

# **COMPUTER SIMULATIONS IN SPACE:** **Seeing is Believing**

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## **INTRODUCTION**

One of the most complicated and least intuitive subject matters in the world is rocket science. As many may know, besides enjoying the practice of law, I have a keen interest in the technical side of things. In connection with the space related cases I have handled over the years alongside many insureds, insurers and brokers; I have come to understand how important it is to make the subject matter understandable to clients, fact finders and even adversaries. Towards that end, I will herein explore issues associated with a computer program called Satellite Tool Kit ("STK"). The program allows highly sophisticated computer animations concerning space to be created on a personal computer.

The main STK program is free, what one pays for are the modules like: gravity, wireframe models and one meter resolution of the earth's surface.

As part of this presentation, I will first provide some background on how simulations are created with the software. I will then discuss the mostly pros and some cons about computer simulation use from both a psychological and legal perspective.

## **STK SOFTWARE**

As indicated above, the software is provided gratis, what one pays for are the modules. Even the training is highly subsidized by the manufacturer.

As a point of background, the United States military used the software to model the battlefield in the Gulf War in real time. This created an unprecedented level of situational awareness. One interesting note is the military had software just like STK some years ago but it decided it did not wish to use it in this type situation because it did not wish its soldiers to understand everything that was happening in real time.

Recently, the software was used to plan and execute the Asiasat moon fly by. This involved a communication satellite stranded in a useless orbit that could be moved to geosynchronous by using the moons gravity in a flyby. Essentially an HS601 satellite, just like the ones used for your backyard DirecTv satellite tv, was sent around the moon.

In connection with litigation and ADR, what follows are the five necessary steps to creating a simulation:

1. Creation of a storyboard;

2. Selecting wireframe, and surface texture, models and then setting color and reflectivity;
3. Animating - in low resolution;
4. Rendering - in high resolution -- stacking up individual images to make what is essentially a movie; and
5. Post production.

As a side note, in a truly over the top statement, one space animator has written that he considers himself God during this process.

### **PSYCHOLOGICAL ASPECTS**

As a practical matter, there is no way to make jurors or other fact finders experts. What the simulations actually do is to allow people to see symmetries and take advantage of the highly developed human skill at pattern recognition in order to understand matters -- without knowing the math. Studies by neurophysiologists have shown that people retain about ten percent of what they hear after twelve hours. But, they retain up to eighty five percent of what they see. This is because about one third of the brain is used for visual processing.

As part of modern life, people increasingly expect sensational elaboration in information communicated to them. This is why: weather is presented in 3d during local news, ever more detailed and exorbitantly grotesque aliens appear in movies, and video games of today run in 128 bit environment creating photo realism.

In everyday life, individuals tend to believe things they see on computer screens because computers carry an image of infinitesimal precision. Thus, during courtroom simulations attorneys have been heard to say things like: "you saw it with your own eyes", when referring to the simulations. This has tended to, in some cases, cause an arguable shift in power from the Judge more towards the attorneys.

### **CRITICS**

Critics of computer animations in the courtroom describe a circus like atmosphere that is created. They argue that use deteriorates trial system integrity and transcends the ability of the traditional rules of evidence to govern. They go on to say that, with animations, the jury is faced with extracting truth from a haystack of assumptions and fabrication. Critics also argue that allowing the use of animation provides a strong incentive to be biased and to manipulate images - - animators arguably introducing speculation in the interest of creating a continuous display.

### **LEGAL CONSIDERATIONS**

Animations have been used in both civil and criminal contexts. In a criminal context, because of the fact that liberty is at risk, more safeguards are generally needed. In a criminal context, crime scene reenactments are normally what is presented.

In the civil context, animations are often used in transportation disasters. A review of relevant cases in which animation is addressed, there is no clear bright line test for use in evidence or otherwise. And issues have been raised concerning hearsay, authentication, relevancy, accuracy, fairness, helpfulness, and Daubert/Kumho tests regarding scientific and engineering reliability.

To avoid some of these complex problems, some lawyers are simply using the animations in closing -- in an effort to workaroud potential evidentiary issues. In that way, the animation can be characterized as a demonstrative aid and not scientific or engineering evidence.

Reportedly, of the top production houses eight hundred made, about one hundred and fifty have been offered in evidence and only two rejected. So courts do appear to be embracing this technology. And animations are increasingly being used in mediations, often resulting in settlement.

## **CONCLUSION**

In order to make highly technical materials understandable to fact finders, increasingly realistic animations are needed. With the proper safeguards, these animations can help streamline all types of dispute resolution.