**MARKETING CYBERSPACE**
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Email correspondence from various sources.

**Is price an issue? (programmer)**

It's interesting to note, that from:

cheapo 286 clones
to
i860 add-in boards
to
William's i860's + Transputers

... that the cost of the system has increased with each iteration.

Maybe the cost/performance tradeoff doesn't even apply for cyberspace? That is, if cyberspace IS a complex environment in real-time, then perhaps cost becomes a non-issue?

***Reply (William)***

Regardless of where you stand on the price/performance curve, it will be an order of magnitude more desirable in three years. The thing to look at is the performance increase over time, holding cost constant (or the cost decrease over time, holding performance constant). This curve suggests that what we have now will be hobbyist cheap in 1992. Alternatively for substantial bucks, you'll be able to get magic in 1992. Both scenarios are big wins.

**Expectations (William)**

The question of expectations for cyberspace is worth discussing. As I see it, we have at least three audiences.

The Lab: we need to know what we are doing and can do.

The Company: we need to deliver the fly-through capability in June to meet project commitments. There is also an implicit objective to "knock their socks off".

The Public: we need to adopt a policy about public image and expectations.

Our actions are not consistent across these audiences. We are distributing

papers and ideas to the Public with virtually unlimited scope. If we are concerned about raising expectations, then we should stop this form of communication. I'd be much happier talking publicly about what we have in hand. However, there is a fundamental component of actively building Public expectation, in order to drive both progress and the market.

If we were adopting a conservative Public approach, we would never dream of taking a six month prototype to a public exhibit. As a research manager, my expectation for taking complex one-of-a-kind equipment (equipment that requires outfitting users one-at-a-time with gloves, helmets, etc) to a show is *utter disaster*.

So I strongly back showing only fly-through to the public. This contradicts the "knock their socks off" model. Our world designer's point (that socks won't fly off with a sterile display) highlights a contradiction in our approach. Either we accept the necessary cognitive engineering or we show prototype work that will erode the expectation base ("I've seen flythrough, so what?").

It's a bad idea to tell people what its going to be like *soon*, regardless of content. We certainly should not tie deliverables to showing a prototype, in any public arena. BUT, the public generates its own agenda for expectations. My feeling is that *anything* we show at a show will create out-of-control product expectations. Is letting them wait a year for production a bad idea?

Along the same line, showing cyberspace will create the expectation of a product. I could almost insist that we have commitment to do a product build as a prerequisite for taking the prototype on the road. We do not, after all, wish to be taken as fools.

The expectations within the Company fall into an entirely different model. These are folks we see daily, folks we tease at Forums, folks who can come in and see the Lab. If cyberspace is to be a product, this group must be sold first. The current research design includes extensive exposure to the company before any traveling.

An anecdote: an employee came by briefly while we were using the optics in conjunction with the stereo display. He looked through for three seconds, and his eyes froze crossed *for half-an-hour*. Are we ready to face potential legal suits by putting a non-calibrated experimental technology in the trade show booth?

We should ask: why hasn't anyone else made cyberspace-like display available to the public? We should ask why the *dozen* aerospace companies building head-mount displays haven't even considered the entertainment market.

To address Company expectations, we need only ask. How many employees would like to schedule a journey into cyberspace? Who will be pissed off if we

show cyberspace to the general public before we show it to our friends and colleagues?

The expectations of the Lab (for completeness) must be based on full information. That's the easy one.

On the specific question of the computational cost of wiggliness and whimsy, I believe that we can satisfy the cognitive engineering that our world designer addresses without undue computational cost. We don't need dynamic clouds, or even clouds that provide parallax. A design principal that we all have discussed is *perceptual complexity*. The theory is that cyberspace will need to be compelling, to grab the eye. Look at computer games for an exemplification of this principle. The Void is cold, and is the archetype of non-compelling emptiness. Providing a teal blue, rather than black, backdrop is of course trivial.

*But the bigger issue is that very soon we will have to make choices about which cyberspace facilities to construct first. On the list are:*

compelling backdrops
dynamic objects
direct manipulation (glove)
multiple agents
camcorder input
jacks and skitters
construction tools
tasks (demo of utility)
CAD databases
pre-constructed environments
...

So the hard questions:

what to build first to demonstrate minimal capability
what to build first to meet our goals
what to show and why
how to convert to a product build
what liaisons to arrange with hardware manufacturers
how to protect ourselves legally
how to integrate cognitive and software engineering
what to give up for speed (display and lag)

## Opinion (management)

There is no problem in raising expectations (anyone's) until dates and products start being talked about. Shoot, I don't mind telling our DEALERS that one day they'll be able to design everything as though it were real (or

better) on the computer; they already assume that. In fact, the only way to bring their expectations in line with reality is to SHOW them what's currently possible, that's one of the big reasons for taking a demo public.

The other reason for taking a demo public is to see if people LIKE it. In spite of the fact that our current Cyberspace is a cold, lifeless void, everyone that has adorned the NASA helmet has come away suitably impressed; generally sans socks. Our environment is better than NASA's. If we can't show that this early technology is something worth pursuing, then it probably isn't. When the first CAD products came out in 1982, they were barely usable tools. Yet enough people thought they were usable to enable it to develop into serious software that is largely responsible for a billion-dollar hardware/software industry.

We've taken several demos to shows that have never become products. If people don't like them well enough, we're not going to spend much time on them. We've never (seldom) been taken for fools for doing so, more often we've saved face by not spending time on something nobody's going to buy.

I'm not too worried about the liabilities of non-calibrated experimental technologies. Our employee's eyes are crossed most of the time anyway. The reason McDonnell Douglas hasn't come out with entertainment oriented displays is because they haven't come out with entertainment oriented anything (unless you take their military antics as entertainment).

I agree that we need to start building things like compelling backdrops and non-void-like environments. So why doesn't someone start building some? Make some artificial realities!! It's fun!!

**Priorities (management)**

Being a veteran of 1000's of demos on untested or totally reliable software and hardware, I agree with your bottom line. Giving the customer a look at the future and letting them judge the possibilities is useful. Just be prepared to talk at length about those possibilities. Dealing with skeptics will also be bothersome, but you can never get away from them. Flight simulators at previous Comdex's caused long lines. I'd assume that will happen as well. I'd have the glove available so you can show it (not demo, just show) and not worry about stereo, the person under the helmet will get the idea.

***Priorities (William)***

We're all getting eager to see the new world. I spent yesterday demoing. All went well, but we really need more capability before showing again. Specifically:

#  CyberWorld, instead of platform in EmptySpace.

#  6df joystick, instead of glove.  The glove/helmet integration, via the two Polhemi, was the weakest link.

#  Some form of interactive objects, either "fly-the-plane", or "move-the-articulated-joints", or ...

Finger-point flying did not work, or was quite inconsistent.  Easy to get lost, not intuitively coordinated with space (physical space was constantly getting confused with display space), and highly dependent on initialization locations.

I like the direct interaction idea, but the main constraint is:

  WE MUST GET MINIMAL FUNCTIONALITY IN BEFORE ANY EXTENSIONS OR SMOOTHINGS.

I agree that we aren't far from lots of great capabilities.  The main purpose for Tuesday's meeting is to *prioritize* this close-but-not-there list, so we end up with (by mid-May) two lists:  "there" and "close".

***Priorities  (world  designers)***

Yes, we seem to be going off in different directions again, but we are working in a universe with curvature...theoretically, if we keep going onward, our paths will rejoin.  So, here's an attempt at reuniting on the question of priorities for the Expo demo.

My understanding of our goals for this demo follows; I'd really like to know how you see it...I got the impression yesterday that we each have a different agenda going.  Hard to get a coherent demo without some consensus on what's important to show people, and how best to show it.

Most important to me is to give people the experience of Being Inside an interesting, comfortable *3-D* virtual world. Without a stereoscopic display, the experience of 3-D is minimal (remember grumbling at NASA's demo because of that?) -- yet we're not focusing on getting our display to function in stereo.  Why?  Is it too hard to do?

Moving around in Cyberspace, easily & without disorientation, is next on the list, yes?  The orb seems like the smoothest way to do this; pointing is fun, but you can't specify degrees of freedom (which is one way to compensate for lack of collision detection -- if you're "riding in a car", the orb could restrict movement to the plane; going in the "elevator", movement is allowed up & down only --etc.)

Interaction with virtual objects seems to be the next step, and that's where the glove seems most useful. It may not be possible to do this in June, but eventually, a few simple virtual objects one can pick up and examine would be great to have... Using the glove's gesture recognition capabilities has proved difficult for me and for the people we've given the demo to. It works inconsistently, needs calibration for each individual, and is especially weird to use if, like me, you have active hands -- I found my normal hand movements triggering commands inadvertently. Is there some other way to initiate the display that's less tricky? What ever happened to the idea of voice commands? Vocalizing seems more natural to me than arbitrary and sometimes awkward hand signals...

Construction, articulation, & scale changes seem appropriate to demo only after the other features are in place. These are sophisticated acts, difficult for a novice in Cyberspace but quickly learned given time. Time is what we can't give at Expo; so I see these capabilities as things we work on for Demo Level II. Apparently, a lot of time is being spent on scaling right now...what's the reasoning on that?

Social Cyberspace is of major importance to all of us; if we had two systems, could we put people in a shared space now? How far along this direction are we? It's not related to the Expo demo, but I'm curious.

I'd sure like to know what your thinking is on all this; we have such a short time to script this event...