Have you rewritten your business plan this year yet? If not, chances are you’re postponing the inevitable. There’s a new platform underfoot — figuratively, anyway — and nobody in the teleinfoedutainment industries is immune from its effects. Industry players can go on with business as usual, but they’re risking their future if they do.

The change can feel like a software and information vendor’s worst science-fiction nightmare. Actually, it’s probably not a nightmare, just temporary indigestion. Whatever is going on, it’s pretty clear that the collection of electron-moving industries are following a different course from the one they set a year ago.

The resulting chaos and the opportunities it presents are the context of the nineteenth annual PC Forum, described on page 25 and titled, "The Future Now (some assembly required)." This issue of Release 1.0 explores the opportunities in the design and construction of multi-user virtual spaces of many types.

One of the major benefits of the online world is the persistent places it creates and makes available, from bulletin boards to newsgroups, ongoing multi-player game environments and Web pages. These places’ persistent nature may seem obvious and unimportant, but it’s novel and profound. Both TV and telephone calls are evanescent. The TV signal whizzes through your set and is gone, unless you have an endless supply of videotapes and patience. Phone calls are gone as soon as you hang up (again, unless you record all your calls -- or the FBI does!).

Virtual places are useful. Online, you can leave things for others to see and interact with while you’re not present, such as documents that form the basis for social activity, or software agents that can represent you while you’re away. When go back online, places are a handy medium for congregating with others. The commercial online services aren’t growing quickly because they are fabulous repositories of polished information and shopping services; they’re taking off because of the

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rich ways that people can interact with each other in them. Published bits can catalyze those interactions, but they’re not the main attraction.¹

New working assumptions

Persistence is mixed with other phenomena that derive from the platform’s general architecture. People and applications should be able to find each other anywhere in the world through the rich set of protocols that run on the Internet, such as socket services, the Internet addressing scheme and a variety of transport protocols tuned to different application requirements (see box, opposite). The elements are all extensible. That’s essential, because the Internet is under considerable stress from rapid growth, and many of these protocols will be upgraded over the next few years.

To explore the significance of shared virtual spaces, let’s make three assumptions about where the new platform is headed. None of them is a stretch. Taken together and given some time to evolve, they resolve many of the reasonable doubts that people have about the Internet.

Assumption 1: The connection is always available

People can be connected all the time, inexpensively. Organizations can pay a fixed monthly amount (until they run out of bandwidth and have to upgrade), after which the system is always on, and links between people and objects are always available.

In today’s session-oriented world, we tend to tie up resources when we communicate. Pick up your phone, and you’re probably tying up equipment at your phone company’s central office. Dial in every morning and keep the line open for a modem connection, and you’re driving that company’s management nuts -- unless they can drive you to metered rates, to digital service or (preferably) both.

The digital angle is important. When you’re on an ISDN call, bits only move when you make noise. When you’re silent, the far central office might generate a little noise so that the other party doesn’t think the line’s gone dead, but you’re not sending bits across the country. In fact, if you dial in using ISDN and just reroute bits to different destinations all day, it should be preferable to the phone company than locking up an analog port.

If your connection is always there, you can keep your Web browser open to a favorite page all day long. (You could do that anyway, as long as you disconnect and don’t call another page.) When you do request something, it can be available right away. That also means you could hang out in a multi-user text adventure game all day or have an intercom open all day long using something like VocalTec’s Internet Phone -- all at practically zero marginal cost. The idea of being in a virtual space (or several) all day long begins to make sense, especially if you’re building customer relationships there.

¹ The shared virtual spaces covered here build on ideas from previous issues of the newsletter, especially from multi-user virtual environments (Release 1.0, 6-94 and 7/8-94); platforms for communication (10-94), unified messaging (12-93 and 1-94) and zines (6-95).
Assume TCP/IP wins

TCP/IP, the protocol suite that acts as the Internet's glue, isn't ideal for all purposes, but it's winning the overall protocol wars. It's also being put to uses previously unimagined, including real-time voice delivery. Here's some detail on why it's useful and interesting.

An application/port pair is called a socket. Two sockets talking to each other (e.g., an e-mail-enabled client application and an e-mail server, or a Web browser and a Web server) are called a connection. This arrangement, generally referred to as socket services, allows for multiple applications to run concurrently, each potentially connecting with other machines anywhere on the Internet. Socket services make sure the data streams all match up. This is certainly feasible over protocols besides IP, but it hasn't taken off anywhere else the way it has on the Internet.

Because they support multiple, concurrent tasks, socket services reduce the need for many separate communication connections per PC, such as a LAN interface, a voice/data/fax modem and an ISDN adapter. (Adding scanners, video cameras and other increasingly affordable peripherals will, of course, exhaust your machine's ports anyway.)

In particular, simultaneous voice and data (SVD) modems are practically irrelevant in a socket services environment with adequate bandwidth (not necessarily broadband), because you can compress audio in an application and pass it to a socket for transmission elsewhere -- even to multiple parties simultaneously. (This limitation is most obvious in shared-audio situations, since SVD modems work only between two participants at a time.)

Atop TCP/IP runs a collection of protocols that are designed to move different kinds of information. Some are good at moving huge amounts of Usenet news messages between servers. Others dish Web documents up to multiple requesting browsers. Still others handle individual mail messages, system management messages or wide-area connections to database services.

Before this infrastructure was in place, organizations that wanted to connect with each other either had to arrange for direct connections (often with incompatible protocols) or go through the expense and clumsiness of the ISO-compatible data networking offerings. Then they had to make their applications aware of each other, and so on. The same goes for individuals who wanted to use typical groupware tools, though the issues were originally of a smaller scale. These problems have melted as a TCP/IP connection to the Internet has become the new common platform.

Here's an optimistic estimate: Half of the US white-collar workforce will have full-time or on-demand Internet connections within the next five years. The key is to lose the "session" frame of mind, which might take a
generation or two. Deeply held assumptions are hard to shake, but it's worth starting now.

**Assumption 2: Many flavors of internets**

The second assumption is that there will be multiple, fully compatible Internet offerings, some with quality of service (QoS) guarantees and other premium services, some completely private. It's the traditional value-added and private-network businesses, gone Internet, except the players are different. Imagine all of the following use standard Internet protocols and services.

<table>
<thead>
<tr>
<th>Public Infrastructure</th>
<th>Private Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal Network</strong></td>
<td><strong>Company-built (or leased and dedicated; see cell below) systems behind firewalls, often called intranets. Secure. Can offer QoS. Already in use by large corporations.</strong></td>
</tr>
<tr>
<td>Invisible to rest of Net. Move encrypted traffic over open links. Don't publish any internal addresses or links. No QoS. Also useful for small communities or industries that want to keep their operations private.</td>
<td></td>
</tr>
<tr>
<td><strong>External Network</strong></td>
<td>Overlay networks from major carriers such as AT&amp;T, richly connected to the public Internet. Offer QoS (especially for end-to-end connections), private networks, mirrored sites, better and faster local access, extra services (e.g., video bits, centralized billing, discounts, integrated services, tech support). Business and consumer. Coming soon.</td>
</tr>
<tr>
<td>What we think of as the Internet today. No QoS. Low price; competitive access market.</td>
<td></td>
</tr>
</tbody>
</table>

QoS = guaranteed Quality of Service

Some Internet-based services will link to the rest of the communication infrastructure. This is already underway. For example, International Discount Telecommunications (IDT), the company that created the international callback market, recently announced that it will connect Internet phone calls to the conventional phone system through a new subsidiary called IDT Internet Services.

Similarly, not much prevents @Home (the TCI/Kleiner Perkins joint venture that plans to bring high-speed Internet access to homes over cable connections) from offering TV channel-surfing over the Internet. You could click on a Web-browser button to select a program to watch, and have the video feed fulfilled over the same cable (or a different one), but perhaps not over TCP/IP. The TCP/IP network would be the control/signalling channel.
Assumption 3: Simple elements, richly linked

The new environment is built from simple components that are heavily linked -- even recursive, in a way. The rich structure emerges, à la complexity theory, from the interacting components. Imagine messages that contain HTML tags, which invoke VRML spaces (the HyperText Markup Language and Virtual Reality Modeling Language, respectively). Objects in those spaces could, in turn, contain tags to other worlds or back to Web pages and specific e-mail messages. Several new applications illustrate the power of this concept wonderfully.

Take, for example, the Netscape Navigator 2.0 beta, which integrates e-mail and Usenet news client software. The fact that those client applications are part of the Web browser doesn't just add other applications' functionality to the browser; it changes the rules. The e-mail and news clients are fully HTML-capable. That is, any message can include embedded HTML tags, including formatting commands, embedded graphics or sounds, and tags to other documents or applications.

This capability makes it trivially easy to send someone a message that reads, "We think we have something of interest to you at our Website. Please click here to check it out." Of course, the word "here" would be a tag that would immediately bring a Net-connected person to the Website in question. Sound easier than cutting and pasting a URL into a Web browser? Is that message a more reliable way to get in front of a potential customer than hoping they add your Website to their bookmark file and remember to return? Of course.

A year from now, e-mail client software that doesn't support HTML will be obsolete.

Another great application along these lines is Enhanced Systems' @once, which offers a universal mailbox (through which you can view and manage your e-mail, faxes, voicemail, etc.) with a twist: Its front end is a standard Web browser. In principle, that means you could get to and deal with your messages from anywhere on the Internet (though it's tricky to do that with voicemail right now). Oh, and those messages could include links to work documents, relevant sites and so on.

For a third example, read later about Pueblo, which adds three-dimensionality and more to textual MUDs by HTML-enabling them (page 10).

Open questions

Linking is useful, but how can one coordinate several related applications and events that occur simultaneously or in close succession, especially

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2 MUDs (Multi-User Dungeons or Dimensions) started out as fantasy role-playing games. There are variants: MUSH = Multi-User Shared Hallucination; MUSE = Multi-User Simulation Environment; and MOO = MUD, Object-Oriented. People often use "MUD" or "MOO" to refer to the entire category. See Release 1.0, 6-94 and 7/8-94 on multi-user virtual environments and 6-93 and 7-93 on community.

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when they involve multiple participants? Something has to help request, negotiate and coordinate those activities. Because of the way it coordinates several Internet protocols, the Virtual Places technology from Ubique offers one approach to such a protocol (see Release 1.0, 2-95).

Virtual Places requires some code at both client and server machines. People with enhanced browsers who visit similarly enhanced Websites will see icons atop the Web page representing other users who are present and are using the Virtual Places technology. To someone who has become accustomed to the rather lonely act of Web surfing, the effect can be startling: There are suddenly other people around -- or at least little icons that purport to represent people. These participants can invite each other to multi-party text chats, audio chat (two at a time, using Internet Phone technology that Ubique licensed from VocalTec) and guided tours.

In September, AOL bought Ubique. Its founder, Udi Shapiro, is working from AOL headquarters to integrate Ubique’s technology into AOL’s infrastructure, both within the current service and in GNN (Global Network Navigator, the Web presence that AOL bought from O’Reilly Associates and recently launched as its own Internet service).

Funding follows function?

To summarize, the new (virtual) environment is persistent, always available, ubiquitous and highly linked. It comprises relatively simple, highly distributed components. In fact, every participant on the network might be running a server locally; application needs would dictate whether processing occurs locally or on some other server. (Oracle’s recent Web-related announcements included the introduction of PowerBrowser, which will incorporate a small database engine as well as a Web server.)

People and applications will put information in places which make the most sense, given the traffic it generates. People will use the communication mode that suits them best, given their personal preferences and where they happen to be (you can do a lot more at your desk than in an airport lounge...although sometimes that’s not quite true).

The rest of this issue of Release 1.0 is devoted to systems that make innovative (and sometimes quite inspired) use of the new environment while creating a part of the environment themselves. It’s easy to dismiss many of the systems described in this issue as mere games. We encourage you instead to evaluate their underlying functionality, to play with what they offer in ways that might serve you. The idea is not that everyone will be using 3D virtual spaces, but rather that people will need different kinds of spaces that are accessible and easily customized.

The pie that’s in the oven

Here’s one recipe for making sense of the rest of this issue: Take the shared audio technology from OnLive! (see page 16), marry it to Latitude’s front end (page 19) for more formal communication (including business), or to any of the other more visual worlds described in this issue for more playful environments. Push nested and linked functionality as far as it will go and encourage interface innovation. Add some novel protocols that help synchronize and coordinate activities (along the lines of Ubique’s Virtual Places). Blend until smooth. Bake on the Net until set.

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Before covering new ground, it's worthwhile to catch up with some of the initiatives we covered in our double multi-user virtual environments issue Release 1.0, 6-94 and 7-94). The first of these initiatives is the Virtual Reality Modeling Language (VRML).

VRML Update

In the year and a half since VRML was invented, it has attracted considerable attention and spawned many startups, such as Paper Software, Inter-vista and Construct. These companies have built interesting experimental VRML browsers and demo files (Paper's WebFX VRML browser is now distributed with the latest Netscape release), but it will take more time until someone has built interesting, commercializable VRML spaces. Sun's Java language opens new possibilities, but also adds complexity and time to the equation.

VRML is a demanding application. If you have plenty of computer power and bandwidth, VRML works quite well and offers vivid, accurate scenes. Near term, though, people want to do things besides maneuver 3D spaces by themselves. They want to interact with others and add other potentially CPU-intensive processes such as shared audio or video.

VRML 1.0 doesn't allow for multiple avatars in shared spaces; it's a one-camera view of inanimate objects. In the meantime, there is a lot of quick-and-dirty stuff underway with less verisimilitude (see the Palace, page 13).

VRML should continue to evolve quickly. VRML+, an initiative from Worlds Inc. with IBM backing, is expected to add behaviors to objects, which would create multi-user capabilities. However, it is not yet a real proposal. Also, participants on the VRML list have been kicking around ideas about VRML 2.0 for a long time. While the list stews, the standard is likely to be driven by a single company that takes it in some direction by fiat. There will probably be considerable activity on all these fronts at the VRML conference December 14 and 15 (see Calendar, page 22).

For now, the Pueblo system, which combines VRML spaces with MUD and Web capabilities, helps put things in a realistic perspective (see page 10). It is also potentially one of the most commercializable VRML offerings.

WORLDS: FROM BETA TO ALPHA?

When we first wrote about Worlds it was called KA Worlds and had just spun out from Knowledge Adventure based on founder Dave Gobel's belief that there was a market for online multi-player environments. Since then, the company has shortened its name, established an identity of its own and developed its technology considerably, mostly by moving from one pilot project to the next and learning along the way.

Plenty of people are trying out Worlds' pilot worlds. The more public prototype, WorldsChat, was just officially released as a product. WorldsChat is a finite, somewhat homely 3D space that's quite easy to move around in. (To get reasonable real-time performance and multi-user capabilities,
Worlds uses its own 3D modeling and rendering system. It plans to converge its design with VRML or whatever 3D technology becomes dominant over time. With IBM, it has also proposed the VRML+ extensions mentioned above, which would add behaviors to VRML, enabling multi-party interaction.)

WorldsChat looks like a five-pod space station with tunnels connecting the pods. Each pod has rooms with topic names over their doors. There are a few artifacts around, such as a mirror and a TV, but other people are the attraction. When players type to each other, the words appear over their avatars, which can look like people, fish, aliens and so on. The avatars, which players choose in a gallery when they log in, are more interesting than the 2D playing-card avatars available last year. The new ones are somewhat three-dimensional, although they are not articulated, nor do they have expressions.

Worlds is using the WorldsChat engine in a few other prototypes, including as a front end to IBM's Digital Library, for a Japanese online service called Cyber Oz City and to mock up an online bank for Visa (and yes, a virtual bank lobby is as unwelcoming as the real-life model).

The AlphaWorld alpha

In a few months, AlphaWorld has gone from being an internal testbed to the online gaming world's worst-kept secret. Now it has become a small boom-town. The secret is that it allows participants to build their own places.

AlphaWorld is a bare-bones operation. Everyone gets the same avatar (custom avatars are in the works). There is no manual. To find out how to build things, you have to ask someone else for help. The building tools (if you can call them that) are quite primitive, yet they are functional enough that people are creating homes, museums, laboratories -- even cities of their own -- in this cyberspace. Over seven thousand people have visited AlphaWorld so far.

A touch of Spielberg showmanship

The Starbright Foundation, founded by Steven Spielberg, recently premiered a system that will offer terminally and chronically ill children in hospitals access to a virtual world that combines 3D reality from Worlds with Intel's ProShare multimedia conferencing.

The Starbright World system demo combined the construction capabilities of AlphaWorld with the varied and whimsical avatars of WorldsChat. In fact, Spielberg's wizards created some charming avatars, including a helicopter, a bear with a jaunty walk and (of course) ET. Participants in the 3D space could select someone else's avatar and invite that person to a live audio or video session (using the ProShare system, and limited to two parties at a time).

Although Worlds' system could run over standard modem lines, the ProShare system raises the bandwidth requirements. So far, all of the workstations (StarStations) are fiber-connected to Sprint's backbone network with UB Networks equipment (formerly Ungermann-Bass). These companies are all contributing their equipment, bandwidth, software and expertise to Starbright.
The demo at the Starbright premiere began as a chat-room nightmare: Several sets of participants (Spielberg, General Norman Schwartzkopf and kids at workstations around the US) waved at each other, introduced themselves awkwardly and didn't know what to say.

Then, after some minutes had passed, one child led the other participants on a tour of a cave world (complete with ambient sounds of water dripping off stalactites and running downstream) and to a construction zone; another child, in a car avatar, challenged General Schwartzkopf's bear to a drag race -- and they did, with the bear doing its funny walk. Suddenly, the (virtual) world seemed alive and compelling.

Worlds has set the pace for 3D multi-user environments. If they can freeze the system at one state of development long enough to launch a service, it should turn into a revenue-generating proposition soon.
A year ago, we searched the Internet for software to front-end some things on the Net that were fun but difficult to use, particularly MUDs and Internet Relay Chat (IRC). To our frustration, there was very little such software around, and what did exist added only marginally to the experience of using those systems.

A lot has changed in a year. Suddenly, interesting multi-player systems are sprouting like weeds; the Internet is alive with them. Most of them take an entertainment perspective, though a few companies are piloting more serious uses. The systems' architectures vary widely, from MUD enhancements linked to VRML worlds (Pueblo; next) to serverless, souped-up text chat (PowWow). Microsoft is playing in this space as well, with an offering that will be announced soon (see page 12).

PUEBLO: ELEGANT INTEGRATION OF SPACES

Pueblo, from Cupertino, CA-based Chaco Communications, is a multimedia MUD client. If you visit ordinary MUDs using Pueblo, you get a few capabilities that make MUDs easier to manage and navigate (e.g., a hierarchically organized list of all MUDs, an editable history buffer and a macro language). If you visit a Pueblo-enhanced MUD, you get 3D, Web and MIDI audio functionality. The result, while a bit slow in its beta release, is startlingly good (see screen shot, opposite).

The Pueblo browser can have multiple panes, depending on how the MUD owners have used Pueblo technology. In the example above, one pane shows a space rendered in 3D using VRML, the other pane has the text that would normally scroll by in a MUD -- with HTML tagged text! You can use your mouse to move through the 3D space. The panes are linked in interesting ways. Click on the text description of available exits (in the lower pane) and the VRML browser loads the new scene. Any scene or object can have a tag or MIDI audio associated with it. The 3D view won't include participants' avatars until VRML supports that feature.

Chaco's Website has a list of MUDs that have been enhanced with Pueblo functionality. (Xerox PARC's LambdaMOO has not; in Pueblo, it looks like other text MUDs.)

Social interaction and persistent places first

In the quest to design a platform for multi-user virtual spaces, building atop a MUD makes sense from many perspectives. Top of the list is the fact that a MUD is a social engine. Adding social spaces and interaction meth-

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3 To announce its capabilities, a participating MUD sends the text "Pueblo [version] enhanced" every time a visitor logs in. If the visitor is running the Pueblo client, it recognizes the text and both sides of the session jump to the more powerful feature set.

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ods as an afterthought is much more difficult than beginning with them. In
addition, MUDs offer lots of functionality, including an object store, pro-
gramming language, meta tools, state preservation, place definitions, and
navigation and dialog methods.

There are, of course, plenty of drawbacks. Current MUDs aren't appropriate
for robust, commercial delivery of online spaces. Given their genesis as
hobbyist systems, they are notoriously complex to program and sluggish un-
der heavy loads. Chaco and other companies are working to develop better
MUD engines.

From SDKs to social spaces

Dan Greening and four other people who were previously the core of the
Novell Appware Foundation Group founded Chaco. When Novell management de-
cided it didn't want to be in the software development kit business, many
of the engineers in the group went to Netmanage. Itchy to control their
own destinies, they pooled their funds last January and went on their own.

Greening and his team see Chaco as a software engineering company, not a
media developer or service provider. Chaco is looking for companies to li-
cense its technologies, which also include VR Scout, a VRML viewer that
runs under Windows 3.1. In fact, Chaco is already profitable from software
licensing revenues from companies such as Mastersoft, Netmanage, Strategic
Mapping and Velocity.

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The Pueblo system offers dynamic updating: It can download modules of code that add new functionality and run them right away -- a handy way to do product upgrades. Now that Netscape 2.0 offers features such as frames and in-line applications, Chaco will be shifting development from its separate browser toward integration in Netscape. However, the Netscape browser will not be required.

MICROSOFT'S (VIRTUAL) SOCIAL SPACES

One of the initiatives bubbling away inside Rick Rashid’s Advanced Technology Group at Microsoft is Linda Stone’s Virtual Worlds Group, which includes several diehard MUDers, character animators and 3D-world designers. The team is working on new kinds of online social spaces. Over time, they plan to offer several kinds of virtual social spaces, several of which they are ready to debut.

Soon Microsoft plans to announce the team’s first product, which enhances MSN’s chat feature with visually distinct 2D and 3D virtual spaces and avatars. The Virtual Worlds Group expects outside artists and developers to create more avatars and places, as well. Stone has been thinking about creating warm, tactile and fun virtual spaces for some time. To her, most 3D graphics worlds have too many sharp edges. The early designs for Microsoft’s new system succeed nicely: They don’t look much like any existing virtual worlds, and they have a flowing, whimsical, friendly feel.

Take, for example, Bug World. In a flat, abstract landscape reminiscent of paintings by Joan Miro and Wassily Kandinsky, participants can choose avatars that look like the abstract wiggly beings (and non-beings) that Microsoft’s artists painted. Other avatars look like bug-eyed monsters and animated symbols. Each avatar has a small repertoire of expressions, including idle-time behaviors, such as floating or looking around. In fact, the world space itself has idling behavior. Participants can move their avatars up and down in the 2D space; their chat text scrolls below the viewing area.

A subtle note: The system includes the ability to create an ambient noise effect by looping several segments of digitized audio in random order. The effect is much more believable than looping a single segment. As in other systems described in this issue, objects in these spaces can have hotspots that link them to other places or items. Here, of course, those items can be inside MSN, on the Web or elsewhere.

Microsoft will offer other enhanced chat spaces that have 3D environments.

This is a first step for the Virtual Worlds group, which sees chat as a separate, proven online application but also recognizes the limitations of chat servers and plans to move to other architectures. There are plenty of resources inside Microsoft to draw on. For example, in February 1995, Microsoft bought Rendermorphics, maker of Reality Lab, a 3D rendering engine that will be integrated into a future version of Windows. Over time, expect to see other compelling offerings from this team.
POW WOW: TURBOCHARGED Multi-USER CHAT

Tribal.com is a quirky site on the Web. It has a strong Native American motif and is replete with mysterious references and tongue-in-cheek comments (although few Native Americans). Somebody's clearly having a good time here.

Visitors to the site can download a multi-party chat application called PowWow that is intended for use between up to eight users (10 or 12 if you have a huge monitor and like a busy screen). As people join and leave a chat session, the application dynamically divides the screen into scrolling panes, one per participant. (Most other multi-party chat systems lump all participants' text in the same window, alongside their names.) Buttons across the top of each pane point to each participant's image, Web page and e-mail address.

Unlike most chat systems, PowWow is completely peer-to-peer; there's no server involved. (Tribal's Website does include white pages in which people can register, as well as listings of the last 10, 20 and 50 people who have visited the site using PowWow.) Each participant is connected directly to the others. When one of them leaves a session, then reconnects, PowWow automatically brings back all the connected participants. It's easy and efficient.

There are plenty of cool features. Participants can send each other software objects, from new sound files to the program itself. A few features are similar to Ubique's Virtual Places system. Any participant can invite others on a tour of the Web. As they use PowWow to chat, their browsers will update automatically to wherever the leader goes. Any two participants who are connected with a 28.8 Kbps modem or better can initiate an audio link (PowWow uses openly available compression algorithms).

The mastermind of the operation is John McAfee, computer virus detective extraordinaire, who founded the group in the summer of 1994 as a way to experiment on the Internet. He hired a boisterous band of developers, who wrote a great product and have created a big following for it on the Net. The group's ulterior motive is to stimulate the growth of "tribes" of people who use PowWow to share common interests, exchange files and otherwise get to know each other. Lists of such tribes are available at the Tribal.com Website.

THE PALACE -- FROM TIME WARNER!

Just when we were losing hope that media titans were ever going to field something organic and compelling, we found the Palace. This project was born at Time Warner Interactive (TWI), which designed CD-ROM products and programming for Time Warner's infamous Full-Service Network. The Palace was a nascent interactive title. The Time Warner/Turner Communications deal almost squeezed the Palace project out of existence as Time Warner began to consolidate overlapping groups. The Palace Group was recently formed out of the chaos (the name is not fully official).

In this improbable setting, the Palace project began to take off when Jim Bumgardner, its inventor and lead architect, teamed up with Internet

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aficionado Mark Jeffrey, who joined the group after working at Delphi Inter-
ternet and the Fox Network. At Delphi, Jeffrey had experimented with Web
interactivity while building sites such as the fX Networks site. Jeffrey
was brought in to make the Palace work on the Internet.

Bumgardner and Jeffrey went all the way and decided to emulate the formula
that has helped the Web grow: Keep it simple, distribute the software
widely and inexpensively, and allow anyone to create spaces.

The Palace crew isn't wasting time. The system has been in public beta
only a month; its first official release is this week. Visitors who
download the client software get the server, too, though they don't know
it. They have to register the product to turn on server and full client
features. That means practically anyone can run a server, script it and
customize it. Servers are also easy to link to each other.

2.25D

The Palace is a flatland with nifty artwork. Each scene is rendered in
three dimensions, but captured as a two-dimensional still (sort of two-and-
a-quarter-D; two-and-a-half-D is reserved for more realistic environments
that aren't fully 3D). You can move your face (avatar) around the room,
but not into it. While this isn't particularly realistic, it's efficient
and quite amusing. You can easily dress up your default face, which looks
like a tennis ball, by using a pop-up palette of expressions. A briefcase
opens up into a selection of disguises and accessories, from bunny ears and
martian antennae to cigarettes and scarves.

The Palace doesn't have underlying 3D models or a MUD engine. Servers just
route messages and pass props and objects to participants as needed. While
this architecture is simple, distributed and flexible, it lacks the
sophistication possible with other server and interaction models.

That's not holding early users back. Since the Palace's scripting allows
things to happen just about anywhere, players have gone to town. The Palace
game room has fully functional chess, backgammon and checker games.
Mention Harry in Harry's Bar and he tells you to shut up. Click on the
suit of armor in the hall, and it giggles. Sit on the heart-shaped bed and
click on the coin-op meter, and your avatar vibrates. Click on a doorway,
and it can transport you to another Palace server as easily as to another
scene on the same server, much as Web links do. Web pages can link to Pal-
ace servers and vice versa. Server owners can give each other privileges
on their machines. On one system, called Rainbow Palace, everyone is a
wizard (system operator).

--------

4 During the beta test, registration was free. After the launch, people
can call 1 (800) PALACE2 and get a registration number for $20 that enables
both the full client support and the server. In version 2.0, the Palace
Group may separate the client and server modules, but Jeffrey intends to
keep prices low. The server may sell for $70.

5 The Palace's scripting language, iptScrae (yes, that's "script" in Pig-
Latin), is designed for multi-user environments. It also uses Reverse
Polish Notation (postfix notation) and is still very much in development.

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FUN WITH AUDIO

Online, text tools offer a wide variety of topologies for communication. They are generally efficient ways to communicate, from two parties on up, and even between large numbers of participants. For instance, it's not much harder to send e-mail to six people and two news groups as it is to send to a single person. Mailing lists are handy ways to keep correspondence going between larger groups. Bulletin boards allow people to post their thoughts for hundreds, sometimes thousands of others. At the other extreme, live chat and multiplayer games are often best suited to smaller groups.

Because these applications are text-based, relatively few bits need to move between participants, and they don’t have to get to their destination in real time: These are not "twitch" multi-player games.

Internet audio and video

One of the early miracles of the Web was that it allowed people to download and play audio and video files easily. Entrepreneurs realized right away that waiting for these files to download was a burden; now there are many options for moving audio and video over the Net in a more user-friendly manner. They include real-time-audio playing systems such as Progressive Networks' RealAudio and VocalTec's IWave, as well as Xing Technology’s StreamWorks and VDOnet’s VDOlive.

All of these systems are asymmetric and generally designed to work one-way, optimally sending a variety of streams to a multitude of requesting clients.

There are also an increasing number of live, real-time audio products such as VocalTec's Internet Phone and the public-domain VAT and Haven programs. For live video, there's Cornell's CU-SeeMe. Although full-duplex operation is still a trick for these systems, they are quickly getting better. There is one thing they're not designed for, however: multipoint communications.

One potential solution is multicasting, which is an efficient way to send an audio or video stream, live or stored, to multiple receivers. While multicasting is a great solution for streams that go from one source to many different destinations, it isn't designed for moving streams between multiple peers. To do so, each participant would have to be a multicast source. Each would have to register itself with all the others as a receiver, too. The complexity would get out of hand quickly. Luckily, there appear to be better alternatives.

The audio world is altogether different. Messing with topologies is difficult. In fact, there is a sharp discontinuity at the number three: It's relatively simple to conference three people together with a standard PBX or three-way calling from your friendly local-exchange carrier, but getting more people to participate in your call requires that you use a third-party bridging service such as ConferCall or buy expensive audio bridges for your...
company. Participants have to reserve the equipment ahead of time; using it requires operators and other help. This high cost has opened opportunities for vendors of customer-premises-based audioconferencing systems such as Latitude Communications (see page 19).

The ISO standards world has generally dealt with this problem by adding layers and options. One result is the collection of videoconferencing standards known as H.320. But those systems are expensive and inelegant. They use a brute-force engineering approach to solve thorny problems of moving bits between many participants.

Carved in stone?

It's easy enough to assume this is just the way things are and either they will stay that way, or the imminent miracles of ATM (Asynchronous Transfer Mode) to the desktop will solve these problems. But we're not convinced that ATM will make it to enough desktops and homes.

Besides, there's another approach, which begins with the following question: What's keeping the participants in a text chat session from invoking an audio conference call? After all, the system knows what parties are connected. Shouldn't it be able to add in a new media type? Current digital audio and video offerings aren't focused on this question, though they are certainly working on some of the capabilities (see box, previous page).

ONLIVE!: LATERAL THINKING PAYS OFF

Two years ago, Rod MacGregor and Henry Nash left Novell to pursue what they thought was a big opportunity in interactive TV.6 Their original plan was to deliver content over their own narrowband networks connected to set-top boxes developed by gaming companies such as Nintendo, Sega and 3D0. The company they founded was Enter TV.

But new set-tops didn't materialize; multimedia PCs and the Internet did. Also, services such as AOL grew phenomenally fast, so launching a new network seemed like a waste of effort, since other networks would become available much more rapidly than they had expected.

More importantly, they realized that there was huge demand for people communicating with each other, so they changed course and headed for the Internet. They could not have made a more productive course correction at a more auspicious time.

The company now has a new name, OnLive!, and a new CEO, Betsy Pace. According to Pace, OnLive! will hit the market in early 1996 with an Internet-based voice chat application with 3D lip-synching avatar heads. Their goal is to offer super-enhanced online chat to Internet service pro-

6 MacGregor and Nash previously worked together at Insignia Solutions, which sells DOS and Windows emulation software, and at International Business Software (IBS), which sold a distributed Mac file system called DataClub. When Novell bought IBS, they began to work on Netware.

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viders, commercial online services, media companies and large Websites. They have approached companies in each of those markets already.

Along the way, OnLive! has raised $20 million from a who's-who of investors, including AT&T Ventures, Creative Labs, Kleiner Perkins Caufield and Byers, Merrill Pickard, Mohr Davidow and New Enterprise Associates.

The system

OnLive!'s system has two major elements: A 3D virtual space with head-only avatars and a unique multi-party audio technology (participants must have a Pentium-class processor). We'll describe the audio in a moment.

The development team started to create full-body avatars, but found that making them expressive required too much processing for most computers. So they focused instead on heads with expressions (menu choices include surprised, angry, happy and sad). By detecting pitch changes, pauses and so on, the faces lip-synch with speakers.

The 3D scenes are described in VRML or 3D Studio and rendered with the Reality Lab engine. As with many of the systems described in this issue, objects in the space may have tags to other Internet objects, such as Web pages. That's how participants could move from one server to another.

While the lip-synching avatars are interesting, they are not the big story.

The clever twist

Instead of starting with a graphics engine and tacking on audio links, OnLive!'s engineers started from the communications end, with the goal of offering high fidelity, multi-party voice with low latency -- all over Internet protocols. Their crown jewel is additive voice bridging, which involves an elegant idea that is potentially as important as the insight that led Whit Diffie and Marty Hellman to develop public-key encryption.

It starts with the fact that raw audio signals (digital and analog) have the interesting property of being additive. You can combine several digitized (but uncompressed) audio signals, transmit them, then separate them at the destination. (This is not true of video signals.)

Normally, compressed audio signals can't be added in this way, because most compression algorithms are optimized for throughput or storage density. Adding compressed streams produces useless noise at the receiving end. However, OnLive!'s engineers took a different approach: They created a compression method based on mathematical functions that can be combined and safely reconstituted.

This means that shared-audio servers don't have to be expensive audio bridges that can receive and decompress multiple audio streams, custom mix a feed for each participant, then recompress and transmit them all. That's the conventional wisdom, and the status quo in the industry. Instead, OnLive! servers can simply route bits to and from the appropriate ports, performing many fewer processor-intensive functions to combine and separate the various streams. The company's engineers estimate that a Sun Sparc server can handle 200 simultaneous speakers.
Where are you?

OnLive!’s technology also helps people deal with confusing settings, such as multiple conversations going on in large spaces. Distance attenuation allows participants to hear others in the same space, located in three dimensions. People farther away sound fainter. It’s also directional: People on your right come through the right speaker. OnLive! is working on an event-oriented version of its system called Arena that would allow people close to each other in the (virtual) audience to hear each other.

That doesn’t mean OnLive!’s job is done. For one thing, PCs are rotten platforms for communication. The minority that do have multimedia capabilities generally support only half-duplex (walkie-talkie style) connections. OnLive! is developing ways to exploit multimedia hardware to achieve full-duplex audio with existing gear and to make sure all future versions support it as well.

For another, speed kills -- or lack of it, actually. Because Internet-based audio is very sensitive to network delays, OnLive!’s system will work best on private internets that can guarantee quality of service. There’s no guarantee that random points on the Internet will get adequate performance. The good news is that one bad link will not degrade others in a session, private networks are being announced monthly and existing networks are being upgraded at a furious pace. Eventually, this technology should be ready for the business market. MacGregor believes that could happen as soon as 1996. When it does, business users may want a less playful interface. Latitude Communications, described below, offers just such a system.

Sell servers, give away clients

Following the Internet M.O., OnLive! will initially give away the client software, called Traveller. It will then sell various server-side software elements, including the Site server software, an SDK, and an Author package that includes SpaceWizard and AvatarWizard, to allow developers to create places and faces.

In principle, using the Internet-to-phone system technology recently announced by IDT Internet Services (see page 4), someone could participate in an OnLive! session from a public phone booth. Their avatar might look like an immobile phone booth, or they could move around by hitting touch-tone keys. The permutations and possibilities are endless.

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7 This is a feature that Virtual Universe was developing with its custom audio bridging hardware; see Release 1.0, 6-94.

8 OnLive!’s engineers have done a lot of latency testing of Internet protocols, and they are convinced that their technology works. Their system, which constantly meters signal quality, uses both TCP/IP and UDP (the connectionless User Datagram Protocol). On reliable links, it uses TCP/IP to minimize latency; on unreliable links, it uses UDP to minimize retransmissions.

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LATITUDE: GREAT (VIRTUAL) MEETING SUPPORT

Latitude Communications offers a system called MeetingPlace that fills a gap between three-way calling and the expensive and cumbersome audio conferencing services from companies such as AT&T, MCI, Sprint, ConferCall and ConferenceUSA.

MeetingTime, Latitude’s client software, has two modules. One lets users set up and coordinate meetings over standard e-mail (including last-minute "I’m running late" notes). The other lets them log into meetings over TCP/IP and enhances their participation by showing the meeting agenda and the list of attendees, tracking (and highlighting, with an asterisk) who is speaking and more.

At meeting time, all participants dial in to the MeetingPlace audioconferencing server, where they are asked to type a PIN into the phone keypad. Each participant has a unique PIN, which helps the server identify and track all the parties (PINs can be any number, including those that spell easy-to-remember words such as "sales")

The MeetingPlace system adds many other useful features to conference calls. It can announce attendees’ arrivals and departures, sound a warning

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a set number of minutes before a meeting is scheduled to end and offer private breakout sessions within larger meetings. With the MeetingNote option, the system can record meetings (the audio session as well as any notes posted using MeetingTime) and make them available later. (We do enough of these calls that we wish we had one, too.)

Exploring the value proposition

Latitude's major selling points are functionality, cost savings and security. Most of its early customers are especially interested in eliminating outside operators and gear -- all of which are potential security leaks. MeetingPlace starts at $40,000 for an 8-port system (which, we should note, can host a maximum of eight callers, in as many meetings as are permutationally possible). Its largest system, which has 120 ports, starts at $280,000. To those prices, add the cost of software modules such as E-mail gateways, SNMP management support, MeetingNotes and the MeetingTime client software. Despite this up-front cost, companies can pay for the systems relatively quickly by avoiding the conference bridging services that cost several hundred dollars per hour.

The advent of radically different shared-audio technology such as OnLive's (see page 16) opens interesting opportunities. Latitude could use its software expertise to set up and manage Internet-based conferences. This also poses a very different business model for the company, selling less secure, lower-cost connections to new buyers. Because of the gaps that still remain between Internet telephony and phone-system quality and reliability, it'll be some time before the two converge.

We can't wait.

Latitude's president is Emil Wang; the vp of marketing is Glenn Eaton. They and many of their colleagues worked together at Aspect Communications and Rolm. The company raised $10 million in financing in two rounds from Mayfield Fund, Menlo Ventures, Asset Management Company and others.

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RESOURCES & PHONE NUMBERS

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Dave Gobel, Greg Beasley, Worlds, Inc., (703) 690-2877; fax, (703) 690-7297; daveg@worlds.net, gregb@worlds.net

WEB RESOURCES

Chaco Communications (Pueblo) www.chaco.com
IDT Internet Services www.idt.com
Intervista (WorldView VRML browser) www.intervista.com
The Palace Group www.thepalace.com
Paper Software (WebFX) www.paperinc.com
Tribal Voice (PowWow) www.tribal.com
Ubique (Virtual Places) www.ubique.com
VRML Resources www.vrml.wired.com
Worlds, Inc. www.worlds.net

COMING SOON

• The economics of the Internet.
• Avatars: motion and emotion online.
• Networked object graphics.
• Visualization of information.
• The analog world.
• And much more... (If you know of any good examples of the categories listed above, please let us know.)

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<thead>
<tr>
<th>Date</th>
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<th>Contact Information</th>
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<td>November 28-30</td>
<td>EMail World &amp; Internet Expo - Boston. Sponsored by DCI, America Online and Microsoft. Call customer service, (508) 470-3880; fax, (508) 470-0526; <a href="mailto:DCIconfl@aol.com">DCIconfl@aol.com</a>.</td>
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<td>Competitive Value-Added Services for Telecommunications - Philadelphia. Organized by Institute for International Research. Call Deborah Johnson, (212) 661-3500 x3215 or (800) 999-3123; fax, (212) 661-6677 or (800) 959-9644.</td>
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<td>International Conference on Evolutionary Computing (ICEC '95) - Perth, Australia. Sponsored by the IEEE. Come help find the Web's missing link. Call 61 (9) 380-1969; fax, 61 (9) 380-1101; <a href="mailto:ec95-request@ee.uwa.edu.au">ec95-request@ee.uwa.edu.au</a>.</td>
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<td>Nov 30 - Dec 3</td>
<td>The Fourth International Conference on Telecommunications in Education (Tel*Ed '95) - Fort Lauderdale, FL. Organized by ACM SIG/Tel. Call Lori Novak, (503) 346-2411; fax, (503) 346-5890; <a href="mailto:Lori_Novak@ccmail.uoregon.edu">Lori_Novak@ccmail.uoregon.edu</a>.</td>
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<td>New Media for the Music Industry - New York City. Organized by AIC Conferences. Call Heidi Wooden, (212) 952-1899 or (800) 409-4242; fax, (212) 248-7374.</td>
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<td>January 9-12</td>
<td>Internet World Canada '96 - Toronto. Organized by Mecklermedia and Computing Canada. Call, (203) 226-6967 or (800) 632-5537; fax, (203) 226-6967; <a href="mailto:iwcandconf@mecklermedia.com">iwcandconf@mecklermedia.com</a>; <a href="http://www.mecklermedia.com/shows">http://www.mecklermedia.com/shows</a>.</td>
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<td>ISA's Annual Strategic Business Meeting - Miami. Organized by the Interactive Services Association. Call Patti S. McKnight, (301) 495-4955; fax, (301) 495-4959; <a href="mailto:ISA@isa.net">ISA@isa.net</a>.</td>
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<td>Fourth Annual Conference on Communications and Media Finance - New York City. Organized by IIR. Call Douglas Campbell, (800) 999-3123 or (212) 661-3500; fax, (212) 661-6677.</td>
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<td>Jan 30 - Feb 1</td>
<td>SoftExpo '96 - Santa Clara, CA. Sponsored by Software Publisher. Call John Gargile, (303) 745-5711 or (800) 803-9488; fax, (303) 745-5712.</td>
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<td>The Online Advantage - Bellevue, WA. Sponsored by Digital Media Alliance and the Washington Software Association. Call Michele Ruegg, (206) 450-9965; fax, (206) 889-8014; <a href="mailto:Mruegg@aol.com">Mruegg@aol.com</a>; to register call (206) 889-8880; <a href="http://www.wsa.com/wsa/events/ola96">http://www.wsa.com/wsa/events/ola96</a>.</td>
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<td>Virtual Reality World '96 - Stuttgart, Germany. Sponsored by IDG. Call Caroline Dattner, 49 (89) 36086-390; fax, 49 (89) 36086-274; <a href="mailto:vrw.idg@lao.fhg.de">vrw.idg@lao.fhg.de</a>.</td>
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<td>March 14-20</td>
<td>GeBIT Hannover '96 - Hannover, Germany. Sponsored by Deutsche Messe AG. Take comfy shoes. Call Mette Peterson, (609) 987-1202; fax, (609) 987-0092.</td>
<td>Hannover, Germany</td>
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<td>March 17-20</td>
<td>1996 PC (Platforms for Communication) Forum: The Future Now (some assembly required) - Tucson, AZ. Sponsored by us: You read the newsletter; now meet the players. Call Daphne Kis, (212) 924-8800; fax, (212) 924-0240; <a href="mailto:daphne@edventure.com">daphne@edventure.com</a>.</td>
<td>Tucson, AZ</td>
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* 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. -- Luba Yurchyk

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1996 PC FORUM PREVIEW

It's the day after Christmas. The children are in paroxysms of delight. The floor is littered with shiny new toys, spare parts, wrapping paper, unopened cards from well-meaning distant relatives. Overlooking it all is Teddy the Bear, who has survived many Christmases unscathed.

About all these toys: How can we get them to work? Are the parts all there? Everything looks great, but nothing works together. The batteries Dad bought on sale last summer, with great foresight, have already gone dead. No one can figure out how to assemble the kitchen robot; the instructions are inscrutable, and maybe a part is missing; it's impossible to tell. Dad is an old hand at this; he actually gets one of Junior's toys to work, but he can't figure out what it does. Junior grabs it from him; it breaks.

....now it's February. The electronics are forgotten; the video has lost its charm; the talking doll has permanent laryngitis. But Teddy stays on. He's a source of comfort, a witness to events, a steady friend in a changing world. The children are playing with Teddy and with the sled; the electronic toys are in the basement. And in the mailbox: the credit-card bills.

Sound like any business you know?

Each Release 1.0 subscription (plus a fee!) entitles you to two registrations to the 19th annual PC (Platforms for Communication) Forum, March 17 to 20, in Tucson, Arizona.

The theme this year is "The Future Now (Some Assembly Required)."

The age of online and multimedia is upon us. Computers that aren't connected aren't part of the picture. The development platform is not the mainframe or the pc, but the network. Businesses are setting up Web sites; content companies and search services are going public at astronomical P/E ratios; companies are merging and divesting with abandon. But it's not clear that any of these pieces will actually work together, or that they're plugged into a steady power source -- profitability.

Online technology and services are opening up a new world, but like the kids at Christmastime, we face a number of questions before we can get the toys to work. What's a keeper, and what should we give to cousin Fred?

- interoperability and openness. Do the dolls fit in the dollhouse? Do the trains run on the tracks? How can we get all these services and products to work together? Consumers won't stand for payment systems that don't let them pay all their bills from one service. Content providers don't want to reformat their content for the standards of different services.
• playing with the toys. What will these toys and tools let us do? Will teenagers decorate their home pages as they now decorate their rooms? How will consumers actually spend their time and increasingly scarce attention? How will businesses operate when everyone's connected all the time, everywhere?

• rebellious toys. What happens when the toys get minds of their own? What will happen when agents -- some of them distinguishable from viruses only by attitude -- roam the Net? How will they interact? How can we ensure system integrity?

• the bullies down the street. Will we be able to keep our toys, or will the rich bully grab them away? Is the online world really a new kind of market where diversity rather than standards will reign?

• sharing with other children. Do all these mergers make sense? The behemoths are all buying content companies, sure such alliances will ensure their futures, while content companies are looking for distribution and access. Is it worth it to own a content company? Content wants to find its way to all consumers; delivery media want to deliver all content. Exclusives are no longer bottlenecks that allow an owner to charge a toll; they're detours that will be bypassed in the long run.

• parental control. Who's going to control the Net? Like it or not, the government wants a say. But commerce won't move onto the Net without strong security, and international commerce will be tough without global agreements on standards for intellectual property, authentication and the like. Meanwhile, how will governments react to a world that ignores traditional national borders?

• lemonade stand or allowance. Will we get paid for content or for intellectual services around content -- searching, reliable delivery (subscriptions), consulting, performances, authentication, exchange and brokerage services? Will advertisers pay for it all? Who gets to keep the revenues?

• the bills. Are telcos ignoring the economics of the Internet just as the mainframe vendors of old ignored the economics of PCs? In the long run, the Internet brings economies of scale down to small players -- whether customers or providers. Anyone can afford to be a provider; anyone can market his goods worldwide.

Join us next March in Tucson, where we'll consider all these questions. Seriously...

We'll have speeches and panels, debates and audience interaction. We also plan a special roundtable with the consumers of the future -- your children.

We'll also have presentations from interesting new companies such as Connect, the Electronic Rights Management Group, OnLive!, GNN, Net Objects, Saqara Systems and Worlds plus our own Rumpus Room full of "future now" products and services organized by Jerry Michalski.

Release 1.0 15 November 1995
We hope to see you there, along with the "future now" customers -- your families.

Speakers will include:

Jim Barksdale, Netscape
Steve Case, AOL
Scott Cook, Intuit
Anthea Disney, News Corp./MCI Online Ventures
John B. Evans, R.E.M. Productions
Bran Ferren, Walt Disney Imagineering
Bob Frankenberg, Novell
Frank Fukuyama, Rand Corporation, author of Trust
Bill Joy, Sun Microsystems
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