The Animation Production Process

by

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Animation is a media staple. One would be hard pressed to watch television, see a movie or visit a website without encountering it. Sometimes it's just a word moving across a webpage. Sometimes it's a cartoon fish teaching children how to spell. Sometimes it's an army engaged in epic battle so realistic you don't even know it is animation.

No matter what the situation is, though, the process of creating animation always starts out the same: Somebody wants it and is willing to pay for it.

There are also several different types and styles of animation and the cost depends on many factors. Price is influenced by how much of it needs to be produced, how many people contribute to the production, how expensive the technology is to help produce it and the production experience of the individuals involved.

What follows is a brief account of the many stages of animation production as well as what influences the time and cost involved. I hope you find it useful.

1. Pre-Production
    - Idea
    - Script
    - Storyboard
    - Animatic
    - Previsualization
    - Design
    - Modeling
    - Rigging
    - Texturing
2. Production
    - Layout
    - Animation
    - Lighting / Rendering
3. Post-Production
    - Effects
    - Compositing
    - Editing
    - Audio

1. PRE-PRODUCTION

Several steps take place before production actually starts. This “problem solving” phase is known as pre-production. There is an entire industry devoted to these steps, since animation (and film-making in general) can be a prolonged and expensive art form.
As the saying goes, “Time is money”.

Idea

Hopefully, it’s a good one! Usually, an individual’s idea relies on the medium of animation when there is no other way to execute it…such as cowboys riding dinosaurs- animation can make anything possible!
Of course, the individual’s budget will determine if the production will feature live actors blended with CG dinos or wind up as a Flash cartoon.

- *Time Involved:* Ideas can come in a flash. *Good* ideas may take years to develop.
- *Cost Involved:* Ideas are free and nobody can actually own one outright.

Script

Usually, a writer translates the idea using a document format known as a script. The script details the narrative through setting, character actions, dialogue and camera framing. From that, a director can break down the story information into scenes and shots. A scene (also known as a sequence) is made up of several shots and can be anything from a setting to a scenario within the story. A shot is a single, uninterrupted camera cut.

- *Time Involved:* Depending on the product, a day to a week. Motion picture scripts can take months.
- *Cost Involved:* 5 to 10 percent of the production budget is usually devoted to writing.

Storyboard

The script now needs to be represented visually. The quickest and most cost-efficient method is to storyboard it. A storyboard is like a comic book in that several panels of sequential drawings map out the story. Here, scene blocking, camera moves and even character performance are first illustrated. Since animation is such an expensive and time-consuming process, production does not start until the storyboard has been approved by the client. It is not unusual for storyboarding to continue throughout production as certain story elements may change. *Nothing* gets done without a storyboard!

- *Time Involved:* A week or less for a 30 second commercial and months for a movie.
- *Cost Involved:* Based on a per page, per panel or per hour of work charge.

Animatic

Once the storyboard is complete, the individual panels are edited together along with dialogue, music and sound effects to see how it flows as a movie. This is known as an

animatic. At this point, any story issues are still inexpensive to fix or change. The animatic acts a blueprint for the final edit and helps determine how much actual animation needs to be produced for each shot.

- *Time Involved:* Prepping the panels and building the edit can take a couple of days to several weeks depending on the amount.
- *Cost Involved:* Based on a per second/minute of film or per hour of work charge.

Previsualization

Also known as "previs", this cost-efficient technique is used widely in 3D animation, special effects and live-action film. Instead of developing or shooting finished elements and footage at the start, digital stand-ins are used to help figure out camera positions, timing and movement in 3D space. Any obstacles that a shot may present can be worked out long before a lot of tedious effort has been put into the final product.

- *Time Involved:* 2 weeks to a month for a 30 second commercial.
- *Cost Involved:* Based on a per second/minute of film or per hour of work charge.

Design

This is where a signature style is developed for the project. Design can happen at any time in the pre-production phase and ranges from characters to environments to clothing to props and vehicles. Guides (such as character bibles) are created to enable artists to draw or digitally sculpt elements within the design parameters. Conceptual paintings are done to establish design of environments and setting ambiance.

- *Time Involved:* Continues until finalized by the client.
- *Cost Involved:* Based on a per page of elements, per painting or per hour of work charge.

Modeling

2D (Limited): In limited 2D animation, a character's base poses are created and then dissected into several layered elements such as head, mouth, eyes, arms, legs, etc. These elements must be designed to overlap correctly when manipulated so the 2D artwork actually appears to have dimension.

3D: If there are any (or only) 3D elements in the production, they must be modeled using a 3D software package. There are several ways to model: by assembling or molding existing geometry into new shapes, by creating a wire framework then webbing a surface over it or by scanning real-world sculptures with a 3D scanner…just to name a few.

Stop-Motion: There may be several methods of modeling involved with stop-motion. For characters, physical puppets are made from clay or foam latex. From there, cloth, hair and other real-world materials may be added to the final puppet. For environments, anything can be used from cardboard to balsa wood to paper mache.

- *Time Involved:* A week or two for minor detail, a month or more for major detail.
- *Cost Involved:* Based on a per model or per hour of work charge.

Rigging

2D (Limited): A character's dissected elements (arms, legs, etc.) need to be set up like a puppet. For instance, the foot is linked to the lower leg which is linked to the upper leg which is linked to the pelvis. These linked elements must then have their pivot points adjusted so they rotate at the correct spot.

3D: Once a character model exists, it needs bones and other rigging systems set up in order to manipulate it. It can be a very tricky and laborious job to make sure the 3D mesh bends and folds in the desired fashion. Other elements that may require rigging are muscles, hair, clothes and even eyes.

Stop-Motion: Bendable wire or machined aluminum skeletons, known as armatures, are constructed to support the clay or foam character. Nuts are usually attached to the bottom of the character's feet which are then bolted to the set, allowing them to stand freely and balance when walking.

- *Time Involved:* This can be the trickiest aspect of preproduction, particularly where 3D is involved. Simple characters take roughly a week to rig but a complex character can take over a month.
- *Cost Involved:* Based on a per model or per hour of work charge.

Texturing

2D: This is usually a flat or gradient color but limited animation can sometimes have complex textures that move along with the model.

3D: Digital models can have several textured looks. They can even have a graphic 2D look! Texturing can be anything from solid color to hand-painted or photographic imagery. This imagery, known as a map, can be projected onto the 3D model to simulate any surface imaginable. How light behaves across that surface (like reflection and translucency) is also controlled through texturing as well.

Stop-Motion: Texture for stop-motion puppets and sets are usually sculpted or painted right onto them by hand.

- *Time Involved:* Simple texturing consisting of a few colors can take just minutes. But complex texturing, such as realistic dinosaur skin, can take days to create.
- *Cost Involved:* Based on a per model or per hour of work charge.

2. PRODUCTION

Once the story is set, the designs are done and models created, actual production can begin. This phase tends to start out slow and then snowball toward the end. If enough attention was given to pre-production, the project should meet deadline and budget milestones throughout its production.

Layout

Scene layouts are loosely based on their storyboard panels and closely based on their conceptual illustrations.

2D: A hand-drawn background is used to layout both the setting and character blocking involved. The animation stays within the parameters of the background, which is later painted.

3D: A camera and stand-in models (or finished models if available) are set up in 3D space. Camera moves and loose motion are blocked out to establish strong composition for the animators. This step usually occurs during previsualization.

Stop-Motion: Since the puppets exist within an actual set, they must be staged and lit as they would for a live film. Complex camera moves can be expensive and are achieved through the use of a motion control system. Once the camera path is plotted, a computer-controlled rig moves the live camera one frame at a time. This allows dynamic angles within a stop-motion set.

- *Time Involved:* Depending on the complexity of the background or camera move, anywhere from hours to days.
- *Cost Involved:* Based on a per drawing or per hour of work charge.

Animation

2D (Classical): Once the character's position is blocked out within the setting, key frame drawings are done. These are the main poses that establish the character's extreme points of action. Once those are timed out, inbetweens are drawn to smooth out the motion. This sketchy animation is known as a "pencil test". The rough animation lines are then cleaned up (inked), painted and combined with the background. The addition of effects animation, like shadows and highlights, can add considerable time to the process. Classical animation is known for its broad motion and fluidity.

2D (Limited): Minimal drawings (sometimes just one) are digitally manipulated in such a way as to mimic classical animation. Several mouth positions are pasted onto the character's face and interchanged to create lip synch. The individual limbs are attached to the body, hinged like that of a puppet, and manipulated in the computer to create character performance. Inbetweens are created automatically within the software, making the process much faster than traditional. Limited animation is known for its speedy production time and cost-effectiveness.

3D: Once a 3D character model has been rigged, an animator can create motion by manipulating it like a virtual puppet. 3D animation deals with technical concepts such as XYZ coordinates and numeric sliders to control the puppet. Key positions are automatically inbetweened by the software. 3D animation is known for its dimensional look and realistic quality.

Stop-Motion: Just as traditional animation is drawn one frame at a time, a stop-motion puppet is moved in small increments and shot one frame at a time. Since the technique is bound to real-world physics, it is often necessary to digitally remove any rigging or wires that help achieve character action that defies gravity (jumping, flying, etc).

- *Time Involved:* Ultimately, the more frames of motion there are, the longer the animation will take to do. Even cost-efficient animation can be the most time-consuming part of production.
- *Cost Involved:* Usually based on a per second of film charge, although limited 2D animation may be per drawing.

Lighting / Rendering

Lighting a scene not only consists of placing physical lights within the set but also understanding how to control the aspects of those lights with regards to the final rendered image.
Rendering refers to the generation of digital frames by a computer. Even though most video-media software requires some sort of rendering, this section refers specifically to the rendering of 3D animation. This stage can go quickly, depending on how much calculation the computer must do to produce the final image. For heavier processing, there are entire buildings filled with computers known as render farms. It is not uncommon for a single frame of high-definition 3D animation to take over a week to generate.

- *Time Involved:* Depending on how complex the calculation of the 3D scene is or how large the finished images are, anywhere from seconds to weeks.
- *Cost Involved:* Based on a per GHzh charge.

3. POST-PRODUCTION

Once the animation is rendered and film is printed, it is ready for the finishing touches. This can be anything from special effects to image enhancement to color correction. Final sound and music are also a part of this phase.

Effects

Whether it is fairy dust, a glowing sword or a nuclear explosion, special effects can make the unbelievable seem real. Most effects, though, are usually much more mundane; such as extending a small set to look massive or making a day shoot look like nighttime. In 2D animation, elements such as fire, smoke and water are considered effects but so are basic shadows and highlights. Effects usually go hand in hand with compositing.

- *Time Involved:* 2D animation effects can sometimes be drawn, inked and colored faster than 3D effects take to set up and render. It really depends on how complex the effects are and how much of them need to be produced.
- *Cost Involved:* Based on a per second of film or per hour of work charge.

Compositing

Compositing, ultimately, is the layering of several different images into one finished composition. There is a lot more that it encompasses, though. Green screen removal, rotoscope masking and color correction are just a few jobs that take place at the compositing stage. Whether you need a Volkswagen removed from a shot of ancient China or high-definition footage to look like 1930s black and white film, the project's final image depends on the compositing artist.

- *Time Involved:* Subjects shot against well lit green screen footage is faster to mask out than if shot against a multicolored background. Rotoscoping is probably the most time-consuming aspect of compositing and an experienced Visual Effects Director can shave months off production time.
- *Cost Involved:* Based on a per second of film or per hour of work charge.

Editing

Editing starts at the animatic stage to make sure the shots flow at an appealing pace. As production advances, the edit is constantly being updated as the shots progress from previs to rough animation to final render and then final composite. Sound effects and music are also combined with the visuals at this stage.

- *Time Involved:* Fairly quick at the beginning yet editing may take place throughout the entire production. Several hours of raw live footage may take months to edit.
- *Cost Involved:* Based on a per second/minute of film or per hour of work charge.

Audio

Even though final audio doesn't happen until post, temporary sound and music, known as scratch audio, is usually incorporated into the animatic to help set the mood and pace for the edit. It has been said that sound is half of the movie and hiring seasoned professionals in this field can enrich the final product tenfold. Foley Artists are responsible for finding or creating sound effects, Composers write and play the musical score, and Sound Engineers mix it all together in harmonious balance.

- *Time Involved:* The more unique or rare a sound is, the longer it takes to find or fabricate it. Music can take anywhere from hours to weeks to write and perform, depending on composition length and number of musicians required.
- *Cost Involved:* Sound- based on a per sound or per hour of work charge. Music- based on per hour of work charge. Sound Engineering- based on per hour of work charge.