Last month, we examined the personal and social psychology of identity online, especially as it affects our evolving concepts of identity in the much more familiar physical space. This month, we look at the closely related topic of avatars for indications of what our presence online may look and sound like some years from now. (We’ll leave the tactile-feedback systems to your imagination.)

Computer-generated characters of all sorts are popular now. This year’s crop of new, 64-bit games (many of which premiered recently at E3 in LA) do much more realistic rendering of scenes and characters than current systems. First-person shoot-'em-ups such as Doom and Duke Nukem 3D offer gripping twitch-game action. Multi-player games are especially hot.

Standalone and network-playable games are headed for the Internet at full speed, despite concerns about latency. High-end animation is hot, too, as evidenced by Jurassic Park, Toy Story, Jumanji and numerous science-fiction movies. These pre-rendered characters aren’t dynamically controllable, so they aren’t avatars in the sense we examine here, but they do raise everyone’s expectations of computer animation.

Avatars can be playful, but they aren’t only for play. Many companies are trying to create the ideal online shopping experience by building fancy 3D malls. Generally, though, these environments feel sterile and uninteresting. They lack social interaction -- the hum of activity and life that people bring to spaces. The same goes for the Web. To people whose principal experience of the Internet is browsing the Web, the Net is a lonely place. E-mail, Web-based bulletin boards and chat capabilities help alleviate that feeling, but they’re still relatively hard to figure out and use.

Now multi-user environments, conversation technologies and streaming voice and video are livening things up. Especially interesting is how an inventive company might use avatars.

WELCOME, SUSANNA STROMBERG!
and related technologies to transform its customer-service operation (see box, opposite), or how a company might use simple avatars to enhance group communication. Ad agency Chiat/Day is testing one such system, called Oxygen, which was developed for the agency's internal use as a conferencing system by Boston-based Art Technology Group.

In Oxygen, employees are represented by their faces, implemented as icons. They can place their faces in a virtual cafe to chat. As they type, word balloons appear over their icons. It all occurs inside a larger environment known as Oxygenland. The system's goal is to make it easier to form and re-form work groups and share information.

**Etymology and history**

OnLive!'s Rod MacGregor has a nifty definition of "avatar:" "The Hindu religion holds that our souls exist outside of space and time, and that we are represented in this particular reality by our physical bodies or 'avatars.' In other realities we are represented by different avatars. An avatar is the projection of a consciousness into a particular reality; a single consciousness can simultaneously exist in multiple realities." Hindu deities also use avatars to have material form in the physical plane and see how things are doing.

Randy Farmer and Chip Morningstar popularized use of the term in online environments with their ground-breaking 1985 system, Habitat (see Release 1.0, 7-93).

**Just like us?**

Before we get too carried away, though, we should debunk the notion that the ideal for online avatars is to look as much like their "owners" as possible. This point of view holds that fully articulated, photo-realistic characters are the natural outcome of the inexorable growth of MIPS and graphics acceleration, plus advances in artificial intelligence and enhanced input and control devices. It also implies that we will naturally want to use these representations for the major part of our online activity. (There is a similar attitude among videoconferencing proponents that video will replace telephony.)

Not likely. Lifelike, fully articulated, high-function avatars are as far out on the technology frontier as are speaker-independent, large-vocabulary, continuous speech recognition software and machines capable of general-purpose "intelligent" interaction or common-sense reasoning. There are many open research issues around avatars that have little to do with raw horsepower or computer-reasoning capabilities.

One major issue is movement: How does one control an avatar that has as many joints and appendages as a human -- especially if one is sitting behind a keyboard and mouse? Buttons, menu bars, palettes and pre-scripted meta-movements (e.g., the angry walk, the fearful run; see page 25) can't reproduce the many layers of conscious and unconscious intent present in any person, never mind deal with unexpected turns of events (the bike that cuts you off, the cup of coffee that falls in your lap). Technology sophisticated enough to sense moods and respond accordingly, or infer...
The all-singing, all-dancing call center

Imagine a call center that integrates multiple technologies to help customers any way they prefer to communicate. If they like the phone, the transaction occurs as it does today, with a combination of voice-response technology ("hit '4' if you're having trouble with IRQ settings..."), human operators and perhaps fax-response.

Customers who enjoy using a Web browser might visit the company's customer-support Website and use a search engine or troubleshooting decision tree. At any point they could request that a human operator help them out. The operator's voice could come over the phone or the Internet, it doesn't much matter which, and the two people could see and hear the same things. With the caller's permission, a tech-support person could examine and change files, and so on (if the changes require a reboot, as is too often the case, the voice link better be over a separate phone line!).

This scenario is eminently feasible with today's technology, although not enough people use Web technology yet to justify such investments. Also, audio quality on the Net will remain iffy until the next generation of Internet protocols is rolled in place. Again, the audio link can be a standard phone call.

Customers who like avatars and virtual spaces might see an automated avatar -- a bot that does triage on the query by asking simple questions or even presenting a form. Once the question has been narrowed to the point where it needs a support representative, a human would "step into" the character and take over.

If something needs repair, the rep could check things, fix them and describe them. It might be appropriate to lead the caller to a short guided tour or a presentation with video or animation, performed by a bot or presented live. (Step right up and see the Ronco-matic food instantiator!) Agents could help several people at once, or, in some settings, allow visitors to help each other. Sometimes it may make sense to use conceptual spaces.

At the end of the call, the human operator could step back out and leave follow-up details to the bot. Because of call centers' huge volumes, every second of human-operator time saved translates into hefty savings.

Now support tools can be put online easily. All of this could run on the same server system and database: The same logic and answers work for voice-response, the Web and other avenues.

This scenario translates well to other settings. Coaches could step in and out of computer-based training systems. Technicians or management consultants could inhabit performance-support systems (get Regis to do that, Michael Mellin!). Specialists need not be local. They could be anywhere on the Net, and their triage and problem-solving front-ends could be as complex as they care to make them.

Release 1.0 29 May 1996
things by watching a user’s movements or actions is in the earliest experimental stages (see page 24).

Even climbing into a suit wired with sensors (or some future, fashionable sensor-filled gabardine) fails to solve the problem adequately, since the character in virtual space can move in ways the person in physical space cannot match or even mimic properly. That’s a freedom, not a bug. The pursuit of fully realistic virtual reality leads straight to some pretty intractable problems and tends to suppress what is different and useful about virtual spaces and artifacts.

Even if we had such lifelike avatars and knew how to control them, it’s by no means evident that we would want to use them as our everyday representations online. That begs the key question: What will we choose to use for our interactions?

The answer, of course, is "it depends." We can do a bit better than that, though. It depends on what you want to do and how you want to do it.

What do you want to do today?

The substantive stuff we do in online aces, beyond establishing a presence or pushing buttons to place orders,1 is engage in entertainment or communication. We have fun or we connect with others, be it for commerce, for help or just to feel good. The aims are neither mutually exclusive nor collectively exhaustive. They’re intertwined, but together they encompass a broad range of needs and activities.

Motion and emotion

It happens that entertainment and communication also map well to the concepts of motion and emotion. Active games require mobility and broad expressions. They are best played using avatars with strong provisions for mobility and few gestures or expressions. Those avatars may be able to jump and pick things up but not to blink, wave or flirt.

Slower games, such as strategy, trivia, board or card games, are actually more about communication than physical motion. In such games, chatting, bluffing and kibitzing are often the primary objectives. Communication environments will likely rely more on gestures, fine-grained expressions and other subtleties. They may require little or no mobility.

1 Commerce is a byproduct of successful social interaction, not the other way around. A sales call leads to a purchase order. A recommendation from a trustworthy neighbor leads to a trip to the store. People negotiate; they agree on terms. Exchanging money is only a small part of the transaction. The social interaction behind a purchase might have occurred long ago. Once you know exactly what you want, you might as well automate the purchase - turn it into a mini-EDI arrangement. If not, then you’re going to the store to be social.
Time for a diagram...

To illustrate our discussion, it's helpful to introduce a framework. The diagram below plots multi-user online environments according to two of their avatars' attributes. The horizontal axis is the depth and detail of the avatars' depiction, which ranges from plain text to 2D, 3D and beyond -- from simple lines to textures and photo-realistic renderings.

The vertical axis represents the amount and granularity of control ordinary users have over those avatars. It begins with avatars over which average users have only rudimentary control and customizability, even though the avatars may be able to execute complex behaviors or motions (in the end, programmers have to modify those characters). The scale then moves through avatars with broad, coarse motion such as walking, sitting and jumping to those with more fine-grained expressions, such as waving, smiling, mixed or partial expressions (the frowning laugh, the smirk) and so on. At the end of the scale are fully customizable environments, the best current examples of which are the old, reliable MUDs and MOOs.

The trade-off curve

Many diagrams carry the subtle implication that the best place to be is in the upper-right-hand corner, where both parameters are maximized. For this

Release 1.0 29 May 1996
diagram, that would mean that the ideal multi-user system would have fully
customizable and perfectly rendered 3D avatars; we have already argued this
may eventually be doable, but it is not desirable as an "optimal" solution.

There is a trade-off curve of acceptable feature combinations that stretch-
es from the upper left-hand corner to the opposite corner of the diagram.
The band delineates a range of satisfying and believable user experiences,
as long as the environments' features are balanced. An important element
in this balance is cognitive binding, an idea we return to in a moment.

Following the curve from upper left to lower right we find the following:

- Plain-text MUDs and MOOs, which can be extremely believable and
eemotionally appealing if participants are articulate;
- Customizable 2D avatars, with gestures plus text either in a sepa-
rate window or in word balloons (The Palace, 2D V-Chat spaces and
Virtual Places);
- Modifiable 2D avatars with word balloons, a broader range of ges-
tures and useful objects (WorldsAway);
- Unmodifiable, low- to medium-res 3D avatars, text on the side or
not present, some sound, plenty of movement (Doom, Mario Brothers);
- Modifiable 3D avatars, limited text, construction environment (Al-
phaworld);
- Modifiable, lip-synching 3D avatar heads, shared audio (OnLive!);
- Well rendered 3D spaces and avatars with mobility, high-quality
audio and shared voice (Diamond Park); and
- Sophisticated, semi-autonomous, unmodifiable, single-purpose 3D
avatars (Improv, ALIVE).

In further defense of text

Typing is not particularly intuitive, yet text is infinitely malleable and
pleases many people. People chat all the time on commercial online ser-
vice. MUDders invent devices and give themselves every imaginable power or
attribute. Text makes it easy to have many people in the same virtual
space. It's inexpensive and usable worldwide. Text also leaves a lot to
the imagination, which is the online developers' greatest ally.

In fact, in a successful system, human imaginations complete whatever short-
falls the characters or environment may have as far as realism or motion are
concerned. Cartoonists and ventriloquists know this. They also understand
the power of setting and context. Genres come with expectations. People
are predisposed to complete the illusions. (Microsoft uses this fact well
in its cool, new comics-based visual chat offering; see page 19.) It's bet-
ter to omit things than to put in the wrong things.

As the technology improves, the trade-off curve will drift upward, but it
will remain extended. It won't converge to a point. People have different
preferences. Some people like to type, or maybe they like the way typing is
quickly revised, then becomes permanent. Others like to talk -- or maybe
it's the immediacy or intimacy of speech that attracts them. Still others
like video or 3D virtual spaces. The key is helping them find each other in
a variety of appropriate spaces. As Doug Crockford, ceo of Electric Com-
munities says, "There will be a marketplace of virtual worlds. People will
gravitate toward worlds that resonate for them."
The primary factor for what kinds of environments will endure is that market. Yet ugly implementations of great ideas, management slip-ups, lack of funding, poor marketing -- any of them could doom an otherwise viable offering on the curve.

**Mixed-up media**

A third potential axis is the use of audio and video, which have powerful and different effects on virtual spaces. The Jupiter project at Xerox PARC, which adds audio and video to a text-based MOO, is a good example (see *Release 1.0*, 6-94). High quality audio can sharply boost the credibility of systems that are otherwise quite simple.

It's interesting to note that the telephone long ago established itself as the de facto form of electronic one-to-one communications. It's the technology to beat -- or complement -- to create new forms of communication.

There are many interesting ways to use video. It can be tacked on to a more traditional multi-user environment, as in Starbright Worlds. It can be integrated into a multi-user space, as in NTTsoft's InterSpace (see box, page 8). Video can be an input and control mechanism, as in MIT's ALIVE project (see page 24).

The key, then, is to match offerings (complete with avatars, media mixes and their environments) to tasks (e.g., chatting, playing games and troubleshooting a PC).

**Understanding avatars**

Cartoonist and author Scott McCloud loves the possibilities that online spaces present. "So far, we've been constrained by the technology of the page," he says. "We have an associative love of print -- it's a fetish. The prospect of an infinite canvas is really appealing." McCloud wrote *Understanding Comics*, a bible of sorts for avatar aficionados (see *Release 1.0*, 6-94).

McCloud also believes that audio is a special medium, and that adding it to shared virtual spaces really complicates things. He notes, "This is not chat plus sound. As soon as you cross that barrier, the rules change." More specifically, he believes that first-person systems with shared audio will dominate other schemes, but that they must be designed quite carefully.

OnLive!'s Traveler is designed with such care. We first covered the company last March, as part of the 1996 PC Forum.

**WHY ONLIVE! CHOSE LIP-SYNCHING HEADS**

OnLive!'s Utopía is the first commercial, multi-user, avatar-based system that includes shared audio. Rod MacGregor, OnLive!'s chairman, has strong, clear feelings about what he wants the company's products to do. He wants the system's users to believe they are present in the space and that the avatars they are speaking to are real characters.
Video on a stick

NTT Software has created a system called InterSpace that uses live video faces. The system's avatars look like TVs mounted on mobile platforms (NTT has developed a version of InterSpace in which the videos replace the faces on more human-looking avatars). Participants use joysticks to navigate the spaces. The overall effect is interesting, but rather uncomfortable. It seems as if participants are trapped in goldfish bowls.

InterSpace prototypes have been used mostly as information kiosks. Pilot customers include Tower Records (for a virtual music store), Levis (for entertaining promotional games) and the College of Marin near San Francisco (for virtual campus tours and help). The system runs on Windows NT workstations with ISDN links.

He wants the avatars to fade from the experience in the way that Bill Warner, founder of Wildfire Communications, wants the Wildfire phone agent to fade from its quite visible role as intermediary (see Release 1.0, 10-94). MacGregor is thrilled when he notes that participants treat other avatars as they would if the other parties were present by moving to face them and making eye contact. The avatars automatically lip-synch to their owners' voices.

Believability, MacGregor says, has less to do with realism than it does with offering well-correlated elements of the environment that allow users to bind them into a satisfying whole. Binding is what happens (or fails to happen) as you process various cognitive and sensory streams, such as narrative, sounds, images and scents. When they fit together well, or "bind," the experience is believable and usually quite enjoyable. As we mentioned above, the human imagination is a willing ally in this process. It doesn't need many cues to create great simulations.
Blinking and chatting in OnLive!'s Utopia

Breaking the spell

Getting the binding right can turn scraps of cloth into a stage partner or a performing troupe, as Edgar Bergen and Jim Henson knew. Getting it wrong is easy and destroys the entire illusion. A poorly dubbed movie or one with poorly synched audio and video tracks will do the trick. So will repetition. The characters in Disney's Aladdin interactive VR ride are beautifully rendered and have canned behaviors. The first time you see them, they are interesting. The second time they go through the same behavior, the characters break the illusion and drop out of your imagination.

Binding is about correlation. A beautifully rendered face that doesn't move at all is less believable than a more abstract face that moves in sync with the voice. That's why TV cartoons work, even though they have such slow frame rates.

Good synchronization creates correlation in time. To get better correlation in space, Utopia includes directional sound and other, more sophisticated techniques. Characters on your left seem to speak from your left, those that are far away sound fainter and so on.

OnLive!’s developers decided that avatar bodies didn’t contribute enough to communication to merit rendering them and making them useful. The developers spent time making the avatars bind better, rather than look better. They also found that lip sync wasn’t enough: The avatars still looked wooden. So they added details, such as autonomous blinking and a subtle, random cycling through various expressions. An idle OnLive! avatar actual-
ly cycles through a little of each emotion: one percent sad, four percent happy, etc. These last items are meant to add texture; they are not controllable by users.

The result is a system that does many things right. By paying attention to details that really affect users' perceptions of the avatars, rather than messing with beguiling engineering challenges such as how to do realistic texture mapping, the company has created a useful tool -- not just a toy. Videoconferencing vendors and groupware companies, take note.

**Toys R Us?**

Simple choices can greatly improve believability. Facial expressions and skin are still almost impossible to render realistically. Solid objects are much easier, even if they have some expressions. Note that in *Toy Story* the toys are much more believable and engaging than the human characters. They're almost more human.

Using toys as the protagonists was brilliant, because it not only leveraged our long experience with toys and cartoons (and therefore our willingness to help animate the characters), it also made the rendering task much easier, though still far from simple. This probably bodes well for avatar toys as agents, or for special virtual outfits that we don as our avatars, much as astronauts put on space suits.

**Assumptions and pitfalls**

There are a few traps it's easy to fall into when thinking about avatars. The first is to believe that avatars are somehow central to online experience. In fact, avatars are just useful tools, representations that offer a place where people can pin their identities, comment on what's going on, or just play. Allee Willis, creator of willisville (see page 20), believes this strongly. People's presence is manifest many ways in willisville, not only as avatars. When people do use avatars, they can flex between many different representations, from 3D to pictures or text.

Another trap is to believe that 3D, Cartesian space is necessary for multi-user online spaces. Familiar metaphors probably do make it easier for novice users to figure out what to do, but they also greatly constrain the realm of possibilities.

The opportunity is to invent new kinds of spaces and forms of interaction. As Amy Jo Kim, longtime designer and producer of interactive online environments, says, "How can you give people enough cues that they can get around and remember things, yet give them an environment that's magical enough that they feel like they're someplace really different?" Kim, president of Naima Productions, helped develop CyberPark, the successor to the ImagiNation Network and the systems interface to Mplayer, a low-latency online gaming environment debuting this summer. She is also at work on a "magical" environment of her own, which she calls the Ambient Club.
Macro Focus

Avatars and Cartesian space are useful, optional components of the Big Redesign of the communication infrastructure that is now underway and may last for another decade...or two. Our identity online is a central issue.

Given that we construct our social identity, choosing an avatar (better still, creating and decorating one) may be the most explicit and effective way to do so available yet, especially in combination with Web pages and other persistent online artifacts. Avatars are personal and political statements, like clothes or cosmetic surgery. Linda Stone, who runs Microsoft's Virtual Worlds group, sees social online environments as harbingers of the next wave of computing, which will fundamentally change the way we interact. Says Stone, "Agents and avatars all force the questions, 'Who am I?' and 'How do I want to be represented?''

We're still near the beginning of a decade-long effort to redesign the fit and finish of the technologies we use to overcome time and space, and with it the ways we relate to each other. Today we use the phone heavily and other, disconnected media occasionally. The future is not just about jamming together TV, phones, the Internet and other stuff. It's subtler. It requires degrees of interactivity, shades of dimension and gesture, graceful transitions between tools and environments. It will evolve as our ability to express ourselves with it evolves.

Relevant materials and events

We've discussed the social aspects of online interactions and relevant topics in many previous issues of this newsletter, especially those covering multi-user virtual environments (Release 1.0, 6-94 and 7-94), communities (6-93 and 7-93), shared virtual spaces (11-95), online identity (4-96), explicitness (10-93) and VR (10-90).

Electric Communities' Website has a pretty complete set of pointers to virtual environments (see Resources, page 28). Soon after you read this, we will put the diagram on page 5 on our Website (www.edventure.com), with screen shots from and links to the various systems. Note also that two relevant conferences are coming up: Virtual Humans is in Anaheim, CA, on June 19 and 20, and SIGGRAPH is in New Orleans this year, on August 4-9 (see Calendar, page 28).
WHAT'S DIFFERENT?

Figuring out what kinds of spaces to offer, given the tradeoffs described above, requires understanding what we lose and what we gain with various technology choices. Here's a start.

Lost: nuances

An obvious major casualty is subtlety, much of which has to do with aspects of presence that are simply not transmissible online (which doesn't exclude the possibility that these things will find a different manifestation). MIT Sociologist Sherry Turkle says, "The effect when I put my hand on your arm during a conversation is quite different than when my avatar does the same thing."

Subtle things can change the gesture completely. Is the hand there for reassurance, as a warning or to suggest intimacy? Online, it's nearly impossible to tell. The lack of nuance online has implications for virtual sales avatars and other roles that require trust.

Found: gestures -- and more

Most avatar gestures emulate human gestures, such as waving. Of course, much more is possible. The Palace, the Time-Warner skunkworks project we first described in Release 1.0, 11-95, is a great example of the wide range of expressions available through avatars, props and other affordances.

Canned gestures have strange side effects. "Flirting" online becomes a parody of the real thing, which is defined by being inexplicit. By being made so obvious -- particularly when everyone in the space can see the throbbing-heart animation, for example -- the emotion is transmuted. Real flirting has to find other channels. Waving and laughing gestures don't suffer as much from this problem, although laughing can be misinterpreted as easily as the irony emoticon in plain-text messages.

THE PALACE: AVATARS AS INSTRUMENTS

The Palace is probably the avatar-oriented online environment where user design creativity has blossomed the most, probably because it offers users a scripting language as well as full control over avatars, props and the spaces themselves. The system is also simple and inexpensive. Pay $20 and you can run a server and put up your own, freestanding little world. Other Palace users connect to your site the way they would to a Website.

2 Other kinds of creativity have flourished on other systems. For example, the members of the Ur-avatar-based service, Habitat, evolved their own forms of government and entertainment. (Fujitsu Cultural Technologies' WorldsAway is a descendant of Habitat.) People build all kinds of structures in Worlds Inc.'s Alphaworld, but they don't interact socially as much as on other systems. Text-based MUDs and MOOs have been hotbeds of creativity for years.
This opportunity for creativity has been central to The Palace’s popularity. (Around 700 servers are up and publicly available, though they’re not up all the time. Users have downloaded almost 100,000 copies of The Palace, which doesn’t account for mirror-site downloads and some bundling arrangements.) Mark Jeffrey, its co-creator, notes that people don’t want to use what you give them. They want to create their own representations. Jeffrey takes the thought a step further: "People don’t want to be seen as they are," he says. "That’s why videoconferencing hasn’t taken off."

The Palace is a 2D world. Its backgrounds and avatars are flat, standard GIF files. New users get a default avatar that looks like a tennis ball with a simple smily face. They can choose from some colors and expressions on one pop-up palette, as well as a series of props on another. A third palette brings up drawing tools, with which Palace participants can wreak havoc on any scene. Any occupant can just as easily clean up the debris. Registered users can post their own avatars and create their own worlds.

Avatars cavort in a Palace lounge

Users don’t treat avatars on The Palace as accurate representations of their physical identity. They use avatars as general-purpose communication tools -- almost as billboards. They create avatars out of cartoons, signs and symbols. They do funny and occasionally offensive things with them.
although Jeffrey reports that use of CDA-violating body parts is surprisingly rare, given how simple it is to do. Many Palace participants change their avatars frequently, to indicate mood or comment on what’s going on.

For example, one user created an avatar that looks like a jar of Smucker’s jelly with the word "goober" replacing what was previously on the label -- in the same font, of course. Its creator would switch to this avatar when someone in the same space was being a geek. Others can and do use the avatar, so that at times Palace rooms will have all but one avatar looking like the goober jar. The effect is silly, quite funny and effective.

Another approach to props and gestures

In Fujitsu Cultural Technologies’ WorldsAway, props are more serious. They are important elements of the plot and setting, and include tokens, furniture, heads (valuable assets and embarrassing to be caught without) and casual-use objects such as sports gear. Props cost money; the tokens are part of the system’s internal economy.

The fact that props have intrinsic value in WorldsAway leads to interesting phenomena -- such as crime.

Similarly, gestures in WorldsAway are more social and functional than in most virtual worlds. Characters can pick things up, carry them and exchange them. They can sit down on chairs in the spaces.
This shareable action helps bind the community. A similar thing happens in various online forums when people adopt pseudonyms with similar roots, patterns or suffixes.

The Palace's props are funny and very American: They include bunny ears, corncob pipes, clown noses and painted frowns, tiaras, Hawaiian shirts, martinis and swords. Participants can use many at once, as well as create and publish their own. As more people download and use the Palace around the world, the avatars and props are becoming more international. Japanese anime avatars are popular, for example. When the Palace team introduced animated props, people went nuts developing, exchanging and using them. The Palaces thus afflicted looked like Las Vegas. Users quickly got over the novelty, though, and now use animated props sparingly.

The Palace Group is now implementing private property, so that a person or group can have exclusive use of a prop (a feature V-Chat already has). An upcoming major release of The Palace software will add more features to the props, as well as other goodies such as an auditorium capability, multimedia object support and major, much-needed capacity improvements. Jeffrey expects to close a deal with a major new backer imminently, which should help fund all the improvements and create new marketing opportunities.

From anarchy we now move to intentional design and relatively high production values.

DIAMOND PARK: MOTION AT THE HIGH END

John Barrus runs an ambitious project exploring virtual social spaces at Mitsubishi Electronics Research Labs (MERL) in Cambridge, MA. The prototype world is called Diamond Park; the underlying technology, which MERL hopes to license to others, is called SPLINE: the Scalable Platform for Large Interactive Networked Environments. MERL has put a nifty tour of Diamond Park on its Website (www.merl.com/dp/Welcome.html).

Diamond Park is a broad-ranging experiment that isn't intended for household use in the near future: Each participant runs on a separate SGI RealityStation. Because of this (budgetary) limit, the largest number of users that have been on the system concurrently so far is four (of course they get great rendering and smooth movement). SPLINE is designed to work with less powerful systems and scale to far larger numbers. The SPLINE team, led by other MERL scientists, is in the process of porting it to PCs.

One of Diamond Park's clever twists is the way its designers mapped the limited degrees of control available to users to moving around the virtual world: Every participant in the Park is shown riding a bicycle or unicycle.3 People can ride together or stand next to each other. Navigation

--------

3 MERL collaborated with scientists at the Georgia Institute of Technology to design the cycling interfaces and animations. MERL’s engineers hooked recumbent, computer-controlled exercise bicycles to Diamond Park, so players can not only get a sense of their motion, they can also get some exercise as they participate. The bike interface is quite intuitive: Pedal and it moves forward; lean and it turns. Pedal uphill and it gets harder to pedal.

Release 1.0 29 May 1996
consists of speeding up, slowing down, or turning. The use of bicycles does two more things. It makes rendering movement easier (it's simpler to simulate riding a bike than walking and running) and it creates a physical way in which participants interact.

All participants don't have to sit on real bicycles. Trackball users show up in Diamond Park as unicyclists (unicycles can go backward; bicycles can't). The Lab is also at work on more advanced interfaces that track motion and offer force feedback.

Pedaling through the Plaza to the Cafe in Diamond Park

The avatars sit calmly atop their mounts and move about the landscape more convincingly than most walking simulations. (Of course, there is a bit of awkwardness when cyclists stop to talk but don't tip over.) Avatar rendering specialists at Boston Dynamics also generated some canned avatars that walk around Diamond Park and make it seem more populated and a bit more normal. The system's designers paid special attention to textures, structures and sounds so the park would feel comfortable. Their efforts pay off. Although the simulated park is only a mile square, it feels spacious, serene and manageable.

People race each other in the park and in the velodrome. They can take a bus tour or teleport to other locations in the Park from special obelisks. The only place where users can control objects in the park is an obstacle course with movable pylons and ramps.
The Park uses high-quality audio to enhance the users' experience. Participants wear headphones and can speak to each other as they ride along. (They will soon be able to place calls to participants outside Diamond Park over the standard phone system.) There are ambient noises, such as flags waving in the breeze, crowd noises in the velodrome, and animal, insect and water noises near the lakes.

SPLINE makes every object in Diamond Park programmable and "visible" to other, relevant objects. For example, birds are programmed to make noise, which is then audible to any avatar within hearing range. Bicycle brakes squeal, and so on. To keep processing requirements in hand, Diamond Park is divided into locales such as the velodrome (where else would you go if you were on a bicycle all day?), an assembly hall and many paths, parks and passageways.

NEEDED: ART

To continue to create engaging, useful online spaces, developers will need to balance technology with aesthetics and emotion. Communicating has more to do with presence and emotion than with polygons rendered per second. For the most part, technology still has the upper hand.

Luckily, many developers are scouting for and finding artists who aren't from the computer graphics or online animation worlds. For example, to create the V-Chat-based world called PlanetOut, Tom Rieley hired Alison Bechdel, the author of the not-so-mainstream cartoon strip *Dykes to Watch Out For*.

Any shape's OK in PlanetOut

Avatars and their gestures set an environment's tone right away. For instance, in WorldsAway, nobody's overweight or unshaven; in PlanetOut, which has many kinds of body shapes, one of the characters shaves his chest and another scratches her head. The gestures of PlanetOut's avatars play up
the various stereotypes of the gay and lesbian community. Note that in WorldsAway, participants can alter their avatars by visiting the Nu Yu, whereas PlanetOut has only the avatars that were designed by Bechdel.

At DreamWorks SKG, Kay Sales and her design team have created some truly endearing avatars for Starbright Worlds, the online system created for Steven Spielberg’s Starbright Foundation for critically ill children. Starbright Worlds is based on Worlds Inc.’s technology and adds ProShare audio- and videoconferencing from Intel.

The avatars that Sales’ group created include a bear with a great, jaunty walk, which Norman Schwarzkopf used at the system’s launch event, and a wolf designed for Robin Williams. The members of Sales’ team have years of experience in professional animated feature films.

Disconnect

Unfortunately, though, the link between these artists and the environments they’re helping to create hasn’t been forged solidly yet. Many of these artists have yet to see their final work online.

What tends to happen is that the artists simply turn paper renditions over to the virtual space developers, who then digitize, color and otherwise animate them. For a character in a simple 3D space such as Starbright, artists might generate a turnaround (eight views, from all sides) and a walk cycle (six drawings, to turn into 24 frames).

The disconnect seems to exist partly because it’s early in these relationships; these artists aren’t computer geeks. Some even fear losing their raw materials and having to jump to computer graphics tools. These issues should fade with time and familiarity.

Beyond interactive movies

Mixing art, plot and engineering is difficult. A year or two ago, interactive CD-ROM developers learned similar lessons when, for example, their art directors discovered that the last-minute plot and character changes that would have been normal and easy to execute for a film near completion would take an extra two months to re-code and quality-test, push the project over budget and exceed the CD’s storage capacity.

San Francisco-based PostLinear Entertainment is trying avoid those problems and stake its own claim in the new-media space. Its objective is to create story environments with ambient conflict that are useful across many media, from CD-ROMs to online services, video games, TV and movies. These media properties will feature shifting objectives and require participants to col-
laborate to meet them. The short-term objectives might be to find a key piece of information, protect a building or a person, or get somewhere within a short amount of time. It all sounds like great fun so far.

Here are two quite different examples of art and technology combined to make creative, enjoyable social experiences. Both are exceptions to the disconnect we just described. The first offering is from Microsoft; the other is from a startup called willisville.

MICROSOFT CAN TURN YOUR CHAT INTO COMICS

When Microsoft user-interface researcher David Kurlander saw V-Chat, the MSN-based visual chat system (see Release 1.0, 11-95), he asked himself why chats had to be so evanescent. Wasn't there a way to create a simple recorded history of the chat sessions? Intrigued, he had the idea that comics were a great medium to draw from. He found Jim Woodring, a Seattle comic book artist, who explained comic-book protocols to him. Together they interpolated between the chat and comic worlds to develop a prototype system that keeps the character of both, yet offers something unique and interesting. Kurlander shopped the idea around Microsoft and found Linda Stone's Virtual Worlds group.

Last week, only nine months later, his brainchild shipped with the beta release of Microsoft's Internet Explorer 3.0 as the built-in chat function. Microsoft Comic Chat’s output looks amazingly like a polished comic strip,
servers. Chat participants using other IRC client programs will see plain text. Those using Comic Chat will see the comics, though they will be able to turn the comics on and off in the shipping version.)

The program watches what users type and reacts accordingly. Type "LOL" (Laughing Out Loud), and your character laughs; use capital letters and your character will look like it’s yelling. Use the word "I" and it will point to itself; the words "you" and "they" work similarly. There are other subtle and ingenious mechanisms at work: Strips begin with a wide view, "zoom" closer for the middle frames, then step back and forth to add variety. Of course, none of this can raise the quality of the words, but it sure looks entertaining. In fact, Stone foresees performers using Comic Chat to narrate or explain things.

The Comic Chat user interface is quite similar to V-Chat, with a large main window on the upper left, a participant list on the right and the text input box below the screen. As with other systems, participants choose characters when they first use the program. They currently cannot create their own characters or change the ones that are there. That design decision by Stone and her group creates a pleasing, consistent experience.

Text appears above the characters in word balloons. The characters have a variety of expressions that participants can use in varying degrees of intensity by using a nifty Gesture Wheel: The closer to the outside of the wheel one clicks, the stronger the expression.

Unlike other systems, characters only show up in the comic window when their owners "speak." Comic Chat "prints" panels automatically as it receives input. It will redraw a panel until it is full, then open a new one. Users have no control over where their characters are placed. That’s automatic, too. Since only those people participating at a given moment show up in the panels, many people can participate in a chat at once. Stone’s group has found that the most pleasing chats have under 15 participants. The finished comic strips can be published to Web pages or stored by individuals.

Microsoft Comic Chat is currently not as anarchic as The Palace, where participants have creative control of the environment (see page 12). Stone and her group are leaning toward adding tools to the next release of Comic Chat that will allow for broader user control, though that decision has not been made yet. Then there could be a variety of spaces, some art-directed and consistent, others a free-for-all. With Comic Chat, Microsoft has spawned a fun, attractive and useful addition to the universe of computer-mediated communications tools.

IT’S PARTY TIME AT WILLISVILLE

Allee Willis and Prudence Fenton will change our expectations of cyberspace with their new oeuvre, willisville. The project has its roots in elaborate, outrageous parties that Willis, the merry queen of kitsch, started to throw 12 years ago in Hollywood. Aside from themes, activities, handmade decorations and souvenirs, and other party accessories, Willis would often add actors to bring plot to the events or to run group activities. These activities might include turning Hefty bags into couture gowns, turning footprint-stamped paper plates into jewelry and other exotic crafts and con-
tests. Think of a celebrity-studded murder mystery theater crossed with a birthday party for eight-year-old girls, and you begin to get the idea.

Willis did have a day job, though she gave it up to develop willisville five years ago. Among other things, she is an accomplished and prize-winning composer (the theme music for the TV series Friends; Earth, Wind & Fire’s September; plenty of Cyndi Lauper songs; and more). Her songs have helped sell 52 million records. She also created motorized installation art, videos and a line of furniture. All of this, of course, is fodder for willisville.

Fenton has been busy, too. She has done wonderful creative work for MTV, Pee Wee’s Playhouse, Peter Gabriel, Liquid TV and Colossal Pictures, including animations and vibrant, artistic special effects. She also discovered Beavis and Butthead. When a colleague at Colossal handed her a huge script for the next interactive CD-ROM project she realized how little spontaneity was left in that process, said, "No, I don’t think so," and began looking for more compelling things to do.

Willis and Fenton met through their mutual friend, Paul Reubens (yes, Pee Wee Herman). Willis needed a technical expert who was also a creative genius. Fenton fit the bill wonderfully; she liked Willis’ style and goals. She left Colossal to join willisville, which both of them funded. Together, Willis and Fenton have been creating an online environment that mixes fiction and reality. Willisville fosters improvisation instead of the flat, conditional branching typical of CD-ROMs or experimental interactive movies. Its members are participants, not merely lurkers.

In the spirit of Willis’ parties, willisville will have fun and extravagant events and resident actors who won’t necessarily be incarnated as avatars all the time, such as Pierre Ooh La La (remember the couture Heftys? he helped everyone create them). They will express their personalities through a variety of technological means, as will all participants. The idea is to help participants feel loose and safe; to get them to do things they normally wouldn’t do. In Willis’ words, "The characters’ mission is to make cyberspace a comfortable, funky and fun place for humans and fictional characters alike to 'live;' to truly merge fantasy with reality by providing an environment where fictional characters, the authors behind them, and human beings they interact with merge into one giant throbbing creative brain that has assembled to create the ultimate 'designer reality' of the 21st century -- the greatest social interface in the history of mankind."

Ambitious, no? There’s more. Willis and Fenton want willisville to "help define a new creative, participatory medium and all the art forms that spring out of it; to establish a sustainable economic culture for it, including an appropriate role for advertising and sales as well as other funding sources; and, well, to define an entirely new form of mass/pop culture entertainment/communications."

Starting with an Ovum

The three-month-old willisville prototype, funded by Intel, is the world’s first virtual cul-de-sac. Its many fictional characters are aware of their fictional nature and of the medium itself. In fact, this self-referentiality is an important part of willisville’s current plot. For ex-
ample, Tubs Sporling, a butcher/performance artist, looks chunky as a 3D avatar, so he goes for counseling at the Happy Hour Intimacy Clinic. And so it goes.

The live characters in willisville need stuff from the participants, which helps create plot and interaction. There are also games and contests that play with, mock and test the boundaries of the medium, such as the contest to create a paint scheme for the Ovum, the ideal automobile ("a brain for the road"), with pieces of musical toast. Really.

Odessa Titus, 42-year-old third runner-up in the Miss Iowa contest of 1972, driving an Ovum, the car of the future, past her residence, the White House

Willis and Fenton aren't concerned with how participants are represented in willisville. To them, avatars are ancillary. They would prefer that people in willisville be known for their creations and their participation, such as winning the Ovum-painting contest.
They are trying to ignore conventional boundaries and assumptions as much as possible, especially topics purists get religious about, such as rendering, audio, video, the number of dimensions and so forth. Characters can switch at will between various kinds of representations -- stick figures, photo images, 3D -- even text when they get angry. Willis and Fenton are open to anything: puppets, pictures, text, live action -- individually or combined. They'll mix games, storytelling and more.

Manifesting their ideas with current technology will occasionally cramp their style, but they're finding some of the simpler stuff more compelling than the gee-whiz stuff. For example, they worked with Java early on and tried to generate 3D avatars (such as Tubs), yet some of their favorite stuff in the early demo is done with simple HTML. Willis and Fenton are clearly having a great time. Willisville is a fun exploration of the medium that asks all the right questions. Now its founders have to make it work commercially.

Release 1.0

29 May 1996
DROID FUTURES

So far, we have focused on avatars that people can inhabit and move through virtual spaces. There are several other kinds of virtual humans, including those that are ergonomically correct, those that can learn from or adapt to their surroundings, and those that incorporate more sophisticated motion and interaction. Here we briefly visit a few projects in those fields.

Virtual Jack could save your life

One of the oldest virtual humans is Virtual Jack, created in the '70s by Professor Norman Badler at the University of Pennsylvania's Center for Human Modeling and Simulation. Badler used detailed data from anthropometric surveys so that Jack could play the role of a realistic, virtual interactive model for commercial and government research.

Jack's c.v. is impressive: He has held jobs as a virtual industrial model, crash-test dummy and interior-design consultant. Jack helps car, refinery and building designers figure out if they've made doorways too small or created walkways that are inaccessible or dangerous. He can show whether the instruments in a cockpit are reachable or whether it's easy to get in and out of a concept car. Jack has a pretty good sense of balance.

MIT's many explorations

At the MIT Media Lab's Autonomous Agents Group, Professor Pattie Maes (president of Agents, Inc., which is commercializing the Firefly music-recommendation system), PhD candidate Bruce Blumberg and others have created a virtual pet named Silas T. Dog. Silas lives in a mirror world called ALIVE (the Artificial Life Interactive Video Environment). To interact with Silas, you stand in front of a wall-sized projection screen with a camera mounted atop it. Trevor Darrell, who recently finished his PhD at the Media Lab in Professor Sandy Pentland's computer vision group, developed a machine-vision system that allows ALIVE to detect what you (the user) are doing. Then the system superimposes Silas and plays the resulting image on the wall-sized screen. You appear to interact with him in his world.

Silas has software algorithms that infer roughly what you are doing and let him respond in hopefully appropriate ways. Move quickly and Silas will back away warily. Extend a hand and he'll consider sniffing it and getting acquainted. Silas can learn from his interactions. He doesn't have a complicated model of animal reasoning; instead, he uses pretty simple heuristics that result in surprisingly believable behavior. (You can have a simpler but highly entertaining trainable dog of your own by downloading the game/screen saver Dogz from PF.Magic's Website: fido.dogz.com/dogz/.)

Recently, Darrell began to develop a multi-user version of ALIVE. Deciding that the video image of the user was poorly suited to his goals, Darrell began to explore new ways to represent the user, either as a constructed avatar or also as a series of photographs used as key frames. The system morphs those images to create sequences of actions, all the while following the user's motions.

Darrell has created a couple of these representations for the new system, which is appropriately called Avatar. One version uses photos of himself,
the other of an Apollo astronaut. Because of the way he is rendering the avatars, the system doesn't require much bandwidth, yet it transmits animated, photographic images of the participants. Darrell is also working on facial expressions and how to map them to avatar expressions, or even to behaviors directly. For example, a user's smile could cause an avatar to jump for joy.

The ALIVE system: Silas inspects a visitor

There are many other projects in the Media Lab that relate to virtual spaces and avatars, including Roz Picard's Affective Computing group, which is working on systems that respond to emotional responses in people; Pattie Maes' separate work on expressive agents; and more. Abstracts of these projects are available on the Media Lab Website.

BOTS WITH BEHAVIOR AT NYU

*Toy Story* took 800 person-years to complete. Ten-second sequences took a week to create. Ken Perlin, director of NYU's Center for Digital Multimedia, wants to change those statistics by using relatively autonomous avatars. He also wants to put those avatars to work for more ordinary uses, such as interaction with live players in games. He expects his creations to find early commercial use as virtual extras in movies with crowd scenes.

Perlin has been working on animations for a long time, including a stint with John Lasseter, *Toy Story*'s creator, to make Roger Rabbit look convincingly solid in the Disney movie, *Who Framed Roger Rabbit?* Perlin has worked principally on procedural animation. He calls his group's latest project, Improv, an improvisational animation.

Improv features virtual puppets that have some sense of rhythms and patterns and of their own capabilities for motion. They can be set in motion and directed through activities such as dance or heated discussion. Improv's repertoire of characters now includes dancers, butlers and most recently opera singers you can conduct. The puppets are capable of performing an
entire dance by responding to a sound track, or a discussion by reacting to each other. The person controlling the motion issues occasional, high-level commands.

For a simulated dancer, the commands might include a change in rhythm, a request for a certain move or a change of direction. The avatars choose movements (unless they’re overridden), make smooth transitions between movements and maintain rhythm. As they perform, they add idiosyncrasies and random perturbances of their own to make the movements more textured and realistic.

The Improv dancer

Improv characters send each other snippets of code, small program fragments, which they then interpret within the conditions at that moment. In this way, they can have complex, adaptive behaviors and appropriate interactions without the overhead of deep AI and cognitive models. Perlin wants his avatars to have substantial local body intelligence so they can be relatively autonomous in high-latency networked environments. An avatar’s "mind" might be remote, but the character could improvise and adapt.

Layers of intent

Creating realistic artificial motion is a fascinating problem, even for simple movements. As an example, assume you want to get to the door across the room. You want to leave the room as quickly as possible, so if you see another doorway that looks like it’ll get you outside more quickly as you cross the room, you’ll take it. You want to leave because you’re going on a hot date, or maybe you have to leave because you just had a fight with your boss. In each case, how you leave is different and you will react differently to external events. Each layer of behavior or motivation affects the others. It’s method acting for avatars. The technically inclined might think of it as a motivation inheritance hierarchy.

Of course, when an office cart rolls in front of your avatar, you or your avatar have to interrupt all other processes -- fluidly -- and deal with the
unexpected event. Modeling everything is exhausting, impossible and un-
necessary. You can't plan for every eventuality. Selective modeling is the
key. So is easy transition between modes of control. Perhaps you step
"into" your avatar quickly when the office cart gets close, deal with the
event the way you prefer, then return the avatar to its auto pilot state.

It's hard to envision controlling one's own representation online by press-
ing buttons that represent behaviors. More likely, we'll interact with
autonomous puppets driven this way. The audience for Improv is professional
animators, but the target application is more than feature films: Perlin
would like his avatars to bring characters such as Toy Story's Woody and
Buzz to life on everyday desktops. That would be great fun.

---------------------

**COMING SOON**

- Collaboration and conversation tools.
- Networked object graphics.
- Navigation.
- The analog world.
- And much more... (If you know of any
  good examples of the categories listed
  above, please let us know.)

---------------------

Release 1.0 is published monthly, except for a combined July/August issue,
by EDventure Holdings, 104 Fifth Ave., New York, NY 10011-6901; (212) 924-
8800; fax, (212) 924-0240. It covers PCs, software, the Internet, computer-
telephone integration, online services, groupware, text management, connec-
tivity, messaging, wireless communications, intellectual property law and
other unpredictable topics. Editor: Esther Dyson (edyson@edventure.com);
publisher: Daphne Kis (daphne@edventure.com); managing editor: Jerry
Michalski (spiff@edventure.com); circulation & fulfillment manager: Robyn
Sturm (robyn@edventure.com); administrative assistant: Susanna Stromberg
(susanna@edventure.com); executive assistant: Christy Snipp (christy@ed-
venture.com); editorial & marketing communications consultant: William M.
Kutik (kutik@edventure.com). Copyright 1996, EDventure Holdings Inc. All
rights reserved. No material in this publication may be reproduced without
written permission; however, we gladly arrange for reprints or bulk purchas-
es. Subscriptions cost $595 per year, $650 overseas.
RESOURCES & PHONE NUMBERS

Alison Bechdel, (802) 244-8339; Cleobald@aol.com
Kay Sales, Dreamworks SKG, (818) 733-7349; fax, (818) 733-6408
Doug Crockford, Electric Communities, (408) 342-9500; fax, (408) 777-9200; crock@communities.com
Tony Christopher, Fujitsu Cultural Technologies, (408) 456-7846; fax, (408) 456-7050; tony@ossi.com
Linda Stone, Microsoft, (206) 936-1826; fax, (206) 936-7329; lindastone@msn.com
Doug Crockford, Electric Communities, (408) 342-9500; fax, (408) 777-9200; crock@communities.com
Tony Christopher, Fujitsu Cultural Technologies, (408) 456-7846; fax, (408) 456-7050; tony@ossi.com
Linda Stone, Microsoft, (206) 936-1826; fax, (206) 936-7329; lindastone@msn.com
John Barrus, Mitsubishi Electric Research Laboratories (MERL), (617) 621-7535; fax, (617) 621-7550; barrus@merl.com
David Zhu, Motion Factory, (408) 345-9502; fax, (408) 345-9501; zhu@motion-factory.com
Amy Jo Kim, Naima Productions, (415) 369-0313; amyjo@naima.com
Ken Perlin, NYU Center for Digital Multimedia, (212) 998-3386; fax, (212) 995-4122; perlin@play.cs.nyu.edu
Rod MacGregor, OnLive!, (408) 366-6000 x139; fax, (408) 366-0357; rod@onlive.com
Tom Rielly, Planet Out, (415) 252-6285; fax, (415) 252-6287; tom@planetout.com
Ron Martinez, PostLinear Entertainment, (415) 487-1100; fax, (415) 487-1180; martinez@postlinear.com
Jody Ehlers, Starbright Pediatric Network, (310) 447-9090; fax, (310) 447-9091
Mark Jeffrey, The Palace Group, (818) 295-6886; fax, (818) 295-6793; mjjeffrey@thepalace.com
Scott McCloud, Understanding Comics, (805) 499-7525; sctmcccloud@aol.com
Allee Willis, willisville, (818) 505-6655; zigezunt@aol.com
Greg Beasley, Worlds Inc., (415) 281-1300; gregb@worlds.net

Release 1.0 29 May 1996


June 6-8  Connected Classroom Conference - Baltimore, MD. Sponsored by the National Education & Technology Alliance. K-12 focus. Call (800) 638-1639; fax, (717) 393-5752; register@classroom.net; www.classroom.net/connected.

June 6-9  5CYBERCONF - the Fifth International Conference on Cyberspace - Madrid, Spain. Hosted by the Fundacion Arte y Tecnologia de Telefonica. Call 34 (1) 542-9380; fax, 34 (1) 521-0041.


June 11-13  National Educational Computing Conference - Minneapolis, MN. Sponsored by Technology and Information Educational Services. The big education conference of the year. Call Jamie Schultz, (541) 346-2834; fax, (541) 346-5890; necc@oregon.uoregon.edu.


June 18-19  CyberPayments '96 - Dallas. Organized by the National Automated Clearing House Association (NACHA). Where the high volumes are. Call (800) 529-7375; fax, (216) 464-6601; fbma@en.com.


June 18-21  Digital Media World - Berlin, Germany. Organized by Berlin Fairs and Conventions. Call Kim Rosia (540) 372-3777 or 49 (30) 3038-2077; fax, (540) 372-1414 or 49 (30) 3038-2059; dmw96@illuminet.net.

June 24-26  Intranet '96 - San Jose, CA. Sponsored by Computerworld. Soon there will be Intranet: The Movie. Targeted to senior IT ex-

Release 1.0  29 May 1996
ecs. Call Stuart Dale, (800) 340-2366; fax, (508) 620-9430; stuart_dale@cw.com.

July 10-12


July 21-24

Interactive Services Association 11th Annual Conference - San Diego. Sponsored by the ISA. With AT&T's John Petrillo. Call Patti McKnight, (301) 495-4955; fax, (301) 495-4959; isa@isa.net; www.isa.net.

July 28-30

Spotlight - Laguna Niguel, CA. Hosted by Spotlight. Call Denise Caruso, (415) 312-0545; fax, (415) 286-2750; dcaruso@aol.com.

July 25-26

New Media Hollywood - Santa Monica, CA. Organized by World Research Group. Ad agencies and creative teams meet Web people. Call (800) 647-7600 or (212) 421-9410; fax, (212) 421-7325; info@worldrg.com; www.inter.net/wrg/.

July 28-31

Genetic Programming '96 - Stanford University, CA. Sponsored by Stanford, the ACM, IEEE and AAAI. Call (415) 328-3123; fax, (415) 321-4457; gp@aaai.org; www.cs.brandeis.edu/-zippy/gp-96.html.

July 31 - Aug 2

Web Interactive '96 - New York City. Produced by Mecklermedia. With Martin Nisenholtz, Mark Pesce and Jack Hidary; covering graphics, programming and streaming media on the Web. Call (800) MECKLER or (203) 226-6967; fax, (203) 226-6976; webint@mecklermedia.com; events.iworld.com/summer96/webint (secure Web server).

August 4-9

SIGGRAPH '96 - New Orleans, LA. Hosted by ACM/SIGGRAPH. Call (312) 321-6830; fax, (312) 321-6876; siggraph96@siggraph.org; www.siggraph.org/conferences/siggraph96/core/index.html.

August 8-10

ONE ISPCON - San Francisco. Sponsored by Online Networking Expositions. The creators of ONE BBSCON and Boardwatch Magazine start a conference for Internet service providers. Call Peg Coniglio, (303) 693-5253; www.one.ispcon.com.

Aug 28 - Sept 1


September 16-20

Networld+Interop '96 - Atlanta, GA. Sponsored by Softbank Expos. Call (800) 488-2883 or (415) 578-6900; fax, (415) 525-0199; www.sbexpos.com/sbexpos/interop/.

September 17-19

IMA Expo '96 (1st Annual) - New York City. Organized by the Interactive Multimedia Association and IDG. Covering multimedia tools, technologies and services. Call (415) 286-2531; www.ima.org.

September 18-20

International Conference on Virtual Systems and Multimedia (VSHM '96) - Gifu, Japan. Organized by the Int'l. Society on Virtual Systems and Multimedia. Explores the boundaries between virtual and real worlds, covering advanced interfaces, sensing gear, AI and neural nets, robotics and specific applications. Call Prof. Takeo Ojika, +81 (58) 230-1770; ojika@ojk.info.gifu-u.ac.jp; www.ojk.info.gifu-u.ac.jp/vshm/96/index.html.

September 18-20


September 25-27

3rd International Workshop on Mobile Multimedia Communications (MoMuC-3) - Princeton, NJ. Sponsored by Rutgers Univer-

Release 1.0 29 May 1996

Software Publishers Association 12th Annual Conference - Atlanta, GA. Organized by the SPA. Call (202) 452-1600 x11.


Unicom '96 - Washington, DC. Sponsored by the MultiMedia Telecommunications Association and Softbank Comdex. Focus on communications + computing. Call Bill Moroney, (202) 296-9800 x216; fax, (202) 296-4993; wmoroney@mnta.org.


@CSCW '96 (Computer-Supported Cooperative Work) - Boston. Organized by the ACM. Call (410) 269-6801; fax, (410) 267-0332; cscw96-info@media.mit.edu; http://info.sigchi.acm.org/sigchi/cscw96/.


Interactive Newspapers - Houston, TX. Organized by Editor & Publisher. Call Marsha Stoltman (212) 675-4380; fax, (212) 929-1259.


VRAIS '97 (Virtual Reality Annual International Symposium) - Albuquerque, NM. Sponsored by IEEE. Send in your papers today. Call Larry Hodges, (404) 894-8787; hodges@gatech.edu; www.eece.unm.edu/eece/conf/vrais/.

**PC (Platforms for Communication) Forum - Tucson, AZ. Sponsored by us: You read the newsletter; now meet the players. Call Daphne KIs, (212) 924-8800; fax, (212) 924-0240; daphne@edventure.com; www.edventure.com.

* Events Esther plans to attend.
@ Events Jerry plans to attend.

Lack of a symbol is no indication of lack of merit.
Please let us know about other events we should include. -- Susanna Stromberg

Release 1.0 29 May 1996
SUBSCRIPTION FORM

Please enter my subscription to Release 1.0 at the rate of $595 per year in the U.S. and Canada. Overseas subscriptions are $650, airmail postage included. Payment must be enclosed. Multiple-copy rates available on request. Satisfaction guaranteed or your money back.

Name ________________________________
Title _________________________________
Company ______________________________
Address _______________________________
City __________________ State ______ Zip____
Telephone ______________________________

☐ Check enclosed.
☐ Charge my
  ☐ American Express  ☐ MasterCard  ☐ Visa
Card Number __________________________ Expiration Date _____________
Name on Card ____________________ Signature _______________________

☐ Please send me information on your multiple-copy rate.

Please fill in the information above and send to:

EDVENTURE HOLDINGS INC.
104 FIFTH AVENUE, 20TH FLOOR
NEW YORK, NY 10011

If you have any questions, please call us at 1 (212) 924-8800;
Fax 1 (212) 924-0240; e-mail info@edventure.com.

Daphne Kis
Publisher