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The 3D Animation Process at Framework Media



Thank you for your interest in technical animation and Framework Media!

If you are reading this document, then we assume that you are considering creating an animation for your business needs. Are you are marketing a product that has yet to be built? Do you want to breathe some new life into your corporate training videos? Maybe you need to recreate an accident sequence for a courtroom presentation. Whatever your animation needs, this document is intended to give you an overview of the process we would use to create your animation. Armed with this knowledge, you can make more informed decisions during each phase of the project and ensure a successful result.

Preproduction: Requirements, Research, and Storyboarding

REQUIREMENTS

The very first step in any project is to understand the goal of the project. If you plan to use animation to market a product, then the goal would likely be to educate viewers about the features and benefits of your product. If you are using animation in a legal proceeding, your goal may be to portray how a sequence of events took place to a judge or jury. In almost every project, you will have a set of specific points that need to be communicated, and that list of points is the starting point for the project. Taking into account your audience, the presentation format, and the viewing environment, we can define a list of specific requirements and goals for the project, and then develop a plan to accomplish these goals.

RESEARCH

Prior to the design and creative effort, we thoroughly research the subject of the animation. It is crucial to gather reference material prior to storyboarding, including your existing presentation materials. Some reference sources that can be invaluable in the process:

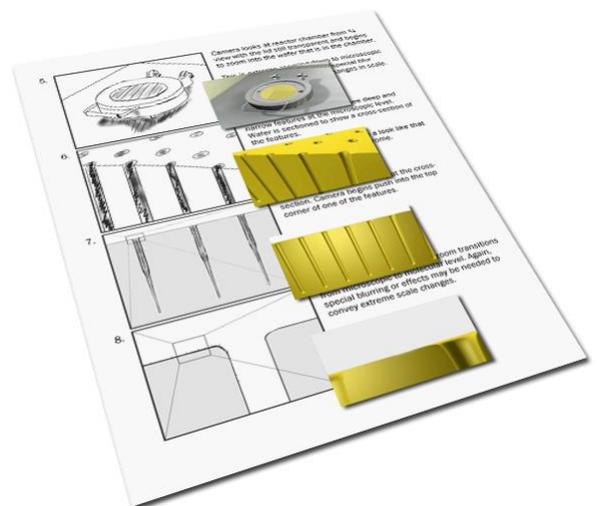
- Existing photographs, illustrations, and video footage
- Existing marketing content, such as brochures or presentations, and sales scripts
- Interviews with technical experts
- Legal documentation, including patents or evidence for forensic animation

In cases where some presentation content is already being used, there are likely lessons that can be learned from these early versions of the message. Expanding upon phrases or points that resonate and clarifying poorly communicated ideas will give us a head start on the design.

In many cases, it is necessary to take additional photographs or shoot video footage during the research phase, particularly for complex processes or animations that require a high degree of accuracy or realism.

STORYBOARDING

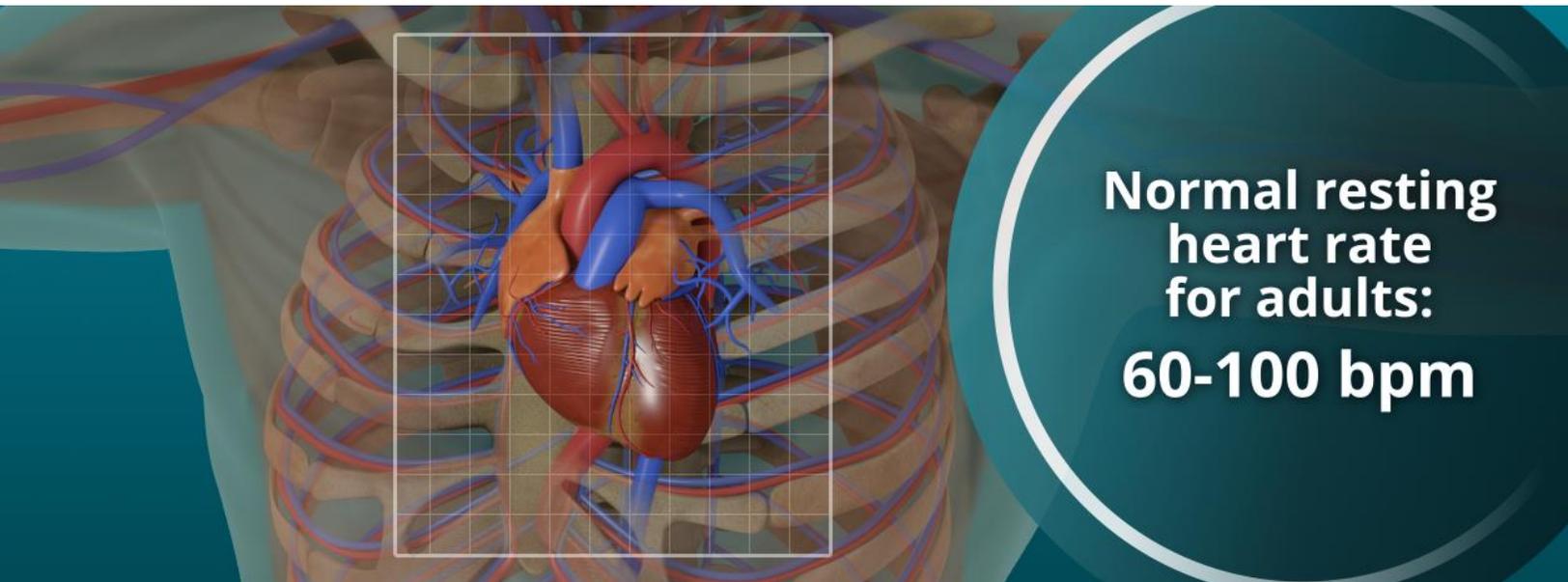
Once the technical requirements have been defined and research has begun, we can start the storyboarding process, where the visual storytelling of the animation take shape. Storyboards come in many different forms, from napkin sketches to detailed drawings. Storyboards convey the key visual elements at various points in the animation. A storyboard is an invaluable tool during the design and production process, as it is used to identify all of the assets



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required for the animation. You should use the storyboard to make sure that your message points are present, ensuring these requirements will be included in the final animation.

It can be helpful to set an estimated budget for the project prior to storyboarding. Design decisions can be made during the storyboarding process to avoid particularly difficult (read expensive) shots. For example, if the story calls for a polar bear to slide down a slide into a pool, a decision to avoid showing the polar bear hit the water might avoid a complex fluids simulation for the water splash, thus reducing the overall cost of the animation.



COST CONSIDERATIONS

Costs for the animation can be estimated up front and provided on a not-to-exceed proposal, or a storyboard can be created as a separate project and a fixed quote be provided for the production of the animation based on that storyboard. Some animation companies that will quote a fixed price per running minute/second of animation. With this pricing method, we find the client either pays far too much for a simple animation, or gets a low quality result because the required shots were too complex for the budget. One universal factor in pricing an animation is the running length of the animation, where longer animations obviously cost more. However, there are many other factors that can affect the cost more than running length. To list just a few:

- **Video resolution:** High-definition footage, such as 1080P or 4K resolution, increases the required level of detail in the models and materials and increases rendering times.

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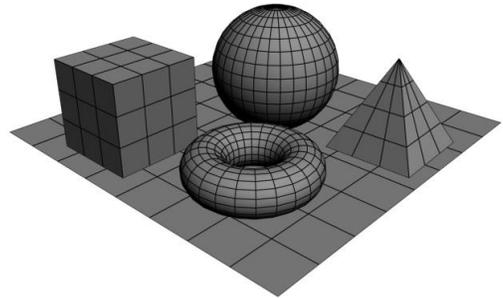
- **Scene complexity:** How many animated objects are in the scene? Are there characters or other organic subjects that will be featured? How many different scenes are there in the animation?
- **Simulation:** Are there any advanced simulation techniques needed to create the animation?
- **Compositing:** Will the animation be integrated with live action (video) footage?
- **CAD models:** Do accurate CAD models exist that could be leveraged in the animation?
- **Audio:** Do you already have a prerecorded narration or rights to music that you would like to use, or will we be responsible

Each animation project is unique in its content and requirements, so the best way to get an accurate estimate on your project would be to contact us to discuss your plans in detail. Our recent animation projects have had typical costs ranging between \$1,000 and \$8,000 per animation, with clients often placing orders for multiple animations. This wide price range speaks to the vastly different requirements of each project. Be sure to check out our suggestions for maximizing the value of your animation later in this document.

Production: 3D Animation from A to Z

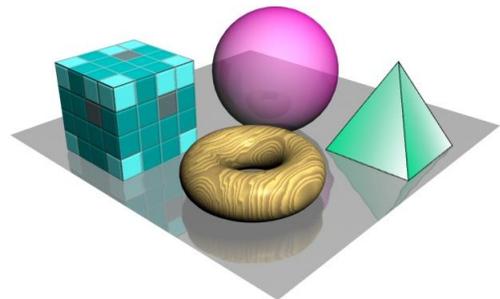
MODELING

As the storyboard takes shape, the project enters the production phase. Our current workflow for 3d animation and modeling is based on Autodesk 3ds max, one of the most popular tools used in visual effects and gaming companies worldwide. During the modeling phase, assets for the animation are drawn or modeled in two or three dimensions. Some pre-built models may be leveraged for a project, but most models are created from scratch, either in 3ds max or in a separate CAD package, such as SolidWorks. We can generate 3d models from existing 2d or 3d engineering CAD data, which can speed up the modeling process, but some CAD models may need rework if they are not detailed or contain surfacing flaws. In the end, 3d models define the topology of the objects that will eventually be animated. The level of detail required for a given model is driven by the resolution of the final image as well as how close the camera gets to a model in the final animation.



MATERIALS

3d models must have materials applied to define their surface appearance. Materials specify properties like shininess, transparency, translucency, reflectivity, texture, and of course, color. Proper materials allow viewers to

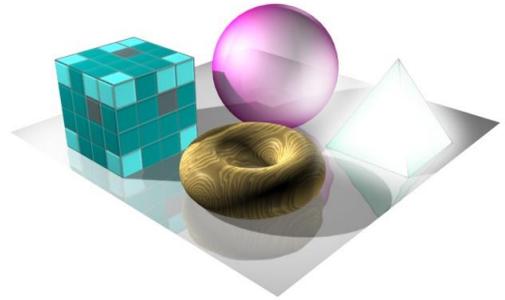


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identify objects in the animation as being made of a particular material, such as glass, metal, concrete, water, plastic, or fabric. This is important for animated product demonstrations or forensic animation such as accident reconstruction. High quality texture maps add details to the surface and can deliver very high levels of realism in the final animation. These high quality maps may be created from digital photographs or created by hand, but will likely be manipulated using Adobe Photoshop.

LIGHTING AND EFFECTS

The models now have all necessary materials defined, so our next step is to add lights and cameras to our 3d scene. A major factor controlling the appearance of models and materials, lighting is important for creating realism and an appealing image. Lighting allows us to control the appearance of shadows and highlights, and cameras can be added to capture a specific point of view. Visual



effects enhance the animation and can focus viewer attention where needed. Effects include glows, fire effects, fog, and lens flares. For example, if animating a chemical reaction that gives off energy, adding a glow to the scene as molecules interact will help convey the concept.

ANIMATION

All of this work has been going into our 3D scene, and we have not animated anything yet! Animation is often the most iterative and time-consuming part of the production process. For the vast majority of projects, animations are keyframe-driven, with an object's position, rotation, and scale set by the animator manually at different points in a timeline. For character animation, the timing, fluidity of motion, and expressiveness of the motion are most crucial. For forensic or product animations, the goal is precision of motion and technical accuracy. Our toolset offers many different animation techniques, which can yield a variety of results, from soft body deformation to rigid, linear motions. Think of a simple bouncing ball, and how the animation for that ball bouncing would change if it were made of stainless steel, glass, rubber, concrete, or grape jelly.

SIMULATION

Depending upon your storyboard, your project may require simulation of some phenomenon. Our current simulation tools allow us to achieve realistic fluid, cloth, and hair effects. We also use particle systems to animate everything from steam and smoke to most recently, an entire array of surface-to-air missiles. We use a physics simulation package to accurately reproduce elastic and inelastic collisions. All of these procedural animation techniques require some simulation of real world physics, fluid mechanics, or dynamics, and can be very computation intensive and difficult to set up. However, when used properly, they can create some impressive results.

RENDERING

Rendering takes all of our work thus far and calculates the individual pixels for each frame, based on models, materials, lighting, and effects.

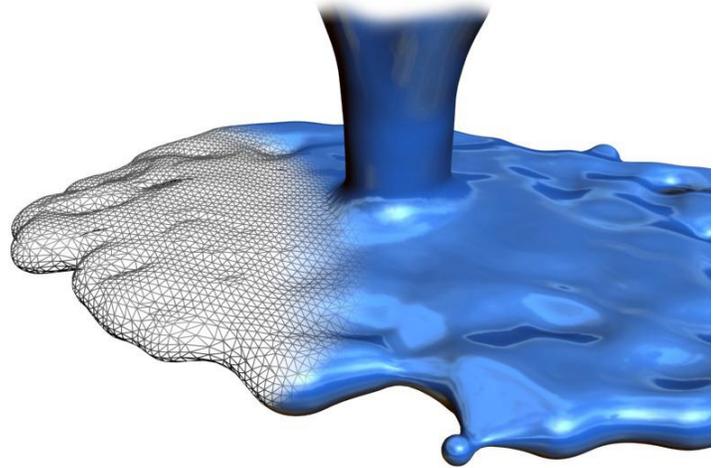
Different rendering algorithms can create different results, ranging from photorealistic results to even a cartoon illustrated look.

Rendering is very CPU intensive and complex animations can take days to render, even when spreading the work over multiple computers.

Consider a 60 second animated product video where each frame takes two minutes to render:

That one-minute animation, played back at 30 frames per second, requires 1,800 frames, which will take almost three days to render! The

rendering process can quickly become a bottleneck, particularly for more complex models and scenes. Quick turnarounds on projects and iterations require the use of the latest computer hardware, with fast 6- or 8-core processors and large amounts of memory.



DESIGN REVIEWS

It is important that you review progress during all phases of development to incorporate your feedback and minimize rework. For any of our projects, work in progress images or animations will be posted on our web site, typically in a password-protected area. You will be able to access that page and review JPEG images or animations as MPEG-4 video files, downloading the files for detailed reviews. We typically receive feedback via phone calls and documented in emails, and new review tools continue to be developed for marking up content, including still images from a video file. We use process works best for you, as it is critical that you, the client, are active and involved during the production process.

Postproduction: The Finishing Touches

With our animation fully rendered, we are move into the postproduction phase. Depending upon the needs of your project, we may include one or more of the following steps:

EDITING AND COMPOSITING

It is often necessary to change the sequence of shots or trim the shot durations of a given animation. This is often done to synchronize the visuals with a voiceover or to improve the timing of an animation. Editing becomes increasingly important as the length of the animation increases, as it is important to balance the pace at which the information being delivered to keep viewers interested without moving too fast and overwhelming them.

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Compositing is simply the process of combining multiple video inputs into a single video track. This is achieved using varying techniques, from simple overlays of titles and logos to advanced bluescreen or green screen keying that allows live action footage to be integrated with computer-generated video. During this phase of production, we may add special effects, including 2d particles and blur effects for both motion and depth of field. Other functions handled by our compositing tools include color correction and preparing video for output to specific formats.

PUBLISHING

The final step of our process takes the uncompressed video out of editing/compositing and converts this video to the intended format for delivery. Here is a list of various target delivery methods and their respective video formats.

Delivery Method	File Formats
PowerPoint Presentation	Windows Media, MPEG-4
Web Video (YouTube, etc.)	MPEG-4
Web Site Images	GIF, JPEG, PNG
Digital Signage	MPEG-4
Video Compositing	PNG, RPF, or Open EXR image sequence
Vector Outputs	AI, EPS, SWF
Print image	TIFF, Targa, PSD

Note that some of these delivery methods will have special requirements, and we will work to make sure your video meets the specifications of your intended end use.

MAXIMIZE THE VALUE OF YOUR ANIMATION PROJECT

To be sure that you get the most benefits from your animation project, it is crucial to publish to multiple formats for use across an organization or marketing campaign. For example, an animation project might be commissioned for the launch of a new power toothbrush, with the focus of the animation being to show how the bristles interface with the teeth. The animation may be intended primarily for inclusion on the campaign's broadcast TV commercials. However, to maximize the value of the animation, hi-resolution print images could be rendered for print advertisements or product packaging. Low resolution images or video could be created for the product web site, an interactive banner ad campaign, or PowerPoint presentations.

Because most of the work (and subsequently the cost) are included in the production portion of the process, it is very easy to generate many different outputs from the same 3D models, materials, and animation. Therefore, it is important to include multiple output formats as part of your ROI calculations for the project.

THE NEXT STEP

If this document has been a help in understanding the animation process, then the next step would be a much bigger help to you, and that would be to contact us directly. We offer a free no-obligation consultation during which we can discuss the specifics of your project. From strategizing what visuals should go in to an animation to helping calculate an ROI for a given project, our experience can help get your project started, approved, and on its way to production. For more information, visit

<http://www.frameworkmedia.com/contact-us>

We look forward to hearing from you!



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