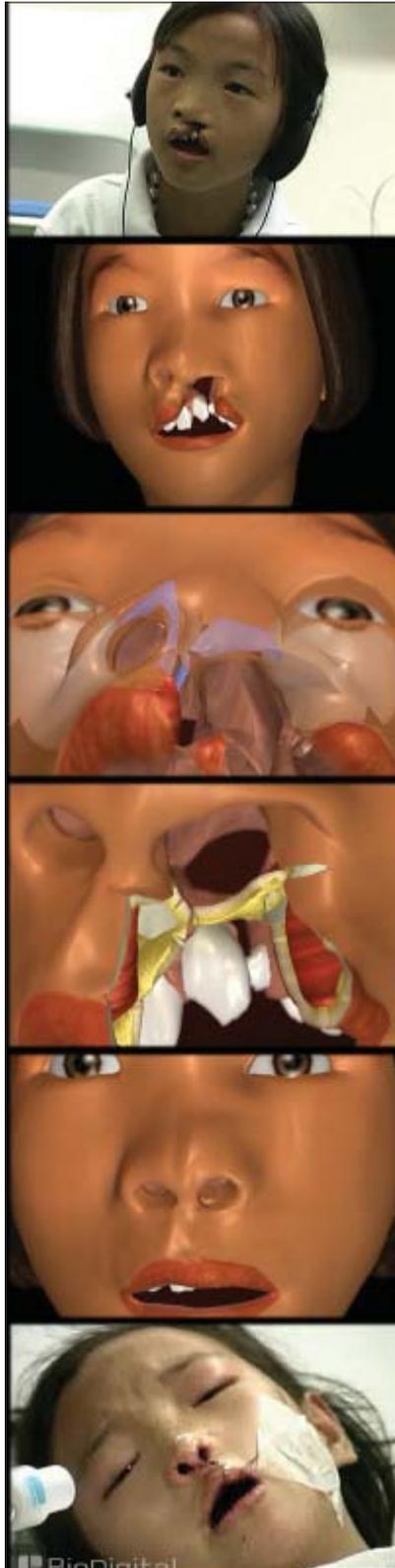


BioDigital Systems: Animating to save lives

By Greg Condon

Like the office of many animation studios, BioDigital Systems it is crammed with a mainly young staff in tight working spaces glued to their computers. Unlike most commercial studios, however, these animators have backgrounds that might be seem more appropriate for laboratories. While they are an innovative and dedicated 3D animation studio, the work they do rarely resembles that which we are accustomed to from movies – they specialize in medical animation. With computer animation and special effects becoming more realistic with every blockbuster, its not surprising doctors have turned to animators for realistic imaging in their work. BioDigital is one such company specializing in this growing field. Instead of animating virus mutations to frighten an audience, they animate virus mutations to be used by biotech companies to explain a complicated new drug mechanism to potential investors.

Aaron Olikier, John Qualter, and Frank Sculli, the company's three founders, had a goal from the beginning – to bring 3-dimensional technologies to the field of health care and medicine. The seed of this idea was formed when Mr. Sculli and Mr. Qualter, who were working for the same information services consulting firm, noticed an increase of efficiency in representing information in 3D. Data for patients at a major cancer institute that was previously presented within spreadsheet like formats was much more effectively communicated within 3D anatomic models. Successful visualizations like this lead to an increase in demand from clients to see more applications of medical models and animation. With combined backgrounds in fields including biomedical engineering, computer programming, graphic



design and biology, they were able to start up their company, which has been up and running since 2002 and working on an ever-expanding roster of projects.

The team of animators at work here has equipoise of scientific and artistic skill sets. “In communicating with our clients, having a scientific background is beneficial”, says Mr. Sculli. Besides the virus mutation, these animators are creating examples of successful ways to draw blood; three dimensional models of medical equipment; and building precise replicas of human hand skeletons. The demand for animation that can be used for medical purposes has grown over the last few years, and BioDigital has more than kept busy with work for clients that include hospitals, pharmaceutical companies, biotech researchers, doctor training films, charitable organizations, as well as being involved in developing prototypes for new inventions. The team also works closely with doctors at NYU Medical Center to remain on the cutting edge of the medical field. To all of these projects they apply 3 Dimensional animations in unique and exciting ways.

When I worked in television graphics the biggest concern was getting the work done quick; completely accurate models were a luxury, but definitely not a necessity. Like most commercial studios, if we could reuse old graphics we did, and any stock models or public domain images were a great help for meeting ever present deadlines. Part of what sets BioDigital apart from a television animation studio is their narrow focus and audience. Their models might have a variety of uses, but they know that the doctors need precise detail. “We really try to go into scientific accuracy, so we really don’t buy any stock models at all. We create from scratch”, says John Qualter, “The surgeons and

physicians are very inquisitive people, they want to look behind things, they want to look under things, we really have to spend a lot of time up front, researching, modeling and building.” If a 3D animator where I worked had to animate a bird, he need only perform a quick search online to find useful pictures and video. Details about viruses entering a human cell, however, may be much more difficult to come by. This is certainly where the biological background of the founders comes in handy. But they also spend a good deal of time in research, using scientific textbooks, MRI or CAT scans, and even watching surgeries. Direct input from doctors helps as well. “Different physicians will have different thoughts on how things should be happening, but in general the feedback has been great”, says Mr. Sculli.

An example of the amount of research put into a project is the cyber heart Aaron Olikier had created before joining BioDigital. A human heart has multiple parts and valves working in concomitance and each valve contains an annulus, a ring like structure located at the end where the valves’ leaflets are. Doctors have been able to get data containing the motion of these parts. However, it has usually been from many different sources. Annulus data, for example, came from dogs hearts, leaflets were obtained from sheep. But to bring it all together into a single model, they need computer programming and 3D animation. Working closely with doctors, Olikier spent 3 months

matching the data into one working model. Taking the motion of the dog and sheep data and putting it into one human model, he and was able to have a full beating heart with all the valves and leaflets working together. It might sound like something out of Frankenstein, but what they had created was the most realistic representation of a beating heart that doctors had yet seen. This model was then used to gauge the effects of heart attacks and heart diseases. Though it seemed accurate, it had been difficult to prove until a recent advanced echocardiogram was made which took sonogram footage of the heart. The footage was compared with Olikier’s animation, and it matched perfectly.

Of all the projects they have been involved with; one of the most rewarding has been their work with the organization Smile Train, a charity that trains doctors in cleft lip repair operations. The procedure is a fairly complex and Smile Train had been running into logistical problems in terms of training doctors – many of whom were in remote locations, and there were the inevitable language barriers. Dr. Court Cutting of NYU and BioDigital were brought on to create animated training DVDs. This 2-disc instructional set shows how the procedure is done in a uniquely visual way that helps overcome some of the obstacles Smile Train was confronted with. Sending someone a packet that explains in black and white how a surgery is done leaves a lot of room for confusion; still images are too

static; and words could get lost in translation. As Mr. Olikier says, “The reason [the DVD set] has had such an impact is it is impossible to explain this type of thing”. The most successful way to explain a surgical procedure like this, the team thought, was to show a fully animated 3D rendering of the procedure. In Beijing, a doctor can watch the procedure in Chinese, while a Mexican doctor can view the same animation while hearing the steps in Spanish. Rather than a typical one shot over the shoulder training video, which may have been the norm ten years ago, this video employs zoom features, moving cameras, transparencies, and special effects. At one point while demonstrating the placement of suture into the patients nose, the animators are able to make the entire nose transparent showing the doctors where the suture lies under the skin. A film of an actual operation would not be as specific. This has proven effective and popular, and they currently send out about 35 of the DVDs a week to doctors in countries all over the globe.

With the success of the demonstrative surgery video for Smile Train, the team has moved on to their next goal. Within the next few years they will have animated a completely interactive and immersive surgery-training environment. This ambitious project would allow the viewer to manipulate all incisions and movements. As the doctors and physician themselves become more curious about the new technology, the demand in the medical community continues to grow. Work of this nature has helped to show the full potential of the medium of animation. The use of more realistic 3D programs have added a level of realism both artists and Doctors want to see in the field.

Greg Condon is a freelance animator, specializing in stop-motion, who lives in Brooklyn, NY. He can be contacted at gjbcondon@gmail.com

