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## HCID 520 - A01. History of User Interfaces

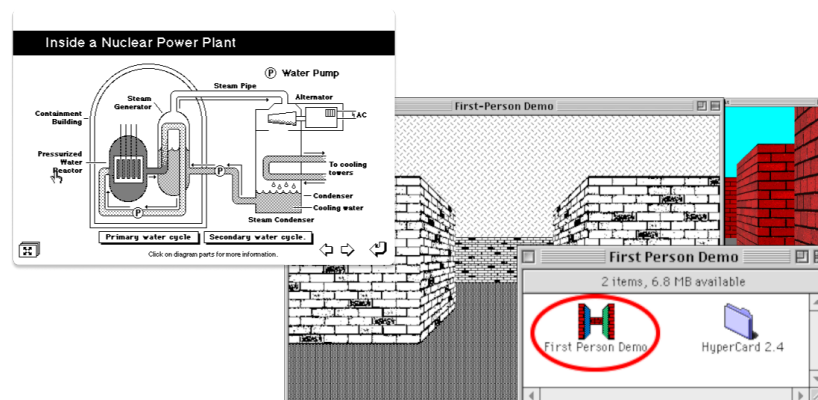
Vannevar Bush's 1945 Memex concept introduced the concept of associative trails or **hyperlinking**—non-linear, user-defined pathways linking related ideas—as a remedy for the limitations of hierarchical indexing and as a method of personal expression and sharing. Bush envisioned a system where scholars could forge "a mesh of associative trails running through [materials]" (Bush, 1945) to mirror the human mind's natural propensity for connection. That this system was described in 1945 is shocking as it deeply reflects how we keep knowledge as a dynamic network today. One can draw a clear throughline of hyperlinking's journey from the private to the public space and back in 1987's HyperCard personal database system, 2001 Wikipedia's endless and interwoven trail of articles, and modern personal and business database tools like Notion and especially Obsidian. However, while the concept has remained evergreen, the way that users of these systems *interact* with hyperlinks has morphed over time from code books and tapes, to a card metaphor, to simple blue underlined text, and now knowledge webs with dynamic, customizable views.

Bush's Memex represented hyperlinks through physical interaction controls and spatial organization. Users operated levers to scroll microfilm reels and pressed keys to create a "trail code" that linked documents stored on dual translucent screens. These trails were stored in a "code book" for later retrieval. Notably, this type of linking was unidirectional, meaning you could only create a "line" of articles, not a web. You would scroll through the trail one page at a time via two screens. The interface notably used space to create connections - viewing documents side-by-side: this would not persist through all executions. Another key difference is that these trails were kept and created personally but meant to be shared with close friends - an idea that isn't impossible today but far from common. Bush wrote, "The process of tying two items together is the important thing." Prescient, but not fully encompassing of how the concept would be implemented in the future.



The two screens display articles from the trail (noted on the screen) simultaneously.  
 You can continue down the trail using the lever in the center.  
 When complete, you note the trail's topic in the code book (right) and it is stored on a film roll.

Apple's HyperCard brought hyperlinking to the digital world through a card-and-stack interface that aimed to create user familiarity with powerful database functionality. Users could functionally use a variety of action buttons to link "cards" (individual notes) within "stacks" (databases), enabling bidirectional navigation via drag-and-drop. Unlike Memex's static code slots, HyperCard's cards could hold multimedia—images, sound, and interactive widgets. For this reason, many preserved HyperCard stacks contain games "programmed" using the HyperTalk interaction system. Similarly to Memex, however, there was still a focus on P2P sharing - stacks could be shared via floppy disks. Brad Myers (1998) noted HyperCard "empowered users to build custom associative networks," bridging academic hypertext research and mainstream creativity.



A more traditional knowledge stack about nuclear power plants  
 contrasted to a wild FPS demo coded in HyperCard.  
 Note that the Power Plant stack can be browsed linearly (with the arrows) or  
 exploratively by clicking on parts of the diagram.

Wikipedia transformed hyperlinking into a public tool with its [blue underlined text](#) (not actually a hyperlink). Links are no longer organized into cohesive paths. Instead, one can circle the Wikipedia database forever, crawling context-agnostic webs designed for collective knowledge rather than personal expression. The platform enforces strict formatting rules to maintain consistency across its vast article network. While this simplified navigation, it diluted Bush's vision of "wholly new forms of encyclopedias" with personalized trails. As Ko (2025) observed, Wikipedia's design reflected "the web's one-way link model," sacrificing individual associative logic for universal accessibility.

Modern tools like Obsidian build on hyperlinks through bidirectional linking and dynamic linking visualizations. Unlike Wikipedia's static links, Obsidian automatically generates backlinks, allowing users to "amplify" connections through layered annotations. The graph view transforms trails into an interactive web, where nodes represent notes and edges reveal relationship types (e.g., tags, embeds). This shift from public, linear pathways (Wikipedia) to private, dynamic networks mirrors Bush's emphasis on hyperlinks as knowledge-building: tailored to individual cognition. Users of Obsidian regularly express "that relationships between information are inherently reciprocal" rejecting the web's one-way model. Despite being our current endpoint for hyperlinks, Obsidian is viewed by many as Notion's complicated brother. Not only does it offer less powerful collaboration tools in database building, the vast webs built in it often start to push at the edge of legibility. One Reddit user lamented, "I've looked at dozens of tutorials but still can't grasp how to structure my vault". However, this outcry is in response to a desire to have one's thoughts organized in the way that only associative linking can. There are thousands of videos on Youtube celebrating Obsidian - sharing tips and proudly showcasing vaults.

The evolution of hyperlinking interfaces reveals tensions between formats suited for public vs. personal knowledge, as well as the tradeoffs between structure and fluidity. Memex's linking system Memex's levers and code books favored knowledge in chunks, HyperCard's stacks balanced creativity with constraints, Wikipedia's blue links sacrificed personalization for universality, and Obsidian/Notion hybridized both paradigms. Yet Bush's core insight—that knowledge thrives in "a mesh of associative trails"—persists. The hyperlink's journey—from

mechanical indexing to decentralized knowledge webs—proves that while interaction models evolve, the human drive to connect ideas remains timeless.

### Links

Create connections between your notes. Link anything and everything — ideas, people, places, books, and beyond. Invent your own personal Wikipedia.

In [Meditations on First Philosophy](#) the philosopher [René Descartes](#) describes a series of doubts about the nature of reality, arriving at the famous phrase:

- `[[I thin]]`

He `I think` therefore I am `thinking`, and therefore, the

ac `Just think` about it `.`

**Thinking, Fast and Slow**  
Books/

**The Thing**  
Movies/

### Graph

Visualize the relationships between your notes. Find hidden patterns in your thinking through a visually engaging and interactive graph.

### Canvas

An infinite space to research, brainstorm, diagram, and lay out your ideas. Canvas is a limitless playground for your mind. [Learn more.](#)

### Plugins

Build your ideal thinking space. With thousands of plugins and our open API, it's easy to tailor Obsidian to fit your personal workflow. [Learn more.](#)

#### Community plugins

<b>Calendar</b> by Liam Cain	<input checked="" type="checkbox"/>
Calendar view of your daily notes.	
<b>Kanban</b> by Matthew Meyers	<input checked="" type="checkbox"/>
Markdown-backed kanban boards.	
<b>Dataview</b> by Michael Brennan	<input type="checkbox"/>
Advanced queries for the data-obsessed.	
<b>Outliner</b> by Viacheslav Slinko	<input type="checkbox"/>

Obsidian’s most popular database views - note the Wikipedia-esque “link” structure at the top left contrasted with the flexible and visual format of the “Canvas” view.

## References

Articles:

Bush, V. (1945). As we may think. *The Atlantic Monthly*, 176(1), 101–108.

Ko, A. J. (2025). A history of interfaces. In *User interface software and technology*. University of Washington.

<https://faculty.washington.edu/ajko/books/user-interface-software-and-technology/history>

Myers, B. A. (1998). A brief history of human-computer interaction technology. *ACM Interactions*, 5(2), 44–54. <https://www.cs.cmu.edu/~amulet/papers/uihistory.tr.html>

Reimer, J. (2012, May 2). *HyperCard vs. PowerPoint: How a 1980s Mac application inspired the Web—and still shapes it today*. Ars Technica.

<http://retroweb.maclab.org/articles/Hypercard-vs.-Powerpoint.html>

Schiffer, J. (2023, January 27). *FPS game engine built in ancient Macintosh HyperCard software*. Hackaday.

<https://hackaday.com/2023/01/27/fps-game-engine-built-in-ancient-macintosh-hypercard-software/>

u/throwaway\_obsidian. (2024, March 15). *Having a hard time getting started with Obsidian* [Online forum post]. Reddit.

[https://www.reddit.com/r/ObsidianMD/comments/1b610zg/having\\_a\\_hard\\_time\\_getting\\_started\\_with\\_obsidian/](https://www.reddit.com/r/ObsidianMD/comments/1b610zg/having_a_hard_time_getting_started_with_obsidian/)

Vox. (2013, November 8). *Memex animation - Vannevar Bush's diagrams made real* [Video]. YouTube. <https://www.youtube.com/watch?v=c539cK58ees>