Ted Nelson's keynote to the CyberArts International conference, 7 Sep 90.

VIRTUAL WORLD WITHOUT END

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Summary.

The gold rush is on. The hypermedia are happening. But which? Where? Whose?

Whatever we call it, here come interactive graphics, text, video, all somehow user-chosen. But how will they tie together? And what about cyberspace and virtual reality, disks and digital libraries, high-bandwidth communication? If producers knew where all this was going, the rush would rival the Talkies. Each manufacturer says his gizmo will be the center of it.

Whatever it is will be very new. But what will it look like? What will it run on? Where will we keep it? How will we connect it? Where do I fit in? What's in it for me? And perhaps most important, What's in me for it?

As always a torrent of technicalities hides simple truths. Talent, not technicality, will be the limiting commodity. Each user has at most 24 hours a day. Complicated setups will be little used. And incompatible things will fade quickly. It all has to tie together. There cannot be island universes.

The problem is putting together the ideas, not the equipment. More people must learn more faster than ever before if we are to survive. This means the user must freely go through magic doors, turning corners from world to world to world, keeping track of what happens on the way. And our new media must merge production values from many technical sources, melding portions of many pre-existing productions into new and greater hyperworks in the hands of tomorrow's producers and artists.

[OPENER]

You hear today about "Virtual Reality," meaning computer-based three-dimensional worlds. But "virtual" means something much larger: *as-if*, the way something seems to be. Virtuality means the *seeming* of what we create, and the appearance of things is the true center of software design.* Our world becomes increasingly virtual, as its appearance departs more and more from depending on the structure of physical reality. Movies and television, moving signs, recorded music and sound, the illusory continuities of broadcasting stations and political parties, all these are virtual.

Deciding the fundamental ideas of our mental and electronic universe seems to me one of the most important tasks of all, and it is the design of virtuality. I will present here that virtual universe of the mind that I and my colleagues have been working on for many years.

In 1960 I was a young academic and aspiring film-maker, but something happened to delay these pursuits. I had a vision of new computer media and the delivery system they would need. I knew there would be interactive movies and interactive texts, and we would need an interactive publishing system to make them available.

But somehow this was not obvious to everybody, nor is it yet.

In my youth I had heard that computers were mathematical, engineering sorts of thing. And you had to know a lot of math, and what they were really for was doing statistics, bookkeeping and astronomy, but there were some obscure interesting things about them. Well, all this sounded fishy to me; I had to know. So I took a computer course in graduate school.

And here in the textbook was a screen, you see, that could be attached to the computer. A screen! On which the computer could make patterns of dots. How about that. Now here's a picture in the newspaper. What is it close up?-- patterns of dots! There's no picture you couldn't put on the screen! And you could store the picture, you could change it by the computer's responding to you. Together you and the computer could do anything.

That story about mathematical computers had been a lie, a coverup. They'd been hiding this thing. Under the rug was the most wonderful machine you ever saw. You could do anything with it. In the hands of an artist, in the hands of a filmmaker, in the hands of a writer it could become anything. This was the answer to my biggest problem-- how to organize writing (something the programmers don't understand yet).

So I figured, holy smoke! I'll have to do something about this.

***Theodor Holm Nelson, "Interactive Systems and the Design of Virtuality" (in two parts), *Creative Computing*, November 1980 and December 1980.**

We are talking the future of civilization here. How we handle ideas and writings and theother media is at the center of everything. The final form that the human heritage takes is *literature*, the collection of writings and ideas and memories we save. I saw that there had to be a whole new computer-based system for the literature of the future.

And I thought *I* had to do it for a very simple reason--if I didn't do it, *they* would, and they'd screw it up. Unless the new literary system were clean and unless it were simple, our human future would be crippled.

That was thirty-two years ago. And what I consider the most fundamental tool of human thought does not yet exist, and the work I put on hold remains unfinished. So far.

THE 2020 VISION

The vision I had in the fall of 1960 was very simple and can be very simply stated. It was so simple it confused people totally. They thought, "That must not be what he means."

The idea is this. Imagine the year 2020. Billions of people, including you, are at their computer screens around the planet. And each of you is able to draw to your screen, from a common document repository of humankind, any fragment of text, graphics, audio or video.

DEMAND PUBLISHING

In other words, universal electronic publishing. *Demand* publishing, meaning things come on request, right away.
Delivery is fragment by fragment, each fragment coming at a user's request. (A whole document is delivered as a series of fragments.) You pay by the byte for what you take.

FROM OWNED DOCUMENTS

Everything sent will be a portion of a some stored *document*, that is, a planned contribution created and owned by some individual or publishing company. The document can be a piece of text, an illustration, a piece of recorded music, a part of a musical score, a photograph, a painting, sheet music, a segment of video, a piece of laboratory data, an architectural design. Or it can be a conglomerate including all these types, or any other kind of information that can be stored electronically.

People often say loosely, "We'll have all the information in the world on line." Well, I don't know what that means. The word "information" is suspect; it means too much and too little. Who owns "information"? Who takes care of it and makes sure it's up to date?

There are these things out there called *databases*-- packages of granular information, like file cards-- and so much of what's in them is suspect, as is the usefulness of the more

advanced database queries. You make these complicated structured queries and the answer comes back: "42." You got an answer, but you don't know what you got. Data bases of this type have reached their limit.

But the real, understandable, common heritage of humankind boils down to *documents.* Notice I do not say information or data or knowledge. Because these words, "information" and "data" and "knowledge," are kind of slippery and amorphous like a zip-lock *[note to editor: this spelling avoids trademark problem]* bag full of water.

But I know what a document is. A document is some kind of information package that some author created. Somebody signed it or took responsibility for the contents. And that gives you a social handle on where it's coming from, and that title tells you that this person or persons who created it created it with some objective in mind, and the continuity of the title over different editions tells you more still. So the notion of a document is in some sense psychological and social, as well as literary.

A *document* is an information package that someone creates, and *literature* is a system of interconnected documents. Each academic subject has its own "literature"-- the literature in biology, the literature in economics. And then including them we have *all* literature, the much greater interconnected whole of which the others are a part, a vast interconnected system of information packages.

And what we need, as we read, is to follow connections. And that is what hypertext, and the new interactive arts, are about.

WITH PRETTY FAST DELIVERY

How fast will it come from the repository network? As "instantaneously" as a phone call gets through, which of course varies.

FROM A SERVER NETWORK

Tomorrow's literary system will not be on a single gigantic mainframe, of course; it will be distributed on server machines throughout the world, coordinated by software into a single functioning delivery system.

DIGITAL, ERROR-FREE AND PLAYABLE

Because it is in digital form, the material comes without error, and your computer screen machine becomes a player with which to read, view, hear or examine what you have summoned.

WITH ROYALTY

And for each piece you automatically pay a small royalty to its publisher, as well as delivery charges to the service providers who store and ship it to you.

COME THE NEW INTERACTIVE ARTS

This would not be simply for yesterday's sequential paper documents, of course, but for tomorrow's new branching and interactive media-- *hypertext* and *hypermedia*, as I was to name them later (in 1965). Today's novelty term, "interactive multimedia," is used so it will sound new; its popularizers avoid the synonym *hypermedia*, which would reveal that the idea has been around for decades.

These interactive arts would not have linkages and options merely *within* individual packages (like today's closed hypertexts and hypermedia titles), but *between* the packages as well, links between documents.

A NEW PLURALISM

Because the different documents could have different authorship and points of view, the whole would be what we now call a *pluralistic docuverse*.

OF OPEN HYPERMEDIA PUBLISHING

And that would lead to the biggest idea of all-- *open hypermedia publishing*.

Now, open hypermedia publishing means the following: It means that anyone can publish a connection to another document. And a reader of the original document can say, "Who has published connections?" and go to any of the connected contributions by others--comments, disagreements, addenda, variora.

These ideas all hit me at once, a long time ago. Such a simple vision. But radical, and very confusing to people in the nineteen-sixties. Now more and more different people understand different parts of the idea, but few seem to understand it whole, even today.

What holds us back remains, as then, sluggish ideas. Then it was fear of computers. Now, we are held back by the terrible slogan that the Macintosh enthusiasts brought out, "Wizzywig"-- the most insidious piece of propaganda on behalf of stupidity that was ever contrived. Actually spelled WYSIWYG, it stands for "What you see is what you get."

What does that mean? Here I am at the screen. What I see is what I see, right? So what does "get" mean? It means *what comes out on the printer*, doesn't it? That's right, folks. WYSIWYG means we're going to use this magnificent piece of equipment, this incredible technological achievement, as a *paper simulator;* we will limit this extraordinary device, capable of enacting any set of instructions the mind of woman or man can devise--we're going to use this incredible enactor to pretend to be the surface of flattened wood pulp. (Imagine the imaginary forest that had to be cut down to make this virtual sheet of paper.) This is like using a 747 as a bus on the highway.

The alternative, of course, is to use the computer screen to show the real structure and interconnections of things-- polymorphic and multidimensional. But instead Macintosh Wizzywig simulates superficial disconnected mess, the images of paper sheets and the

clutter of separate papers on your desk; and gives us no general software to show you how documents and ideas are *related.*

HYPERTEXT & THE INTERACTIVE ARTS

Thoughts are not two-dimensional, but until now the process of expressing ourselves on paper has been breaking the multidimensional connections of thought down into little pieces and putting them all in a sequence on two-dimensional paper.

Why should we want to do that? Because paper was what we had. Now, on the computer and its screen, we have two choices. One, we can go on breaking the thoughts into a two-dimensional structure and plastering them on simulated paper, using the computer to simulate this two-dimensional Wizzywig array of flat thought.

Or, two, we can keep the thoughts in their true, multidimensional structure and create reading and presentational arrangements that will let the reader traverse them in any direction and in any way he or she sees fit. And this, to me, is the most obvious and yet powerful thing about the computer screen world: *ideas needn't be separated any more.*

So the term "hypertext" I define simply as *non-sequential writing*-- links, possible connections to follow, reading opportunities in different directions. "Hypermedia" correspondingly means *interactive presentations.*

There are now many hypertext software products, and hypermedia, but they are amazingly incompatible. As yet there is no common data structure for these interactive arts, so what we need in order to define this arena-- one of the things the world needs most-- is a common system for representing and delivering them. (Not simply a low-grade player machine, as certain large companies have tried to tell us, but a grand-scale coordinate system for the documentary world of the future, and a way to navigate on it.) And that is what the Xanadu group has been creating.

THE XANADU ™ HYPERMEDIA SERVER

The question is, how do you go about building the world repository library? Answer: You write the software-- software that will show all the connections that different people contribute, all the connections you need to keep track of.

This is what the Xanadu system is: a software package for *keeping track of interconnections of every kind*-- the interconnections of ideas; the interconnections of quotations; and the interconnections of documents. Xanadu is one piece of software carrying out this one idea across a whole spectrum of needs, from the office to the vaunted system for universal electronic publishing, a single concept which has a global interpretation and a minute interpretation, both of which are really the same.