Creative Digital Media:
Its Impact on the New Century

Keio University COE International Symposium

Research Center for
Digital Media Infrastructure
and Application
Keio Research Institute at SFC
Keio University

Contents

*Speakers and Panelists's titles are as they were on the day of the Symposium.

replace the question "Should it be done?" Each new technology has the potential to create social and personal changes, which can be both beneficial and harmful. The fact that we could all wear computers or sensors detecting our moment-to-moment emotional state does not mean that we would want to. There are many issues of individuality, control, privacy, and social structure, which need to be addressed as human rather than technical questions. The human answers need to guide the choice of technological direction.

Notes

1 http://www.cc.gatech.edu/fac/Thad.Starner (Thad Starner, Contextual Computing Group, George Tech)
2 http://www.billbuxton.com (William Buxton and George Fitzmaurice, University of Toronto)
3 http://tangible.media.mit.edu/ (Hiroshi Ishii, Tangible Media Group, (c)2001 MIT Media Laboratory)
4 http://vismod.www.media.mit.edu/people/picard/, (Rosalind Picard, Affective Computing Group, MIT Media Lab)
5 http://www.stelarc.va.com.au/ (Stelarc)

Some Alternative Computer Universes

Theodor
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Brief personal history:
Professor Theodor H. Nelson has for forty years proposed an alternative computer universe and system of electronic literature.

As the explosion of computers knocks all of the old arrangements of the world into strange new configurations, everyone who is surprised by the computer world thinks it is novel and completely non-traditional, so what I say confuses people. But the most important thing is to realize how traditional the computer field is. And most of what we call "technology" isn't technology at all. It's *packaging.* So is the Macintosh "technology"? Is Windows "technology"? Is the World Wide Web "technology"? I don't think so.

In the World Wide Web, the *actual* technology has many parts—notably the underlying Internet, the use of typography on screens, and the unfurling of compressed pictures. But the World Wide Web is a package that chose specific forms of typography, specific ways of showing text and pictures, and ruled out others. It's not technology—it's a set of rules; it's a set of conventions. I say this because I am particularly concerned with the things that are wrong with the World Wide Web.

First, a word about my background. You see, my training was in the theater and in media. When I got out of college, I had already written plays; I had directed a 30-minute movie; I produced a long-playing record; I had written a book; I had written columns; I had been an actor and photographer; I understood about publishing. So I was expecting to be a movie-maker, and when I saw computers I said, "Of course, it's a media machine." But in the 40 years since that time, in the continuing standardization wars of the computer field, people have not appreciated the true potential of the computer, and instead we are stuck with a lot of, I believe, very stupid traditions that are holding back human thought and freedom.

Now, human creativity and freedom are my religion, and so this is not my profession at all. You have to understand that. My job in life is to try to show people the truth.

When I was a small boy, my favorite story was Hans Christian Andersen's story of the "Emperor's New Clothes"—of course this was a European emperor. In the story, some tricksters told the emperor that they had the finest clothes for him and they pretended to put this rich cloth on him and he strutted out and paraded before the people. And all the people said, "Oh, what wonderful clothes the Emperor is wearing!" Everyone believed it because they were able to force their minds into believing the emperor had beautiful clothes, except for a small boy on the street corner who said, "The Emperor has no clothes." So this is my role. I am here to tell you what is true. And many people say to me, "I hadn't realized. I hadn't seen. But of course you're right." This is what nourishes me; this is what keeps me going.

Did God create today's computer world? I don't think so. And yet, everyone believes, or acts as if they believe, that the World Wide Web and hierarchical

directories and the imitation of paper, those conventions of the computer field, were delivered from heaven and so must be followed as if they had been laid down by God. I don't think so. Whatever your religion, I don't think you believe that God created computers. And so we are completely free to change the way computers work. But it's all political. Standardization is a political issue, and those who win, like Microsoft, are able to enforce a new kind of reality on the world. But we can break away from that reality if we see what else is possible.

I'll be very brief. The three things I want to talk about are: hierarchy, the imitation of paper, and one-way hypertext. I'll speak briefly about these and demonstrate an alternative to each.

Hierarchy. The first thing they teach you when they show you computers is that files are kept in directories within directories within directories, or, as they now call them on today's modern machines, folders within folders within folders. Now it amuses me that the Macintosh, when it arrived in 1984, was considered so revolutionary, and yet it changed nothing about the conceptual structure. What were previously called "hierarchical directories" were since the Macintosh called "folders," represented by little pictures of cardboard office folders. This seemed to people to be different from the previous structure because it was represented by a little picture instead of having to type a command. But it was exactly the same hierarchical structure. Software is still built around hierarchy.

Now what's wrong with hierarchy? What's wrong with that, I believe, is that it is completely inappropriate for human life. We all live in a storm of *items*—appointments, names, addresses, things to buy, things you must remember, things to say, things to say on the telephone, phone numbers, the schedule—thousands of items, a storm of items. And these items are not hierarchical, but in many categories at once. But does the computer present to us this storm of items divided the way we want to see it? No. You have to open an application and put the item in a file. It can only be in one file unless you copy it to another file. There's something extremely wrong with this, and yet everyone takes it for granted because of the tradition.

Hierarchical files and directories were brought to the computer around 1950 by engineers. Now, engineers are used to being assigned to jobs that fit neatly into such hierarchical boxes, and the engineers thought that should also be the structure of computers. But now we've opened the computer out to human life, and human lives and doings do not fit in these hierarchical boxes. I think all of us suffer from having to force our information into wrongful structures.

So let me show you an alternative. Let's get to the demos right away. So I'll show you now an alternative to hierarchy. I call this structure ZigZag, which is a trademark. I don't say ZigZag is a unique right answer; it's just completely different. The ZigZag project now has branches in Australia, in Finland, and now in England, so it's gathering a little momentum as an interesting structural alternative to the world of information and data as we know it.

1. A Non-Hierarchical World

So now I'm going to show you a multi-dimensional computer world, except I'll make it simple by talking about my family.

ZigZag is just like a spreadsheet in a way, but you see, spreadsheets were designed to fit on paper. As soon as you go to the screen, it doesn't need to fit on paper. But we still have cells which are connected up and down and sideways. But you see, we don't have to fit it on paper. So every ZigZag cell is free to be connected to whatever cells you like.

Here we see a ZigZag view of some lists of people. On the right-hand side, this is my grandfather, Theodor Holm. He was like a father to me; he raised me. And he was the youngest of eleven children—and I've got them all listed here. Terese was the oldest; Christian; Caroline; Gerhard; Helene; Cecilie; Anton; Waldemar; Mathilde; Danckert; and Theodor Holm.

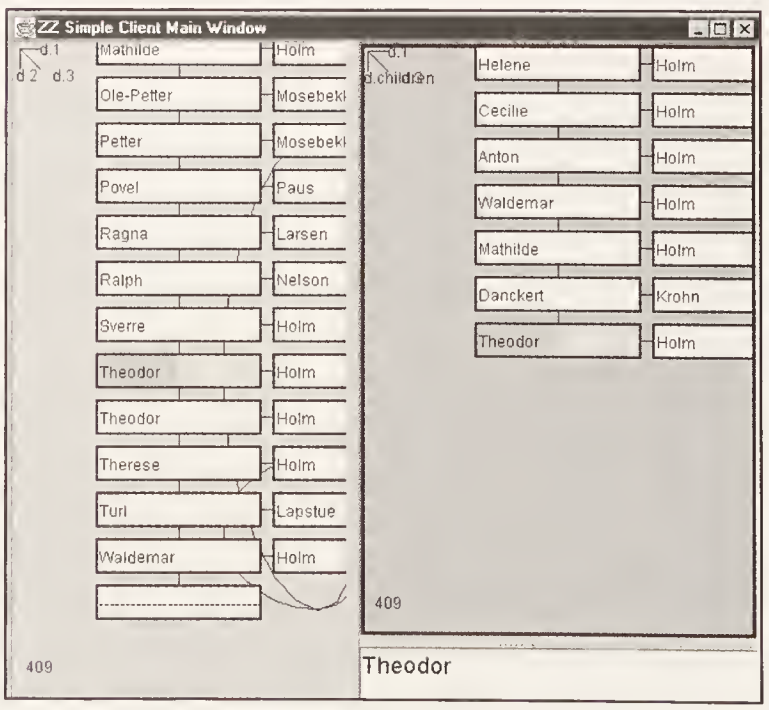

Figure 1: Cursors-on-409

Now on the left we see some of the same people, and we see the rows are the same. (Notice, by the way, that green cursor stays in the middle of one window and the blue cursor stays in the middle of the other.)

Now notice that I've put these two cursors right now on the same cell. Both cursors in both windows are in cell 409. But the views are different because these cells are not limited to two dimensions. Because we're not putting them on paper, why should we restrict our thinking to two dimensions? We have many dimensions here.

So let's mark this list of my grandfather and his brothers and sisters. I'm marking them in red. And you notice that these marks also appear on the left-hand side.

Let's talk about these two views. In each window, we have a dimension map in the upper corner. It shows what dimensions we're viewing in that window—in the left-hand window, we're seeing dimension 1 horizontally, dimension 2 vertically. But now, in the right-hand view, dimension 1 is still horizontal, while vertically we see is "dimension children." We'll get around to that.

The left-hand window shows a listing of 28 of my miscellaneous relatives, but you see, when I marked my grandfather and his brothers and sisters in the right-hand window, they're were also marked in the left-hand window because they're the same cells seen in a different view. So while the rows are the same in both windows (since it's dimension 1 in both), but the columns are different because it's a different dimension in each. If a person is listed in both windows, it's in a different order vertically.

Now consider the left-hand window. Notice that in the left-hand window, with the cursor on the left-hand column, all the first names in that column are in alphabetical order, as I go down. But it's interesting also-still in the left-hand window—that if I go to the other column, the last names are *also* in alphabetical order. I didn't sort them just now; I sorted them months ago, when I made this demo. What we have are two columns linked side by side but each in a different order—which works in ZigZag because each cell's connections are completely independent.

So multiple dimensions gives us a special flexibility. Once we leave paper behind, things change a great deal.

Let's look at what happens when we view this a little differently on the right. We were looking horizontally in both windows at dimension 1. But now I'm going to rotate it on the horizontal axis, so we're going to look on the horizontal at dimension "marriage." So we rotate through 1, 2, 3... to dimension marriage.

Here in the right window we are showing connections horizontally along dimension marriage, and we see that the parents of these eleven children—my great-grandparents in Norway—were Karenos Holm and Cecilie Holm, and their sons Gerhard married Fanny and Waldemar married Ragna, and my grandfather Theodor married my grandmother Jean. (I left out various other marriages to keep the demo simple.)

If I just move the cursor to the right, we see that my grandparents Theodor and Jean had a daughter Celeste (my mother). Now I move the cursor down, and we see that my mother married my father Ralph, and moving the cursor again, there I am.

So this is a genealogy program that required no

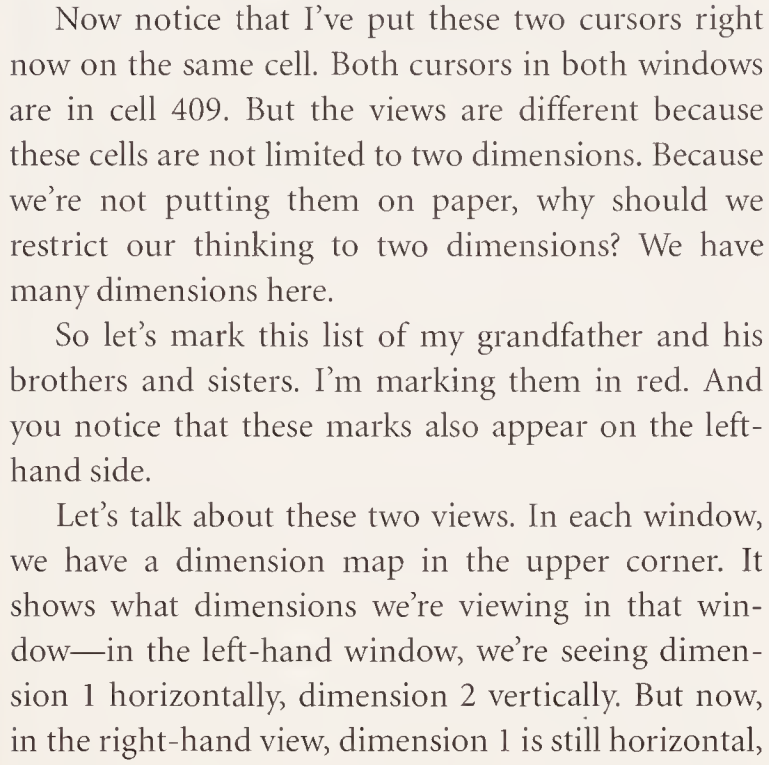

Figure 2: Marked Siblings

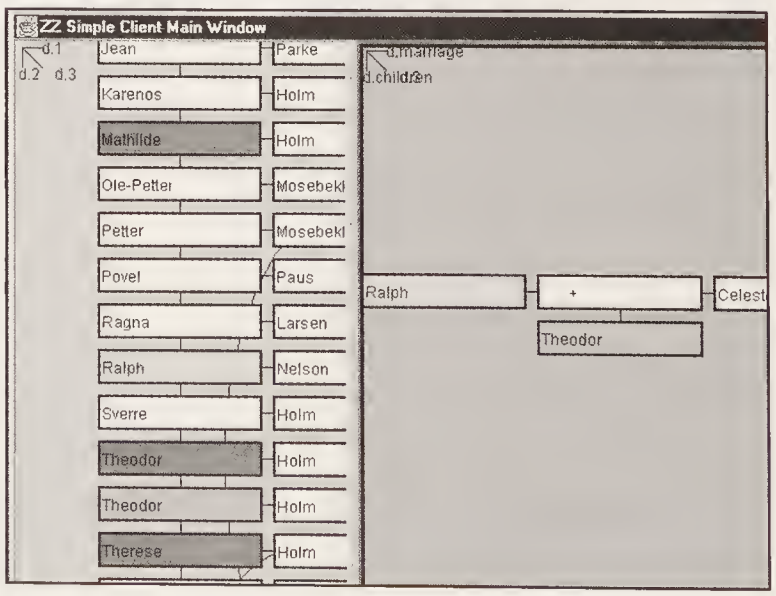

Figure 3: TNparents

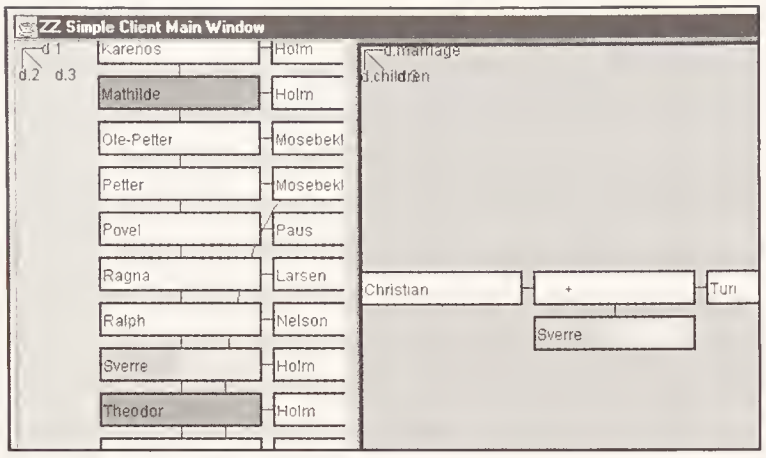

Figure 4: Sverre Parents

programming. I just mapped the structure of marriage and children into this data structure of ZigZag.

Now why did I do this? I did this for a lecture last year at the University of Oslo. My sponsor was this guy—the green cursor—Sverre Holm of the University of Oslo. He said to me, "I know we're related, but I don't know how we're related." I said, "Ah! For my lecture I will show you." So watch carefully. Right now the left-hand cursor is on Sverre, his first name, but let's put the right-hand cursor on Sverre in the other view which shows marriage and children. So here's cell 467 under the right-hand cursor. We see that Sverre is the son of Christian and Turi.

Now if I move up to his father Christian, we see that Christian is the third child of Waldemar and Ragna, and Waldemar is marked in red, so we know he's one of my grandfather's brothers.

This is an application of a system which is extremely simple but very different. It allows us in principle to show all relationships, yet it's extremely simple at its core, and offers a default visualization of everything you explore in multiple dimensions. I don't say it is THE right system for information. What I am saying is that we have been so limited by

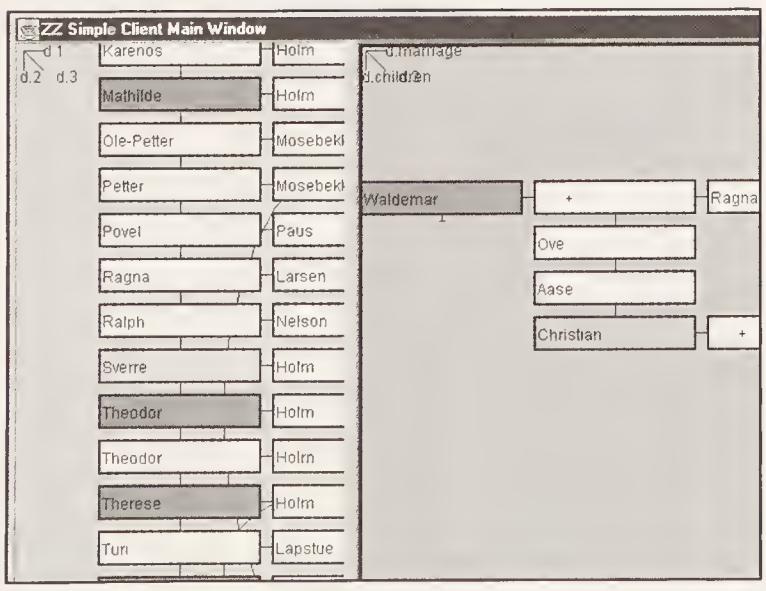

Figure 5: Christian-N-11

our traditions of the computer world that we have completely overlooked many different possibilities beyond what we now have.

(You can download this software at http://www.gzigzag. org, but there are a number of other ZigZag sites now as well.)

This is a powerful and very simple way of representing a very large amount of information, which doesn't run out of space. That's a nice part of ZigZag. In ordinary computer applications, you run out of space all the time because you only allowed a certain amount of room. That's what's wrong with databases. When you set up a database you must plan, for all future time, what it is that you'll keep track of. And this is extremely silly because you don't know what you'll want to know in the future. And the nice thing about ZigZag is that since you have as many dimensions as you want, and you can always put new items in; you never run out of space; you never hit the wall.

That is one demonstration. Let's talk about another problem: the imitation of paper. Now when the Macintosh came out, it was indeed a revolution because it brought to the public the new interfaces for computers that they'd been working on at Xerox PARC, where they'd been imitating paper on screens. And that's what the Macintosh did; that was the revolution—"WYSIWYG," standing for "What You See Is What You Get (when you print it out)"—the imitation of paper on screens. It was good, for a while.

But since that time, 1984, the computer field has concentrated on imitating paper. To me this is the silliest thing in the world. It's like tearing the wings off a 747 and driving it on the highway as a bus. You lose so many additional capabilities—lost in this quagmire of imitating marks on paper. Why did they do it at Xerox? Because Xerox was a paper-walloping company.

But you see, we are restricted by that. We can do anything on the computer screen. Why stop at two dimensions and why imitate paper?

Worse, the imitations of paper are all incompatible and all inconsistent. You have imitations of paper that imitate typography ("word processing"). You have imitations of ways to make marks on paper by hand (paint programs). You have imitations of paper that show connected cells on paper called spreadsheets. You have imitations of paper that mimic drawings on paper like MacDraw. You have imitations of paper that manipulate layers of marks (like the layers of PhotoShop). You have imitations of paper that mimic piles of paper, like Paperport. You have imitations of

paper that record sequences of marks on paper, like Crosspad. None of these imitations of paper are compatible. So each imitation of paper has some of the features of paper and none of the convenience of paper. I believe that the imitation of paper on computers is a total disaster which has completely engulfed the human race.

But what is the alternative? The alternative, as with ZigZag, is to try to represent the structure of the information which the paper was trying to represent in the first place.

Now, paper has only been with us for 2,000 years. It was introduced at the court of the Chinese emperor in about the year 0. So we've had 2,000 years of practice in reducing, compressing, conventionalizing, simplifying, and disconnecting information, so that it fits inside these four-walled prisons of paper. But, you see, with data structures being completely flexible and fluid, we could connect the information any way at all.

So the FUNDAMENTAL QUESTION is—what connections to represent, and how?

Now let me show you my original proposal for the way hypertext should be connected. Here are some pictures from 1972.

I published these pictures in 1972 as a simulation of how information should connect on computer screens. You should be able to see how the contents of one window connect to the contents of another window, and you should be able to scroll those connections. And you know what? They said I didn't understand computers because I proposed such a thing. Well, excuse me!

To show that it's possible, let us look at a product I hope to have on the market shortly called CosmicBook.[1]

As an example of this kind of hypertext, let's compare two Microsoft licenses, okay? So here are the two Microsoft licenses for Internet Explorer and Visual Basic. So here are two windows—the Internet Explorer license, and the Visual Basic license. And we've connected them to a little commentary.

Notice the actual lines on the screen connecting the contents of one window with the contents of another.

The contracts are rather amusing. Here's a section forbidding reverse engineering and disassembly of this software. And here's a denunciation of Java, where they say that Java is an unreliable technology that must not be used.

This is how a hypertext should look on the screen. You should be able to see the connections between the content. Why doesn't the Web work this way? Because the hypertext developers left it out. I spoke at Xerox Park either in 1974 or 1975 about the necessity for these lines; but the fact that those guys decided to leave it out is based upon political factors within the computer community as we know it—not about "technology."

Now it's it's time for the world to get back to the real structure of the information, and presenting what people really need to see. This is one way that hypertext should look on the screen, I believe.

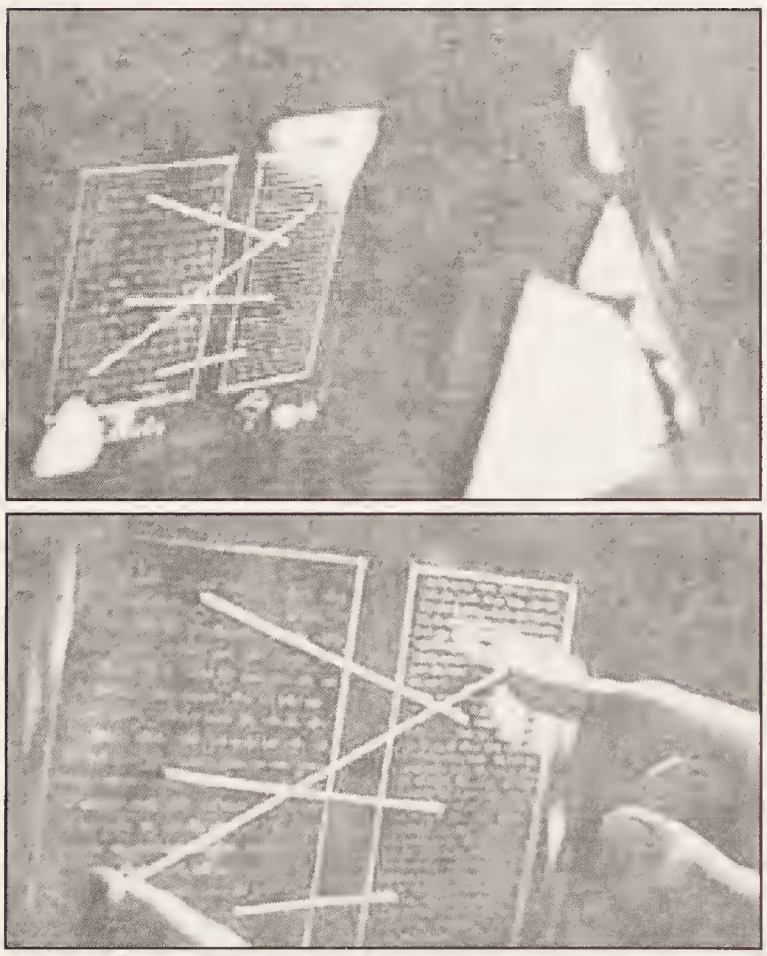

Figure 6, 7: Transpointing Windows

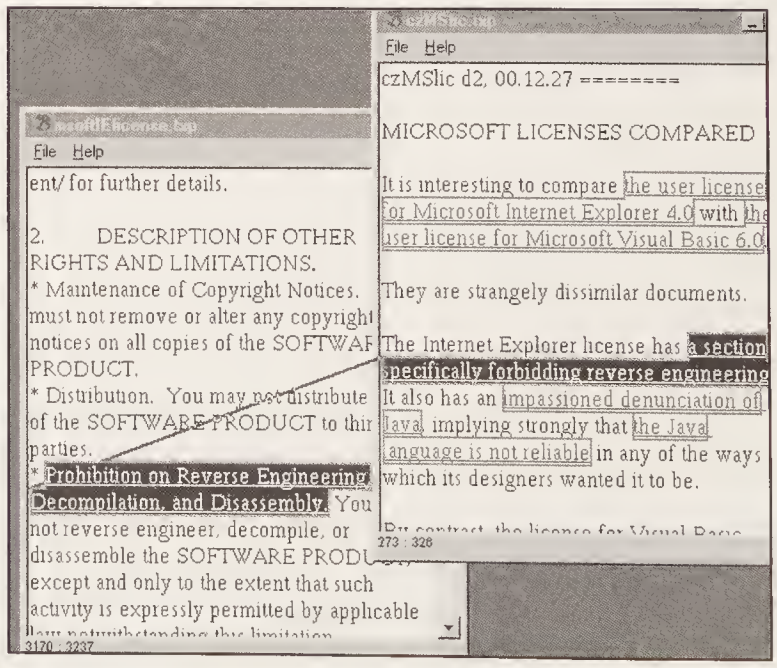

Figure 8: CosmicBook

2. The Deeper Structures of Hypertext

But now, what should be the *structure* of hypertext? This is the real issue, because now we're in a quagmire about rights and about version management and about all the issues that the World Wide Web has brought us.

The World Wide Web is a fundamentally broken model of hypertext. Hypertext links should go in both directions. You should be able to see the links from both sides of the link; you should be able to put millions of links on a page, and millions of people should be able to comment on a given page.

But they broke this when they created the Web structure. The simple structure of HTML is totally wrong in three ways: it's embedded; it's hierarchical; and it imitates paper. So what is the alternative?

What we need to do is go to another system, which I've been proposing for many years, the Xanadu model. I don't have a demo here, but it's a very simple model.

Let's say we have a big pool of content, the published content on the network. Now we're going to have a new form of document: the document is to be distributed as a list of pieces of that content—just a list of what the pieces are and where to get them.

Then the browser—or some descendant of what we now call the browser—sends for those pieces. So anybody can make a content list to this pool of contents; the links themselves are elements inside this pool of contents.

This is the Xanadu model, which we've been working on for a long time, and which we're now sending out to the Web. It's taken quite a while to figure out everything that had to be done because the Web is such a mess. But the point is, what we now call the browser sends for the pieces and we need, first of all, permission.

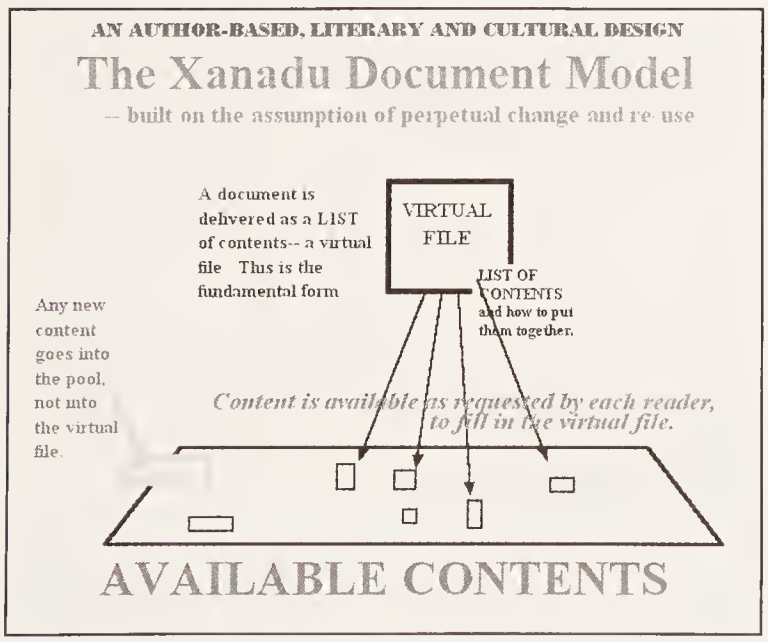

Figure 9: Xupic-theModel.jpg

A principal issue is permission for re-use of the content, and we have a permission doctrine—transcopyright—which basically is the missing legal part. Transcopyright is a form of permission, where the rightsholder says at the beginning, "This content may be used in any new context if it is distributed in the form of a document list, so that the contents come from my server." This improves the situation: the rightsholder controls the content; and the content can be sold in small portions, because now micro payments can be added as a gateway to the delivery of the content. It can be set up so that each person sending for the content pays for the part that is sent for. This is a totally fair arrangement that gives people new powers. The downloader has bought the piece and can keep it, and can re-use it in some other document—providing that the quotation is done the same way, as permitted by the transcopyright license.

That's what I'm working on now. The technicalities of putting this together as a clean system which we hope to develop at Keio University including portion servers, which now work with certain existing commands such as Range and HTTP and a fragment in HML.

I'm defining a file type tentatively called XVF, or Xanadu Virtual Format, which will specify the method of sending for the portions and how to put them together; a browser plug-in to send for the portions and a Deep Cache to keep track of what you already own. This is a simple model, but it's the opposite of what is currently discussed. You see, the World Wide Web was created not by Tim Berners-Lee (who created the initial notion of clicking on a simple page). The World Wide Web as we now know it was really created by Mark Andreessen, whose Mosaic and Netscape browsers defined a lot of special effects to be jammed in, rather than dealing with the real issues.

So I'm just saying: Let's be sensible and start paying attention to content rather than decoration; paying attention to clarity for the human mind; and paying attention to the management of rights and changing versions rather than to superficial presentation.

Notes

[1] The CosmicBook reader is now available free on the Internet, at xanadu.com/Cosbk.

New Databases & Applications

10:30–12:00, Monday, December 4th 2000
6-7th Floor Conference Room

David Siegel
Chief Executive Officer, Blink.com

Kimio Uno
Dean, Faculty of Policy Management, Keio University

Yasushi Kiyoki
Professor, Faculty of Environmental Information, Keio University

Koichi Furukawa (Chair)
Professor, Graduate School of Media and Governance, Keio University