THE CYBERSPACE PROMOTIONAL VIDEO-SCRIPT

William Bricken
June 1989

[Scene Until Next Shot: introductory animation and titles. "The Autodesk Research Lab presents Cyberspace: Inside Information"]

[Scene: JOHN FORBES in an office (his?), with lots of equipment, and a view. Or outside on the deck, if noise can be controlled.]

Hi, I'm John Forbes, at Autodesk in Sausalito. Today I'm going to take you on a tour of a new technology called Cyberspace, a technology that is literally redefining the frontiers of Computer Science, a technology that lets you use AutoCAD to build artificial realities, and then lets you step inside what you have constructed, as if it were real.

[Shot of headmount, slowly rotating with Cybercity view in eyepieces. Enter and slowly explore Cybercity.]

We have always been explorers. First, we explored our physical world. But lately, with movies and television, we are exploring virtual worlds, worlds that exist only as information. What you are watching is the television camera's flattened view of Cyberspace, a world that is actually 3 dimensional, that surrounds the explorer as if it were real, but a world that was constructed entirely in AutoCAD.

[Back to John in his office]

Here at Autodesk, the Research Lab is exploring the potential of Cyberspace, by building a prototype Virtual Reality Construction Kit. Their work reaches deep into the history of computation:

[Clip of COONS]

A man actually talking to a computer, in a way far different than its ever been possible to do before.

>> Really not with his voice?

No he's going to be talking graphically, he's going to be drawing. And the computer is going to understand his drawings. And the man will be using a language, a graphical language, that we call Sketchpad that started with Ivan Sutherland some years ago when he was busy working on his doctoral degree.

And you will see a designer, effectively, solving a problem step-by-step. And he will not, at the outset, know precisely what his problem is, nor will he know exactly how to solve it. But little by little, he will begin to investigate ideas, and the computer and he will be in cooperation, in the fullest cooperation, in this work.

[Clip of SUTHERLAND]

...developed Sketchpad in 1963, had this in mind when he set out to create an alternative to batch input of letters and numbers via punch-cards or keyboards using the now familiar light-pen and function keys. One of Sutherland's goals was to take better advantage of the natural human talent for eye-hand-brain coordination.

[Back to John in his office]

Sutherland's goal was to immerse the user inside the graphics system, to place us and the graphics in the same world. Over the last twenty-five years, many new technologies have been developed that make direct interaction with computer generated graphics a possibility. The main improvement has been the tremendous increase in computational power. This power is utilized by 3 dimensional input devices such as the Spaceball and the DataGlove, and by three dimensional output devices such as the head-mounted display.

[Clip of SpaceBall]

...Spatial Data Systems is one such product. It is impressively intuitive and simple to use. The user simply grasps the spaceball in either hand and pushes, pulls, lifts or twists it slightly to control translation or rotation in all directions. The harder you push or twist, the faster the graphics display reacts. The ball is made of firm rubber and doesn't actually move. Inside is an analog sensor that detects the torques and pressures exerted on the ball. This information is sent to the analog-digital converter housed in the base of the unit, which then connects to the workstation, in this case a Sun 3/260 CXP.

[Clip of DataGlove]

Another breakthrough device is the Dataglove, from VPL research, a lightweight glove that senses hand gesture, position and orientation. Instead of bringing the hand to a heavy control device that typically sits on a table, the DataGlove puts a lightweight device on the hand, and then keeps track of where the hand is using a built-in position sensor.

Fiber-optic threads, sandwiched between the layers of the glove sense bending and extension of the fingers or spreading of the hand. The glove feeds all these sensor parameters through a control unit that can output calibrated records, making it possible to build an individualized gesture library for higher level commands.

[Clip of NASA]

A team in the Human Factors Research Division at NASA's Ames Research Center has combined the data-glove with a speech recognition device and head-position sensors. Together, they control a head-mounted display system, to create a multi-purpose virtual interface environment.

The head-mounted display unit uses two liquid-crystal display screens presented to each eye of the user through wide-angle optics. Each eye allows a 120 degree field-of-view, both horizontally and vertically, with a common binocular field of up to 90 degrees, and allows natural parallax depth perception using stereoscopic images. The imagery appears to completely surround the user in 3 space. The operator can explore and interact with the virtual environment, just as if they were touching real objects, in real-time and from multiple viewpoints.

Possible applications include long-distance control of robots, and monitoring or management of large scale integrated, information systems, such as might be found in future space stations.

Virtual interface environments and head-mounted displays have been researched for more than 20 years, by a variety of people, ranging from Ivan Sutherland to Nicholas Negroponte. The NASA system is significant, because of its skillful use of the latest hardware to fit the interactive graphic system onto the human body in an unusually comfortable and unintrusive manner.

[possible CA fade (?) to TIMOTHY LEARY]

The concept of Cyberspace, creating realities on the other side of computer screens, opens up a new and very thrilling chapter in the human adventure.

For thousands of years intelligent men and women have known that there lies within, somewhere in our brains, a universe of wonder, and of novelty and innovation and creativity.

[substitute from take 6]

But in the past these mystics or visionaries would come back from the universe of the brain within, with no language to express it. People typically would come back and say "Wow!"

[back to take 8]

Occasionally brilliant artists, like Hieronymus Bosch, have come back and have put on canvas a little picture or a still frame of this wonderful series of universes within.

But now, in the late twentieth century, here at Autodesk, a band of explorers has assembled, and given us the hardware and the software to allow us to go beyond and through the screen and to inhabit, to move around in this cybernetic universe.

One of the best ways to describe this, in the most homely terms is, it's like an aquarium:

[substitute from take 6]

The screen of the boob tube, or the computer, now becomes a glass window in which we no longer have to just look through the window at the other side of the aquarium, with all the numbers and figures and events happening there. We can get on the other side of the screen and swim with the creatures and organisms that our minds have designed. And more important, we can interact with other people. I can meet you on the other side of the screen, we can get to know each other and create together wonderful buildings and landscapes of meaning and surprise.

[back to take 8]

Now there are many words currently used to describe this ability to create new universes. We talk about virtual reality or artificial reality. Our prophet William Gibson has described the digital Matrix, the consensual hallucination of all human knowledge.

Here at Autodesk its called Cyberspace, and its a nice place to be.

[John in the Lab, with ERIC, RANDY, MEREDITH, GARY, PAT, and WILLIAM in the background, working or chatting. Eric and Randy are close, accessible]

Here we are in the Autodesk Research Lab. There are three main challenges that the Cyberspace team is working on:

[shot of the Cyberbox]

The challenge to hardware is to provide powerful graphic rendering boards, and to integrate many different input devices,

[shot of dual monitors with articulated rockets (or similar neat thing)]

The challenge to software is to simulate real world systems, to provide for many users to share the same virtual space, and to provide tools for constructing virtual worlds that are modular, reliable, expressive and powerful,

[shot of Gary, Meredith, and William talking over designs. We wave.]

And finally the challenge to cognitive modeling is to provide ways for to interact in virtual space, and to identify techniques that make virtual realities comfortable, productive and fun.

[back to John]

The work being done here is designed to help a person step into the virtual reality constructed other side of the computer screen. Right now, it's only research, but we believe that nothing stands in the way of reasonably priced virtual reality products becoming available over the next few years. These systems will be used for direct experience in and for exploration of three dimensional information such as architectural designs, weather patterns and digitized images of the human body. Or maybe applications developers, world builders, will construct wonderful worlds within which we can experience walking on Mars, navigate educational databases, or play team sports.

Now, we'd like to show you more of what Cyberspace might be like. Eric Gullichsen and Randy Walser, the Chief Programmers of the Cyberspace team, will be your guides.

[cut to ERIC GULLICHSEN, in the Lab with the machines, headmount and glove accessible. Eric starts to put on equipment.]

I'd like to show you the state of our research. There is nothing like actually being inside Cyberspace, but by watching the monitor, you can get an idea of what I am experiencing.

[cut to Cyberspace on monitor. First just a shot of open plan]

We're standing right in the middle of Open Plan. The image is being regenerated at about 6 frames a second.

[fly back]

I'll fly back using the SpaceBall.

[twist world]

We can twist the world by twisting the SpaceBall, and we can fly around by pushing on the Spaceball.

[turn head]

Also, if I stand still and turn my head, the view changes. There's a (Polhemus) head tracking device attached to the headmount. It sends a signal to change the display whenever I move my head.

[show hand, turn hand]

My hand is also part of the computer generated image. There it is now. The image is generated using the Dataglove which measures finger position using optical fibers. It also has a Polhemus sensor, like the headmount, for tracking the position and orientation of the user's hand.

[point and fly]

The glove can be used to give instructions by making gestures. I fly in the direction I point to.

{only if we can demonstrate collision detection do we use the next paragraph}

In Cyberspace, if you want to move an object, you don't need to type or to use a menu, you simply reach out and touch the object where it appears and manipulate it.

[fly around the corner of Open Plan]

Well, we're just about to head outside. I'll turn the controls over to Randy now.

[RANDY WALSER voice. Scene continues to outside OpenPlan, into CyberCity (flow if possible, cut at voice change if not)]

The Cyberspace Construction Kit relies on modeling software to construct and maintain virtual objects. Creating code that supports real-world, real-time virtual environments is the cutting of software research, and that's what we'll be exploring in the near future.

[move around CyberCity]

Right now, we're in a very simple, experimental world called CyberCity. We built it in AutoCAD first, on the outside of the screen. Then we loaded the file into Cyberspace. Then we added a few simple features, such as the OpenPlan room, an airport with a plane we can ride, and an elevator on the side of a building. These CAD drawings look simple, but they are generated by a new kind of programming language, one that lets us specify gravity, for instance. When gravity is turned on, things that are not supported will fall down.

Here in the Autodesk Research Lab, we have a sense of mission and purpose that is motivating us in this project. As we see it, we're setting out to develop a new way of interacting with the computer, and with information. The new paradigm is to make the computational environment in the same form as our external reality, and to provide interface devices, in both hardware and software, to make it seem as if it were real to the user.

[begin to step back from CyberCity, into HeadMount slowly rotating away.]

We want to provide a sense of real world dynamics, a familiar place that supports many users at the same time. If anything is clear at this stage, it's that we don't know exactly what Cyberspace is going to amount to. We are designing the Cyberspace Toolkit to be quite open-ended. We want Cyberspace to be an accessible place, a programmable environment in which it is as easy to decrease the gravity as it is to reach out and turn a knob.

Our mission is to provide the tools that will enable applications developers to build the Cyberspace of their choosing and to get Inside Information. In John Walker's words: Reality isn't enough anymore.

[end animation. *No house flythrough, it isn't good enough to be the future, and its not yet the present.*]