the hair on the oarsmen differs in length and color, plus the clothe color is different.



*Figur 36:
Reconstruction of an oarsman*



*Figur 37:
Oarsmen*

- *The Hair*

The hair on our main character and the oarsmen on the Viking ship were created by using Maya's Paint Effects. First we created curves that represented the flow of the hair and beard, hereafter Paint Effects hair strokes were applied. As with the other dynamics a lot of attributes were toggled to get the result that we wanted. (see the visualization of the Viking chief for pictures of the end result).

The downside about Paint Effects: it's extremely heavy for the computer to calculate, but we felt that making hair out of polygon plains didn't give us the result that we wanted.

These "before-and-after" images are recorded in detail in order to document how well we have been able to reach our goal in actually modeling everything in detail and true to nature.

6. Production Development

6.1 The Process

After having gone through the motions of pre-production, by getting the storyline pinned down and working on the storyboard with the animatics as the end result, we could start modeling. First we had to determine what methods to use.

6.1.1 Modeling:

The two basic methods of creating a model in the computer, by using polygons to describe its surface, and the other, splines. Maya uses polygons and NURBS (nonuniform rational B-splines).

6.1.1.1 Polygons:

Using polygons for modeling objects were formerly driven by demands for simplicity and ease of computation. These characteristics still apply to modern users of polygon-based modeling, but are freed from many of the prior limitations. Maya offers a sophisticated set of polygon tools, enabling users to create and edit highly complex models.

The primary characteristic of a polygon-based modeling system is flexible topology²⁴ giving a great deal of freedom, consequently handing over the responsibility to the user to ensure that an appropriate amount of detail exists in the mesh. Too little detailed mesh, will result in nickeling artifacts or insufficient feature definition. Too much detail results in heavy objects unwieldy to edit or to render.

²⁴ offshoot of geometry that studies those properties an object retains under deformation—specifically, bending, stretching and squeezing, but not breaking or tearing. Thus, a triangle is topologically equivalent to a circle but not to a straight line segment.

The models in Maya are built up into polymeshes consisting of linked polygonal faces, which are composed of edges, which are themselves composed of vertices. Given a sphere; the more polygons its made up off the smoother it becomes:



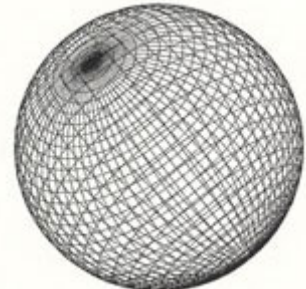
Figur 36:

Too few for the likeness of a ball



Figur 37:

Could pass as a ball, if not shown close-up



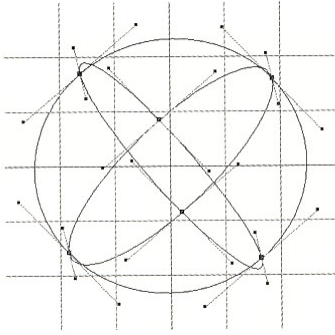
Figur 38:

Smooth enough for a ball close-up

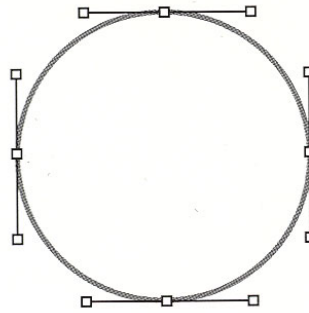
Polymeshes suffer from a lack of fidelity for curved surfaces, but animated applications, however, are usually forgiving enough to allow a mesh to be refined, to make nickeling relatively imperceptible. Polymeshes bend easily, where their more sophisticated cousins - such as NURBS - often break. To bring even more detail to the object one can apply Subdivisions.

6.1.1.2 NURBS:

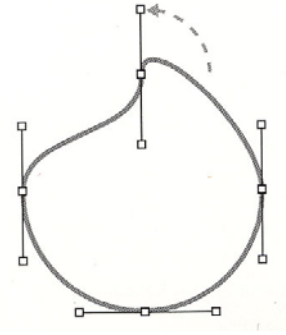
In order to understand NURBS we have to understand the concept of splines. Using splines, a smooth sphere can be modeled with less geometry than with polygons, as the below diagram shows, all that is required is three circles that intersect at six vertices:



Figur 39
Splines



Figur 40:
Splines with handles



Figur 41:
Pushed and pulled spline

At each vertice, there is a control handle that the modeler can use to change the curveture of the spline, the second and third diagram shows what happens to a circular spline, when a control handle is moved.

Maya offers a sophisticated kind of spline called NURBS, that has control handles off the curves. The modeler can shape an individual curve by manipulating these handles in 3D space thus, by pushing and pulling the control handles or control vertices on the spline curves, can create an efficient and accurate model. A complex model can be created by using multiple NURBS surfaces and then attaching them to each other.

Nurbs are not ideal for all shapes. Jagged rocks are better created with polygons. The challenges using polygonal modeling is using enough polygons to create an illusion of detail while keeping the polygon count down.

As it happens we have used both methods in modeling our project. The Chief is modeled with polygons and the Vikingship with NURBS.

6.1.2 Rigging:

After the modeling of the character is completed needs to be rigged by the rigger, so it can be posed by the animator. The rigger creates a series of controls that determines the nature of the characters

movement. This is the step between modeling and animation. Without rigging an other wise rigid sculpture – the computer generated model – would have to be remodeled frame-by frame in order to be animated.

6.1.2.1 Rigging Includes Some of the Following:

Building a skeleton inside the model, it's purpose is only to guide the movement. These are not visible in the rendered version. Adding different rotation constraints to the joints. Handles are added to the different body parts, so the animator can animate the character without having to remodel it in each and every frame. The skin of the character is attached to the skeleton. Adding deformers, these are controllers that changes the shape of the character when it moves it's joints, so they look natural rather than like a bending rubber tube. Facial expressions are created with blendshapes, which inables asymmetrical facial movements ex.: rising one eyebrow at a time.

6.1.3 Setting the Stage:

Before the actual animation process can start the character models need a stage on which to perform, in our case it is the Vikingship, which again is set in the environment of the stormy ocean with the burning village on the island on the horizon.

6.1.4 Animating:

The animator works very much like a puppeteer by posing the model with the controls added in the process of rigging. The animator sets up a series of keyframes specifying when and where in a specific in a particular sequence a character will hold a certain pose, the computer then automatically calculates the motion between each keyframe - fills in the gaps. The facial expressions are merged by using the blendshapes.

It goes without saying that a high quality animation is time consuming.

6.1.5 Rendering:

Rendering is a process whereby a 3D scene, bathed in virtual light, is recorded by a virtual camera and turned into a 2D image thereby producing the animation as a series of frames. After which the process of outputting the digital images to film with sound that can be shown on screen.

7. Conclusion

Working this project has been a steep learning curve, both on the technical side when it comes to Maya, but also as working in the group.

When we look at Maya it's both with joy and aggravation. We love this tool, but we found it very hard to say stop, because the possibilities are endless in Maya. Especially when trying to create realism. You always find some new feature that you want to explore and use.

The process has given us a deep respect for the people working with 3D animation and a peek into what really lays behind a production movie.

In our case the production has proven very time consuming, so much that we have chosen to work with the completion of the final film over the holidays. The process of modeling and animating has taken a lot of time due to the fact that we wanted to produce a film as close to real life as possible.

To conclude realism is very hard to imitate and demands extreme resources to make in Maya

8. Literature:

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Gene Deitch is one of the last surviving members of the original Hollywood UPA studio of 1946 and the instigator of the CBS-Terrytoon "renaissance" of 1956-1958. He was also: Animation Department Chief of the Detroit Jam Handy Organization, 1949-1951, Creative Chief of UPA-New York, 1951-1954, Director at John Hubley's Storyboard, Inc. New York, 1955, President of Gene Deitch Associates, Inc. New York, 1958-1960, Creative Director for Rembrandt Films, 1960-1968, and star director for Weston Woods Studios, Inc., Weston, Connecticut, 1968-1993. He has worked for over 40 years with the Prague animation studio, "Bratri v Triku." <http://www.awn.com/>

10. Links

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