

Project Xanadu and Ted Nelson

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Digital Preservation

Project Xanadu, in production for decades is one of the foundational elements of computing culture, and both because of its extended production and its thematic concerns it becomes relevant to archival theory and modern preservation efforts. Project Xanadu was an early hypertext project, hypertext being a means of linking separate documents in a computing environments, created in 1960 by Ted Nelson conceive of a theoretical structure in which vast amounts of data and separate literary sources would be able to interact and reference one another permanently. It would go on to be an early rival of Tim Berners-Lee's own Internet, intended to connect the world in similar but distinct ways, and represents one of the great pieces of vaporware in history, i.e. a piece of software that despite long production never gets released for all manner of reasons. The development and growth of Project Xanadu, continuing to this day, represents a massive project to create a new way for humanity to interact with the media they interact with, reshape how people consume materials, and seems forever stymied.

Project Xanadu was conceived of as a machine language, which would allow for the storage and display of documents, as well as edits to those documents. It would be built as a series of interlocking documents, where all edits were recorded, and where one

could follow the trail of any edits made to see the original documents. Useful in an academic sense, it would have maximized the function of citations, building accountability and transparency into the process.

It was built to create a system of reading and writing which would allow for non-sequential intake and processing of information. By allowing every document to constantly link back and forth to its various connecting documents, the reader would be able to jump from source to source, taking in the information in whatever order felt right for them.

The theory behind non-sequential intake of information is that it would essentially democratize the process of learning, making every subject accessible to all, conceivably from every angle. People would be able to best learn at the pace and in the order they would learn most easily in. It would also make subjects more transparent. However, the benefits of linear learning is that it allows the student to form a theoretical baseline upon which they can base the rest of their learning, a conceptual framework to operate off of.

To illustrate this idea of informational ingest, Ted Nelson published the boom Computer Lib/Dream Machines in 1974, a book comprised of two books back to back, with non-sequential chapters, able to be read in any order. It was to serve as a model of his vision for Project Xanadu. The book covered his beliefs about the possibilities of the project, his feelings on the future of machinery, and other assorted topics.

As the project progressed throughout the 1970's, the project would develop a piece of software that was the first step in its path towards trying to create a system by which documents could be linked and created in the way envisioned by Nelson. The project was plagued by financial crises, leading to many halts in progress, but throughout

Nelson refined his vision for what he would call a “docuverse,” a system of interlocking documents endlessly held accountable by their unbreakable connections to previously existing documents, with all future iterations linking back to the past infinitely.

By the time the 1980s had come about the project had stalled more than once, but was continuing along. At the same time, Tim Berners-Lee was working on what would become the World Wide Web, and though Nelson has denied that Xanadu was an effort to create the Internet¹ he nonetheless became a rival of Berners-Lee, each attempting to get their program to market first, each hoping to revolutionize the future of human technology and thought.

Nelson and his team were, however, less well funded and less technologically savvy than Berners-Lee, and as a result Xanadu went through another shuttering, for lack of funding. Nelson wasn’t a programmer, and was at the mercy of his better-equipped employees to bring his ideas to fruition. Coming at a key time in the development of what would become the Internet, this put Xanadu behind the World Wide Web, consigning it to a fate of trailing the World Wide Web.

Berners-Lee’s World Wide Web went on to revolutionize the way businesses, governments, and private citizens would interact with the world and each other. A key aspect of this was that the web, as designed, ended up being flexible enough to accommodate for the changes that “Web 2.0” functions would institute. Media formats and temporary sites would abound, social media would become embedded in modern functions of the Internet.

¹ Nelson, Theodor. "Xanalogical Structure." *Xanalogical Structure*. N.p., n.d. Web. 11 Dec. 2016.

This speaks to the fundamental philosophy of the World Wide Web versus Nelson's as to the function of the Internet. Nelson developed his idea of Xanadu, to generate a massive encyclopedia of data and information, which when the Internet became the inevitable result of networking computers became a much more complicated idea.

Nelson's model for Xanadu was based around a series of unbreakable hypertext links between every lifted sentence and word. These links were called Transpointing windows. These windows would be made out of embedded information in words that had been "cut" and "paste" from other documents, a key facet of this model of interlocking documents. Unlike modern "cutting" in word processing programs, the way cutting would work in Xanadu would be to create a link back to the previous document, which would be unbreakable and forever tie the new document to the preexisting one.

Xanadu was delayed for years, in 1995 being called the most famous piece of vaporware ever proposed, by *Wired* magazine². Xanadu, by then a joke in the computing scene, was seen as an impossible dream that would never be made. Ted Nelson had achieved some measure of fame for his efforts, but little success or respect. Xanadu continued as a project only for him. In the *Wired* article in which he was interviewed about Xanadu, he describes the image that fundamentally inspired his efforts towards building Xanadu, the idea of immersing his hand in water, seeing the ripples spread out, and then reforming after his hand left. The information contained in his system would be forever connected the way a great body of water is, with perpetual new connections and reconfigurations for each user.

² Wolf, Gary. "The Curse of Xanadu." *Wired*. Conde Nast, n.d. Web. 12 Dec. 2016.

This branching, non-linear, perpetually new vision of how information would be interacted with was the theme of Nelson's work. He wanted a free, universal repository of information, accessible from any point, and constantly growing, with articles readable side by side, as you could flip from source to descendant to separate source.

To some degree his vision was created in Wikipedia, a free and freely editable web encyclopedia for public use. The underlying concept is similar to Nelson's vision. However, Nelson's objection lies with the underlying structure of the internet, which is where his interests intersect with the values held by archivists, particularly people involved in web archiving and working with issues of copyright.

Nelson, finally delivered a working prototype of sorts in 2014, called OpenXanadu³. Having given up competing with the web, which he calls a severely flawed system that "world of fragile ever-breaking one-way links, with no recognition of change or copyright, and no support for multiple versions or principled re-use."⁴

As any web archivist will know, the issue with broken links plagues the efforts to preserve webpages, creative and corporate, private and public. Nelson's idea would address this issue, building into his system a means of constant archiving, so that no data would ever be lost.

In Web archiving, links break for a number of reasons. The site goes down, the site moves, the entry was deleted, the material was lost, the site was corrupted, or hacked, or uses outdated plugins and software. The media may be an inaccessible file format. All of these issues can make even the most comprehensive attempt to preserve both the visual

³ Hern, Alex. "World's Most Delayed Software Released after 54 Years of Development." *The Guardian*. Guardian News and Media, 2014. Web. 12 Dec. 2016.

⁴ Hern, Alex. "World's Most Delayed Software Released after 54 Years of Development." *The Guardian*. Guardian News and Media, 2014. Web. 12 Dec. 2016.

makeup of a website and the deeper content that lends it value into near impossible long-term tasks. For short-term issues, the standard modern methods of sending a program to crawl the website, archiving each link and level throughout is sufficient. But as time wears on, most of those links will break.

Nelson's hypertext model wouldn't allow for those breakages, because in his vision each document is inextricably linked to each other related document. There would be no issue of link rot, and the problems associated with HTML wouldn't apply.

Xanadu, in theory, is also significantly more secure and stable as a model than the current web. Xanadu was designed with 17 rules in mind, which would set it apart from the Internet as it presently exists and would define its secure qualities.

1. "Every Xanadu server is uniquely and securely identified.
2. Every Xanadu server can be operated independently or in a network.
3. Every user is uniquely and securely identified.
4. Every user can search, retrieve, create and store documents.
5. Every document can consist of any number of parts each of which may be of any data type.
6. Every document can contain links of any type including virtual copies ("transclusions") to any other document in the system accessible to its owner.
7. Links are visible and can be followed from all endpoints.
8. Permission to link to a document is explicitly granted by the act of publication.
9. Every document can contain a royalty mechanism at any desired degree of granularity to ensure payment on any portion accessed, including virtual copies ("transclusions") of all or part of the document.
10. Every document is uniquely and securely identified.
11. Every document can have secure access controls.
12. Every document can be rapidly searched, stored and retrieved without user knowledge of where it is physically stored.
13. Every document is automatically moved to physical storage appropriate to its frequency of access from any given location.
14. Every document is automatically stored redundantly to maintain availability even in case of a disaster.

15. Every Xanadu service provider can charge their users at any rate they choose for the storage, retrieval and publishing of documents.
16. Every transaction is secure and auditable only by the parties to that transaction.
17. The Xanadu client-server communication protocol is an openly published standard. Third-party software development and integration is encouraged.”⁵

Through these rules, Xanadu imagined a world in which the interlocking of computers provided endless accountability and security, as well as allow for reusable and creative reworking of the documents as copyright allowed.

Archiving work to preserve the Project Xanadu is still to be done. However, Ted Nelson has, over the 50+ years since beginning work on this project, kept meticulous records of his thoughts and feelings throughout, as well as a fair bit of documentation online as to the aims and makeup of Project Xanadu. In interviews with him, Nelson reveals himself as a compulsive documenter of his own life, to cope with the distractions that Attention Deficit Disorder (ADD) and Aphasia can cause.

The Wired article that covered the failure of Xanadu to come to fruition at the time psychoanalyzed Xanadu and its archival functions, as well as its ability to jump from subject to subject, as a manifestation of Nelson’s ADD, a way of processing data that more easily conformed to his manner of thinking. As irresponsible as theorizations about a person’s mental health conditions may be, what his vision pointed towards does represent in some ways a new way of thinking about how files and data are structured and to some degree archives could learn or take some lessons from Nelson’s ideas.

Nelson continues to work to make the dream of Xanadu come to fruition, despite the near impossibility of this task. His current plan is to generate workable plugins that

⁵ Atwood, Jeff. "Coding Horror." *The Xanadu Dream*. N.p., 2009. Web. 12 Dec. 2016.

would allow Xanadu type uses on the modern web. Though the future of this plan is uncertain, with Nelson's skill and funds forever uncertain, should they come to fruition archives would be able to make use of them. The ways in which Xanadu is built to permanently embed unbreakable links, with the content displayed in parallel on both sides of the link. This basic concept would revolutionize the process of preserving content at every step of the process.

Secondly, though at present Xanadu is not built for moving image content, there does remain a possibility. If built from the ground up, it is theoretically possible to develop a language that would accommodate A/V files on a Xanadu type system, which conceivably would build into the system a level of frame depth that archives can rarely match. The ways in which Xanadu would embed links would make moving image materials accessible in ways the current Internet can only begin to point at, with embedded videos being similarly impossible to break off, representing another step forward in archival efforts.

At the end of the day, Xanadu is a complicated and far-fetched dream of a committed and aloof man. The possibility that it will generate useful material for the future of archiving is slim. However, as the project goes on, hope abounds, and though there are legitimate benefits to the Berners-Lee descended Web as it exists, the future of Xanadu should be considered; both as a historical curiosity worthy of preserving the legacy of, and possibly as a means of modeling the future.