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Previsualization : Whiz Bang Viz!

by Debra Kaufman

When George Lucas sat down in 1975 to detail his vision for a little space opera called *Star Wars*, it was an arduous task that involved patching together drawings with homespun video, movie footage of fighter planes and even models on quarter-inch rods.

“The whole process was called ‘photomasochism,’” chuckles Richard Edlund, who won an Oscar for his visual-effects contribution to the 1977 feature release, which marked a turning point for the industry: the incorporation of electronics into storyboarding.

Flash forward 30 years: For Fox’s summer blockbuster *Star Wars: Episode III—Revenge of the Sith*, Lucas and his team used personal computers equipped with AMD’s 64-bit Opteron microprocessor running Alias’ Maya to mix and match images created specifically for his film.

The process, called “previsualization,” or previz, is storyboarding taken to the next level: digital storyboarding with a certain degree of interactivity. Creatively, it allows a filmmaker to completely rough out a movie using the same lighting, camera angle and effects parameters as would be employed in the finished film. Essentially, it’s a blueprint of the film but one created in a cost-effective environment where the whole point is experimentation, and changes can be made and viewed on the fly.

“It’s not real time per se,” Lucas’ previz specialist Daniel Gregoire says, estimating it took anywhere from “a few minutes to a half-hour” to render previz shots on *Sith*. “What it does is give a sense of the environment, the dimensionality, the set scope, where you can and can’t go.”

Gregoire and his company, Halon Entertainment, were tapped by Steven Spielberg to provide previz services on Paramount’s June sci-fi actioner *War of the Worlds*. “We had several locations that changed midshoot,” Gregoire recalls, “so I went out and photographed the hell out of them, and we built low-rez 3-D models in Maya so Steven could actually experience the locations (on the computer) and think about them for a few weeks before he actually went there to shoot. He used the previz to block out his shots in advance.”

There are as many different ways to approach previz as there are shops specializing in the service. Some, like Gregoire, use off-the-shelf products, while others create their own tools, writing code and creating a customized pipeline.

A dedicated previz facility since 1995, Pixel Liberation Front has been at the forefront of tool innovation and in-house development. The shop is currently handling previz for such 2006 releases as *Superman Returns* (Warner Bros. Pictures) and *Eragon* (Fox), as well as Sony’s planned 2007 release *Spider-Man 3*.

“The software has come a long way,” PLF chief technology officer Andy Jones says. “It has gotten closer and closer to how it looks rendered out on film.”

PLF also uses 64-bit Opteron-powered machines, complete with nVidia graphics accelerator cards and standard 3-D animation software like Softimage XSI. The tool has greatly enhanced filmmakers’ arsenal, particularly for directors who rely on computer-generated imagery.

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“You can experience directing a big action scene and assemble it without getting out there, without spending any money,” says visual-effects supervisor Robert Legato, an Oscar winner for his work on James Cameron’s 1997 epic. *Titanic*. “You have a shot list, a rig list, camera angles, and you can organize your shooting days.”

Legato is currently aiding Cameron in establishing a previz pipeline for the director’s next feature, which, Cameron announced before a packed crowd of exhibitors at March’s ShoWest confab, will be a sci-fi actioner called *Battle Angel*, to be released in 2007.

As with Lucas before him, Cameron is continuing to collapse the wall separating previz from actual production by using the process to collect data and assemble parameters that will be ported to his finished film.

The idea is to direct on a motion-capture stage actors whose performances will be mapped onto CGI characters displayed instantaneously in the previsualized environments. The previz material will feature the same optical specs (lens perspective, camera angles and camera moves) that will be later used in the live-action shoot.

Legato notes that the previz pipelines he put together for Cameron and for such planned 2006 releases as Martin Scorsese’s *The Departed* (Warners/Miramax) and Robert De Niro’s *The Good Shepherd* (Universal) are built around off-the-shelf software -- primarily, MotionBuilder, a real-time performance animation tool popular with gamers that was used for Scorsese’s 2004 film, *The Aviator*, which allows real-time interaction with performers, cameras, lenses and rigs.

The advantages to this level of previz are twofold: One, it creates a very specific blueprint with which to provide the production crew and later, the effects house. When using standard software from the film-making repertoire, low-rez previz and high-rez finishing tools are often compatible to the point where finished effects -- and even finished performances -- can be popped in, replacing the previz roughs.

“On [*Sith*], we handed ILM our previz, and George said, ‘Here are the shots I want. Make them look good.’ They got Maya files, which they could distill and put into their pipeline and use to do the magic that they do,” Gregoire says.

“It’s a director’s dream because typically in the past when they turn their shots over to effects houses, they’re surrendering a degree of control over the film,” Gregoire continues. “It’s a matter of trying to verbalize, or maybe show through drawings, what they want, and they’re often not really seeing the shots until it’s too late or too costly to make changes.”

The other big advantage is being able to interact at the previz stage with actors performing CGI characters onstage. “Now you can direct CGI like live-action—there is no translation,” Legato says.

If principal photography is being captured digitally, a certain degree of compositing between live-action and CGI can be achieved on the set.

Even as these tools have brought a new level of precision and convenience to moviemaking, there are those already looking to take previz to the next level: real-time interaction on par with that of video games.

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Video game “engines,” the software codes that drive the interactivity, are a hot topic among previz practitioners. And some are doing more than talking about it. Digital Domain built an add-on software module and joystick controllers that allowed director Rob Cohen to use the game, “X-Wing”, to previz the aerial sequences in Sony’s July actioner *Stealth*.

At Zoic Studios, visual-effects supervisor Loni Peristere looks forward to integrating video game engines into the CGI pipeline. “We want to merge the two. We’ll be able to sit with a director and block out scenes in real time, (as well as) make the whole process more efficient,” Peristere says.

Adds Sony Pictures Imageworks effects supervisor Carey Villegas: “There’s a process within games that figures out in real-world physics how things react. We’re trying to involve that in our previz to the point that it takes the onus off the animators.”

The problem thus far with video game engines is that they aren’t as cinematically sophisticated as traditional filmmaking software. The Orphanage visual-effects supervisors Kevin Baillie and Ryan Tudhope note that game engines still do not allow enough control of camera information such as aperture and focal-length setting.

Nor are they directly compatible with the tools of the trade in high-end effects houses: Maya, Max, Side Effects’ Houdini and Softimage’s XSI. On the horizon is something called Collada, a universal format that is expected to speed the movement of modeling and animation software to and from game engines. But for the moment, anyone who doesn’t have a battalion of code-writers at their beck and call is plain out of luck.

Even those that do have in-house engineering complain about the pricing -- software licenses typically cost millions, which is fine if one is amortizing it against multiple-consumer game titles but unthinkable as an added below-the-line cost on a feature film.

However, the real-time operability promised by a merger of these parallel technologies -- previz and games -- is where things are headed. (Alias’ purchase of MotionBuilder parent Kaydara earlier this year is one such indicator.)

ILM developed an experimental game-based previz tool as early as the 2002 Spielberg release *Minority Report*, says ILM integration supervisor Mike Sanders, hinting that a powerful previz tool set will be built into the company’s new proprietary production pipeline, Zeno.

“It’s all about building tools for the creative (personnel) to compose their vision and then for us to make it easy to plug into our pipeline,” Sanders says. “We’re trying to (keep) the technology in the background, so it doesn’t change the paradigm for the director. Previz becomes viz and ends up in postproduction as one big, happy pipeline.”