CHAPTER 18

First Thought, Best Thought

First Thought

Ted Nelson was the first person to my knowledge to describe, starting in 1960, how you could actually implement new kinds of media in digital form, share them, and collaborate.* Ted was working so early that he couldn't invoke basic notions like digital images, because computer graphics hadn't been described yet. (Ivan Sutherland would see to that shortly after.)

Ted's earliest idea was that instead of reading a text as given originally by the author, a more complex path might be created that uses portions of text to create a new sequence, to create a derivative work, without expunging or losing the original. This is what we might call the idea of the "mash-up" today, but it also was the first appearance, so far as I can tell, of the realization that digital systems could both gather and repackage media to enable new kinds of collaboration and new kinds of expression.

As the first person on the scene, Ted benefited from an uncluttered view. Our huge collective task in finding the best future for digital networking will probably turn out to be like finding our way back to approximately where Ted was at the start.

In Ted's conception, each person would be a free agent in a uni-

*In an even earlier article, in 1945, titled "As We May Think," Vannevar Bush hypothesized an advanced microfilm reader, the Memex, which would essentially allow a reader to experience mash-up sequences of microfilm content. But as celebrated and influential as that article was, it did not explore the unique capabilities of digital architectures.

versal online market. It might seem at first as though having only one store would reduce diversity, but in fact it would increase it.

Instead of separate stores like those run by Apple or Amazon, there would be one universal store, and everyone would be a first-class citizen, both buyer and seller. You wouldn't have to keep separate passwords and accounts for different online stores. That's a pain and it guarantees that there can't be too many stores. The way we're doing things now re-creates unneeded limitations that shouldn't be inherited from brick-and-mortar commerce. When too many layers of access to culture are privatized, as has happened online, you eventually end up with a few giant players.

This is an example of how thinking in terms of a network can strain intuition. Ted benefited from beginner's luck. He saw the issues more clearly than we do today.

Ted is a talker, a character, a Kerouac. He was always more writer than hacker, and didn't always fit into the nerd milieu. Thin, lanky, with a sharp chin and always a smile, he looked good. He came from Hollywood parents and was determined to be an outsider, because in the ethics of the times, only the outsiders were "where it's at." He succeeded tragically, in that he isn't as well known as he ought to be, and it's a great shame he wasn't able to directly influence digital architecture more.

Ted began his work years before actual networking existed, so he had to conceive of the whole damned digital world. He called it Xanadu.

He foresaw how digital information could become a new form of expression for people. Instead of conceiving of only a single person in front of a computer, he imagined new networked forms of collaboration and culture. People would create information structures that could be shared, reused, collaborated on, and interacted with. These concepts are utterly ordinary today, but at the time very few could understand them at all. By the time I got into the game, as a teenager in the 1970s, it was still almost impossible to find someone with whom you could talk about this stuff.

Best Thought

There wasn't only one version of Xanadu, as the project evolved over many decades, becoming ever more obscure as personal computers, the Internet, and all the other familiar digital set pieces appeared. Rather than offering a definitive history of the design, I will relate a few principles that I find most helpful.

The first principle is that each file, or whatever unit of information the thing is built of, exists only once. Nothing is ever copied.

We are utterly familiar with that trio of activations, cut, copy, and paste. The right to copy files on the Internet is held up as a form of free speech in the digital rights community. The Internet has even been described as a giant copying machine.[1]

But copying on a network is actually rather odd and at the very least an extraneous, retro idea, if you think about it from first principles. After all, in a network, the original is still there. It's a network!

The idea that copying would no longer be needed in a networked world was almost impossible to convey for many years. It has finally been made familiar in recent years because it is the principle on which most information services that actually charge for information must operate.

For instance, Netflix does not allow its customers to download a video file that is identical to the master file on its servers. Instead, it provides software that delivers a video experience by accessing that master file in real time over a network, and displaying it to the customer. While Netflix might employ cached data mirrors to back up their data, or to speed up transmittal, that is not the same as creating multiple *logical* copies—as users on a BitTorrent sharing site do.

There's also only one "logical copy" of each app on the Apple store. You can buy a local cache of it for your phone, and Apple undoubtedly keeps a backup, but there's just one master instance that drives all the others. When the master version of an app is updated in the store, it's eventually updated on all the phones as a matter of course. The existence of the app in your phone is more a mirror of the original than a copy.

If someone wants to go to the trouble, there's usually a way to

make a copy of information offered in a no-copy way, even if that wasn't the intent of the people who made the information available. The point is that the designs will function without those copies being made.

What's wrong with making copies? In addition to the problems described already, such as in the section comparing music and mortgages, one huge problem is that you never really know what anything is. If you copy a file, you don't know where it came from, if it's been altered, or what other information might be needed for it to make sense. The context is lost, and meaning is dependent on context.

For instance, if you find a copy of a video with a politician intoning some bizarre senseless snippet, you don't know what the context was. Maybe the full version of the video would tell a different story. One of the reasons not to make copies is to avoid problems like that.

The Right to Mash-up Is Not the Same as the Right to Copy

For Ted, it was *crucial* that people be able to extract such a snippet as they wished! This is an absolutely central point.

Ted's original concept of hypertext was based on the idea that people must be able to create derivative works. Someone should be able to snip a bit of what a politician says and put it into a documentary, even if the cut is deceptive. Ted recognized that people need to be able to work with what others have done, and that digital technology could expand the ways that could happen. To expand human capability is to express faith that overall people will do well with their new powers, so Ted advocated opening expression up, even if human failings would be empowered now and then.

The pre-digital world had evolved a set of laws and conventions for how people could reflect and reuse each other's expressions. This is the familiar and uncomfortable web of logistics and procedures including copyright, fair use, libel laws, and so on. As pointed out earlier, it has functioned to provide middle-class levees to generations of creators, and shouldn't be maligned as being entirely

awful. And yet given the speed and fluidity of digital expression, these old structures feel like lugubrious prohibitions today, and are often ignored.

Ted wanted mash-up rights to become a given. Information would be reusable as a matter of course, without hassle. His original idea for how to evolve ideas like copyright into the network age strike me today as being much more sophisticated than the familiar naïve rallying cries about making mankind's information free and open.

In Ted's model, it would be *easier* than it is now to make use of preexisting material. The procedure would be consistent. The ability would become ambient. However, the rights of the masher and the mashed would be balanced.

In a Xanadu-like system, you could extract a misleading, out-of-context passage of a politician's video because that would be a free speech right. You wouldn't need permission. But the link back to the original would always be right there. It would become much harder to make the illusions of misleading mash-ups stick.

These days, we wait for unpaid partisan crowds to pore through a controversial speech to document misleading mash-ups. Bloggers will notice when a candidate is quoted out of context in a campaign commercial. Similarly, journalists will eventually notice when inflammatory anti-Islamic videos have been faked and dubbed.

That is not an entirely dysfunctional means of making up for lost context, but it does mean that corrections and context are trapped within online "filter bubbles." It is not a given that those who might be predisposed to believe in a deceptive mash-up's point of view will be exposed to a factual correction about what was mashed.

Of course, there's no guarantee that a person who wants to believe in an idea would actually follow the link to see if a mash-up was deceptive, but at least the link would be right there in front of them. If you doubt the importance of that small change, just look at Google's revenues, which are almost entirely based on putting links immediately in front of people.

The real sophistication of Ted's idea is how it would bring about a balance of rights and responsibility while at the same time reducing friction. That's a rare, magical combination.

Hackles in the digital rights movement are usually raised so

high that it's often hard to see past the fears. There's an absurd but entrenched fear that any system other than anonymous copying would lead to an end to free speech. These fears only serve to blind. What we are familiar with today is not necessarily the best we can do.

Traces of Ted's idea for balance are reflected in some of today's designs. For instance, each Wikipedia page has a history.

But the economic angle is what concerns us the most here. If the system remembers where information originally came from, then the people who are the sources of information can be paid for it.

That means if a snippet of your video were reused in someone else's video, you would automatically get a micropayment. Furthermore, a Nelsonian system "scales," as we say in the trade. A remash of a remash of a remash is facilitated within this system just as easily as the first remash, preserving a balance of commercial and expression rights for everyone in the chain, no matter how long the chain becomes. If someone reuses your video snippet, and that person's work incorporating yours is reused by yet a third party, you still get a micropayment from that third party.

Forget the usual dilemma that divides people. On the one side are intellectual property advocates who struggle to shut down share sites. On the other are the Pirate Parties, wiki enthusiasts, Linux types, and so on. The contest between the two sides sparks endless debates, but they're both inadequate and inferior to the original idea for digital media.

Ted forged a path through the horns of the usual dilemma, even though the path predates the sprouting of the horns. Anyone in a Nelsonian system can reuse material to make playlists, mash-ups, or other new structures, with even *more* fluidity than in today's "open" system, where the all-or-nothing, ad hoc system of intellectual property intervenes unpredictably. At the same time, people are paid, and information isn't made free, but is affordable. A Nelsonian solution provides a simple, predictable way to share without limit or hassle over digital networks, and yet doesn't destroy middle classes in the long term.

This is the half-century-old idea on which I build.

Two-Way Links

A core technical difference between a Nelsonian network and what we have become familiar with online is that Ted's network links were two-way instead of one-way. In a network with two-way links, each node knows what other nodes are linked to it.

That would mean you'd know all the websites that point to yours. It would mean you'd know all the financiers who had leveraged your mortgage. It would mean you'd know all the videos that used your music.

Two-way linking would preserve context. It's a small, simple change in how online information should be stored that couldn't have vaster implications for culture and the economy.

Two-way links are a bit of a technical hassle. You have to keep them up to date. If someone else stops linking to you, you have to make sure you don't maintain an out-of-date indication that they still are linked. That hassle means there is some initial difficulty in getting a two-way system going as compared to a one-way system. This is part of why HTML spread so fast.

But it is one of those cases where getting something easy up front just makes the price worse later on. If everything on the Web were two-way linked, it would be an easy matter to sort out which nodes were the most important for a given topic. You'd just see where most of the links led. Since that information wasn't present, Google was needed to scrape the *entire* Web all the time to recalculate all the links that should have existed anyway, keep them in a dungeon, and present the results in order to lure so-called advertisers.

Similarly, if two-way links had existed, you'd immediately be able to see who was linking to your website or online creations. It wouldn't be a mystery. You'd meet people who shared your interests as a matter of course. A business would naturally become acquainted with potential customers. "Social networks" like Facebook were brought into existence in part to recapture those kinds of connections that were jettisoned when they need not have been, when the Web was born.

Why Isn't Ted Better Known?

Xanadu wasn't merely a technical project; it was a social experiment of its time.

The most hip thing in the Bay Area from the 1960s to sometime in the 1980s was to form a commune or even a cult. I remember one, for instance, in San Francisco's Haight-Ashbury neighborhood, where hippie culture hatched, that fashioned itself the "Free Print Shop." They'd print lovely posters for "movement" events in the spectral, inebriated, neo-Victorian visual style of the time. (How bizarre it was to hear someone recommended as being "part of the movement." This honorary title meant nothing beyond aesthetic sympathy, but there was infantile gravity in the intonation of the word *movement*, as though our conspiracies were consequential. They never were, except when computers were involved, in which case they were more consequential than almost any others in history.)

The Free Print Shop made money doing odd jobs, included women, and enacted a formal process for members to request sex with one another through intermediaries. This was the sort of thing that seemed the way of the future, and that beckoned to computer nerds. An algorithm leading reliably to sex! I remember how reverently dignitaries from the Free Print Shop were welcomed at a meeting of the Homebrew Club, where computer hobbyists shared their creations.

I recall all this only to provide the context. Ted had a band of followers/collaborators. It would have been uncool to be specific about exactly what they were. They sometimes lived in a house here or there, or vagabonded about. They broke up and reconciled repeatedly, and were perpetually on the verge of presenting the ultimate software project, Xanadu, in some formulation, which would have been remembered as the first implementation of the Web, or perhaps even the Internet itself.

To be clear, the key technical insight that allowed networking to become decentralized and scale was packet switching, and that insight did not arise from Ted Nelson or the Xanadu project. Instead it arose just a little later than Ted's earliest work, from the

very different world of elite universities, government labs, and military research funding. However, at least the functionality of something like packet switching is foreseen in Ted's early thinking.

Ted published outrageous books. One was a big floppy book composed of montages of nearly indecipherable small print snippets flung in all directions, called *Computer Lib/Dream Machines*. If you turned it one way and started reading, it was what Che would have been reading in the jungle if he had been a computer nerd. Flip it upside down and around and you had a hippie wow book with visions of crazy psychedelic computation. Ted often said that if this book had been published in a font large enough to read, he would have been one of the most famous figures of the computer age, and I agree with him.

The main reason for Ted's obscurity, however, is that Ted was just too far ahead of his time. Even the most advanced computer science labs were not in a position to express the full radical quality of change that digital technology would bring.

For instance, I first visited Xerox PARC when some of the original luminaries were still gathered there. I remember muttering about how weird it was that PARC machines supported the virtual copying of documents. After all, the same research lab had pioneered ways to connect computers together. For God's sake, I would say, this is the place that invented Ethernet not long before. We all know it's stupid to copy documents when you have a network. The original is still *right there*!

A stern look would greet me. I would be taken aside. "Look, we know that and you know that, but consider our sponsor. All this work is funded by Xerox, the preeminent *copying machine* company."

Indeed, in those days, Xerox was so associated with copying that it had to worry about whether its trademark would go generic. Visitors to PARC were reminded never to say "Xerox machine."

The admonitions would continue: "No one can tell the Xerox execs that innovations from this lab could make the very *idea* of copies, even in the abstract, obsolete. They'll freak out."

The early computers built at PARC looked remarkably like modern PCs and Macs, and the concept prototypes and sketches foresaw modern phones and tablets. Xerox became notorious for

having funded the lab that defined the core of the modern feeling of computation, and yet famously failed to capitalize on it.

Much later, when Tim Berners-Lee's design for HTML first appeared, computer scientists who were familiar with the field Ted had pioneered—hypertext and networked media—offered the reaction you'd expect: "Wait, it only has one-way linking. That's not adequate. It's throwing away all the best information about network structure."

HTML appeared at a tired moment for Silicon Valley. The way I remember it, there was a trace of panic right in the early 1990s about whether anyone would come up with new "killer apps" for personal computers. Would there ever be another idea like the spreadsheet? HTML was so easy to spread. Each node had no accountability, so nodes could accumulate in a "friction-free" way, even though there is no such thing as a free lunch, and the friction would surely appear later on in some fashion. We were all impatient and bored and leapt at the thrill of quick adoption.

Ted was the source point for much of what we hold familiar today. For instance, he called the new medium "hypertext." Ted was very fond of *cyber-*, which originally related to navigation, and which Norbert Wiener adopted into *cybernetics* because navigation was a great example of the core process of feedback in an information system. But Ted's preferred prefix was *hyper-*, which, he once told me, when I must have still been a teenager, also captured something of the frenetic edge that digital obsessions seem to bring into human character. So Ted coined terms like *hypermedia* and *hypertext*.

Much later, in the early 1990s, the Web would be born when Tim Berners-Lee proposed HTML, the foundational protocol for Web pages. The letters *ML* stand for "markup language," but the *HT* stands for Ted's coinage, *hypertext*.

Ted is the only person alive who invented a new humor to add to my scheme of humors.* Ted's humor suggests an unlimited, but still human-centered future based on improving technologies.

*Positive, optimistic, but solidly humanistic science fiction, such as *Star Trek*, fits into this humor, but so far as I can tell, Ted's early work predates the genre.

PART EIGHT

The Dirty Pictures (or, Nuts and Bolts: What a Humanistic Alternative Might Be Like)