

Theodor Holm Nelson (b. 1937)

— Inventor of new poetic language including

- **hypertext** *
- **hypermedia**
- cybercrud
- softcopy
- electronic visualization
- technoid
- **Docuverse**
- transclusion

* first appears in 1965: “A File Structure for the Complex, the Changing and the Indeterminate”



Concept: Simple Hypertext (1965)

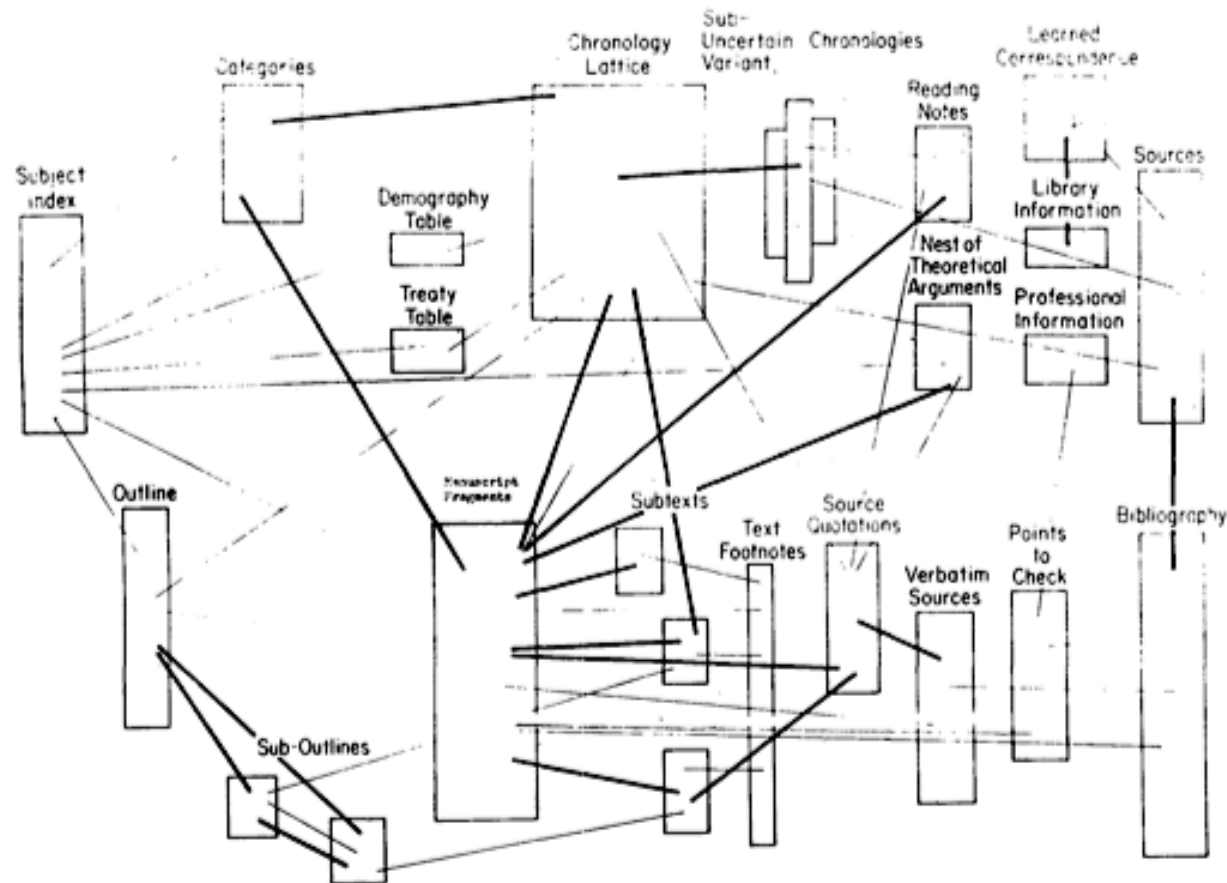


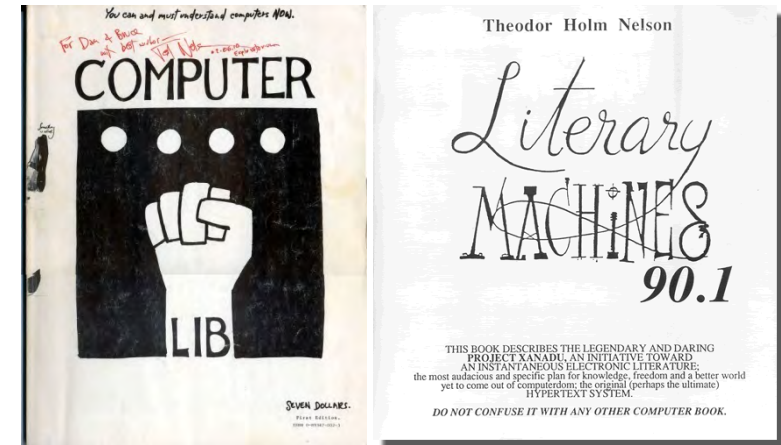
FIGURE 4—ELF's capacity for total filing: hypothetical use by historian. Thin lines indicate links; heavy rules indicate some of same entries.

Ted Nelson

— Collaborator on Hypertext Editing System (HES) at Brown University (1972)

— Author of “underground” computer books

- Computer Lib / Dream Machine (1974)
- The Home Computer Revolution (1977)
- Literary Machine (1981-1993)



— Introduced the concepts of **Project Xanadu** in the 1980s through many talks and articles in Creative Computing, Byte, and other magazines

— Led the Xanadu software system project at Autodesk in late 1980s

A DREAM FOR IRVING SNERD

© 1977 Ted Nelson

Irving Snerd, mild-mannered
doctoral candidate in library science,

is trying to make
head or tail
of it all...

I CAN'T
TAKE IT...
THIS
COMPUTERIZING
OF LIBRARIES
IS
TERRIFYING
STUFF...

IF ONLY...
IT COULD
ALL BE
SIMPLE...



AND A STRANGE DROWSINESS
OVERCOMES HIM...

WHERE AM I?

WELCOME, MR. SNERD.
WELCOME TO THE XANADU*
INFORMATION SYSTEM.

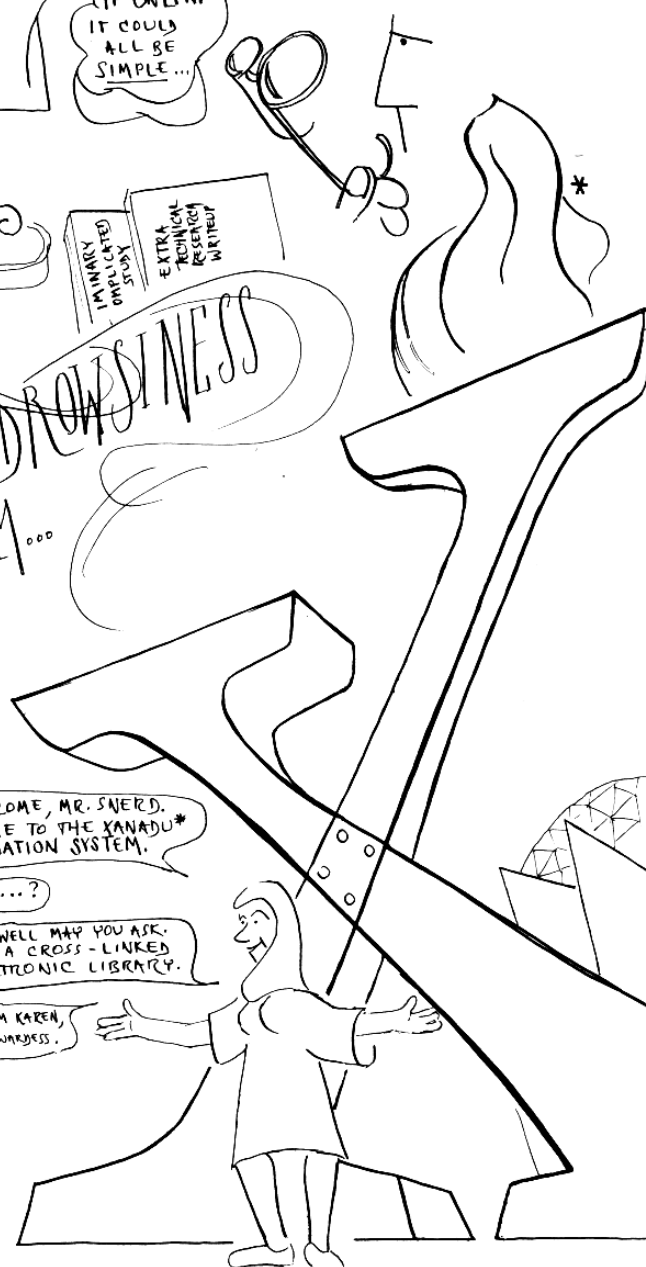
WHAT TH'...?

WELL MAY YOU ASK.
IT'S A CROSS-LINKED
ELECTRONIC LIBRARY.

I'M KAREN,
YOUR STEWARDESS.

*NOTE TO ALL YOU FANS:

"Xanadu Information System,"
"Xanadu Hypertext Network,"
"Xanadu Terminal,"
"Xanadu Information Services"
and the Eternal-Fixing-X
are trade and service marks
for computer products & services
offered by users. Truly,
Keep those compile letters coming. Ted N.



Concept: universal access, follow and publish links

- At your screen of tomorrow you will have **access to all the world's published work**: all the books, all the magazines, all the photographs, the recordings, the movies. (And to new kinds of publications, created especially for the interactive screen.)

You will be able to bring **any published work** to your screen, or **any part** of a published work.

You will be able to **make links** – comments, personal notes, or other connections – between places in documents, and leave them there for others (as well as yourself) to follow later. You may even **publish these links**.

from Literary Machines

Concept: digital rights management & micropayments

- **Royalty** to each publisher will be **automatic**, as materials are delivered over the network. Each piece delivered will be paid for automatically, from the user's account to the publisher's account, when the user receives the piece sent for.

Any document may quote another, because the quoted part is brought – and bought – from the original at the instant of request, with automatic royalty payment and credit to the originator.

Harsh critiques of the file hierarchy and WWW

Some recent Ted Nelson quotes:

—Calling a hierarchical director a "folder" doesn't change its nature any more than calling a prison guard a "counselor".

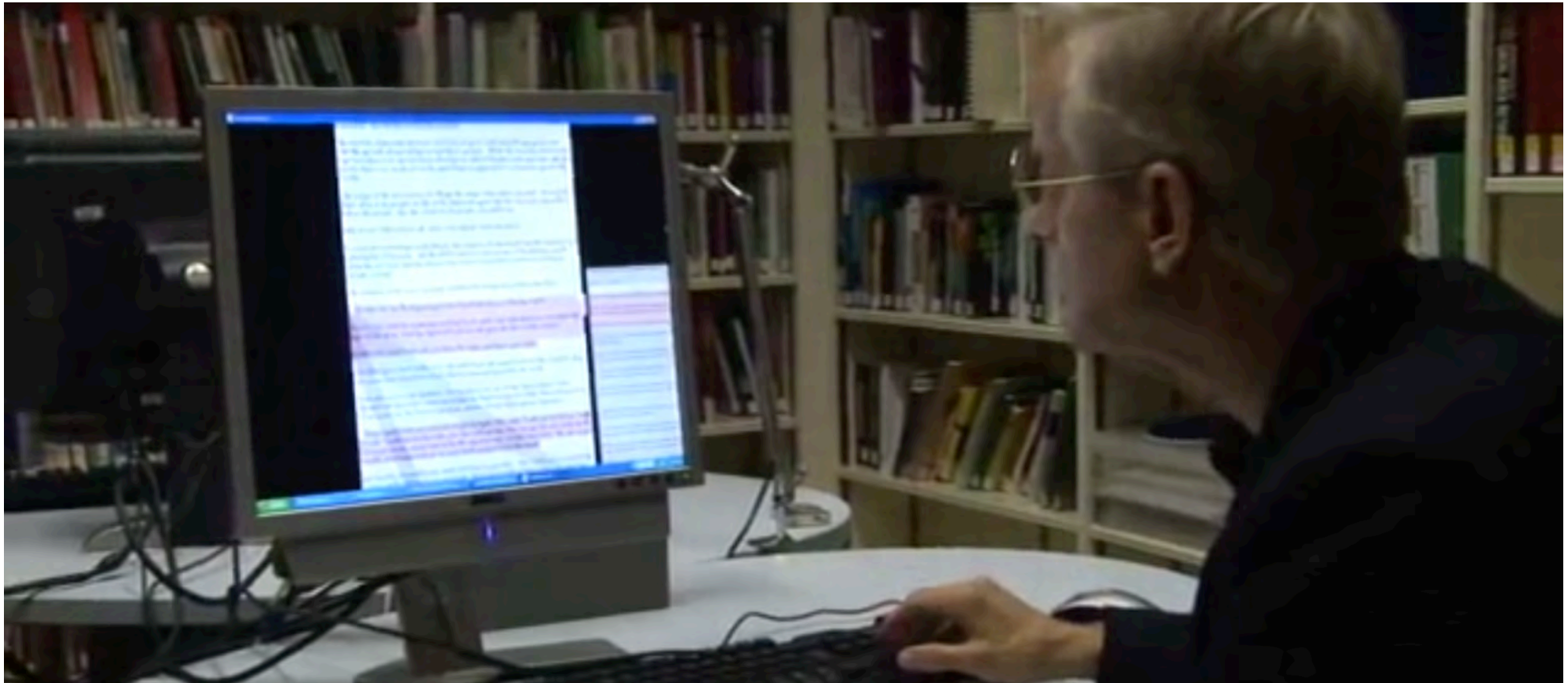
—Hierarchical directories were invented around 1947 – I should check this – when somebody said, "How are we going to keep track of all these files? "Gee, why don't we make a file that's a list of filenames?" And that was the directory. It's a temporary fix that doesn't scale up.

—The Web is the minimal concession to hypertext that a sequence-and-hierarchy chauvinist could possibly make.

Recent Ted Nelson books: *Geeks Bearing Gifts* and *Possiplex*, both published via Lulu.com

Ted Nelson lectures: Demonstrating Xanadu Space

https://www.youtube.com/watch?v=En_2T7KH6RA



Douglas Engelbart (1925-2013)

- Educated at University of California, Berkeley
- Worked at Stanford Research Institute (SRI)
- Published his first theoretical paper in 1962, *Augmenting Human Intellect: A Conceptual Framework*



Concept: Augmenting Human Intellect

- By "augmenting human intellect" we mean **increasing the capability of a man to approach a complex problem situation**, to gain comprehension to suit his particular needs, and to derive solutions to problems. Increased capability in this respect is taken to mean a mixture of the following: more-rapid comprehension, better comprehension, the possibility of gaining a useful degree of comprehension in a situation that previously was too complex, speedier solutions, better solutions, and the possibility of finding solutions to problems that before seemed insoluble.

Concept: engineering tools for complex situations

- And by "complex situations" we include the professional problems of **diplomats, executives, social scientists, life scientists, physical scientists, attorneys, designers**—whether the problem situation exists for twenty minutes or twenty years. We do not speak of isolated clever tricks that help in particular situations. We refer to a way of life in an integrated domain where hunches, cut-and-try, intangibles, and the human "feel for a situation" usefully co-exist with powerful concepts, streamlined terminology and notation, sophisticated methods, and **high-powered electronic aids**.

oNLine System (NLS)

- Augmentation Research Center developed oNLine System (NLS) in 1968
- Focus on developing new Human-Computer Interaction (HCI) models and tools
- Introduced new concepts
 - Computers Supporting Collaborative Work (CSCW)
 - Bootstrapping – using the development group to test new tools
 - Co-evolution – the co-dependent evolution of the software interface and human behavior



NLS (continued)

- Developed the Mouse (analog pointing device) and Chord (5-finger) keyboard
- The NLS system (circa 1968) also included:
 - Mixture of text and graphics
 - Hypertext links
 - Outline processing
 - View control of text and graphic data
 - Collaborative work space
 - Shared pointing device
 - Video conferencing



William English at the augmentation laboratory at SRI





See Douglas Engelbart 1968 demo
<http://sloan.stanford.edu/MouseSite/1968Demo.html>
(see Clips #5-8)



monday afternoon

december 9

3:45 p.m. / arena

Chairman:

DR. D. C. ENGELBART

*Stanford Research Institute
Menlo Park, California*

a research center for augmenting human intellect

This session is entirely devoted to a presentation by Dr. Engelbart on a computer-based, interactive, multiconsole display system which is being developed at Stanford Research Institute under the sponsorship of ARPA, NASA and RADC. The system is being used as an experimental laboratory for investigating principles by which interactive computer aids can augment intellectual capability. The techniques which are being described will, themselves, be used to augment the presentation.

The session will use an on-line, closed circuit television hook-up to the SRI computing system in Menlo Park.

Following the presentation remote terminals to the system, in operation, may be viewed during the remainder of the conference in a special room set aside for that purpose.

Engelbart after 1968

- NLS failed due to **timesharing** computer technology: the more people using it, the slower it responded.
- Many researchers from his laboratory moved to **Xerox Palo Alto Research Center (PARC)** in 1971, where the mouse and the personal workstation was (re)invented
- Engelbart developed **Augment**, a commercial timesharing system for documentation in the aerospace industry
- Engelbart worked on the first network protocols for the **ARPAnet**, the foundation of the current Internet (early 1970s)
- Engelbart created **Bootstrap Institute** in 1999,

Alan Kay (b. 1940)

- Worked with Ivan Sutherland (Utah) on graphics programming
- Worked with Seymour Papert (MIT) on educational programming
- Principal Scientist at Xerox PARC, 1971-1981
- Chief Scientist at Atari, 1981-1984
- Apple Fellow and Disney Fellow, 1984-2001
- Viewpoints Research Institute (since 2006)
“reinventing programming”

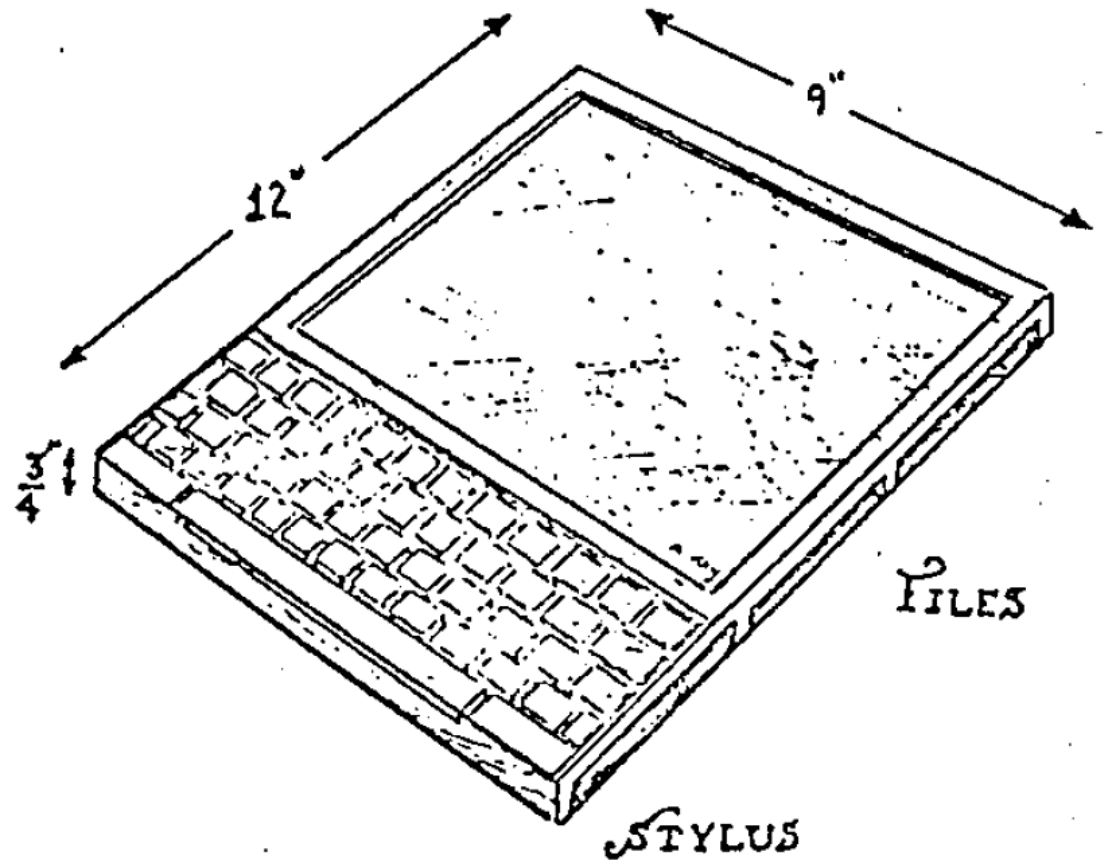


Some of Alan Kay's Contributions

- Combining cognitive science, learning theory, and programming languages
- Development of Object-Oriented Programming Language – SmallTalk
 - Support for direct manipulation graphical objects as interface
 - Use of graphical icons to represent programs
 - Cascading menus to select actions
- Interest in making computer programs as simple to use as possible

DynaBook Concept (1972)

- A Portable Computer
- Powerful enough to manage all kinds of media
- Simple enough to be used by children



from “A Personal Computer for Children of All Ages”

- Imagine having your own **self-contained knowledge manipulator** in a portable package the size and shape of an ordinary notebook. Suppose it had enough power to outrace your senses of sight and hearing, enough capacity to store for later retrieval thousands of page-equivalents of reference materials, poems, letters, recipes, records, drawings, animations, musical scores, waveforms, dynamic simulations, and anything else you would like to remember and change.

We envision a device as **small and portable** as possible which could both **take in and give out information** in quantities approaching that of human sensory systems. Visual output should be, at the least, of higher quality than what can be obtained from newsprint. Audio output should adhere to similar high-fidelity standards.

from “A Personal Computer for Children of All Ages”

- **There should be no discernible pause between cause and effect.** One of the metaphors we used when designing such a system was that of a musical instrument, such as a flute, which is owned by its user and responds instantly and consistently to its owner’s wishes. Imagine the absurdity of a one-second delay between blowing a note and hearing it!

These civilized desires for **flexibility, resolution, and response** lead to the conclusion that a user of dynamic personal medium needs several hundred times as much power as the average adult typically enjoys from timeshared computing. This means that we should either build a new resource several hundred times the capacity of current machines and share it (very difficult and expensive), or we should investigate the possibility of **giving each person his own powerful machine**. We choose the second approach.

The Xerox Alto (interim Dynabook system)

- Stand-alone computer processor connected to other disc and printers via Ethernet
- High-resolution graphic CRT
- Typewriter keyboard, chord keyboard, music keyboard
- Mouse pointing device
- See “Alto Playroom” video from Software Pioneers, Broy & Denert:
<https://vimeo.com/111334072>



Xerox Alto's Descendents

- Xerox Star – the first office product with graphical user interface, mouse and ethernet, \$20-50,000 network configuration (1981)
- See Xerox Star Demo 1984 on YouTube:
<https://www.youtube.com/watch?v=Cn4vC80Pv6Q>



Xerox Alto's Descendents

- Apple Lisa – the first personal computer with graphical user interface and mouse, \$10,000 each (1983)
- See Apple Lisa Demo 1983 on YouTube:
http://www.youtube.com/watch?v=W35vpsPlwIU&watch_response



Xerox Alto's Descendents

- Apple Macintosh – the first successful personal computer with graphical user interface and mouse, \$3,000 each (1984)



The Macintosh Child Video

Alan Kay on interaction experiments



— <http://www.youtube.com/watch?v=SdL6dzWvm5M>

Concepts, circa 1985

- Computers as intellectual tools in business, research and education
- Portable personal computers connected to the Network
- Software to support direct manipulation of text, graphics, video, sound
- Intuitive user interface with icons, menus, and multiple windows
- Collections of documents available on the Network
- Creating and following navigational links between selections in documents
- **No integration with telephony**

Intermedia (1985-1990) at Brown University

- Apple User Interface running on Unix
- Network Hypertext environment with text, graphics, timeline, animation, video
- Anchors and Links collected in Webs

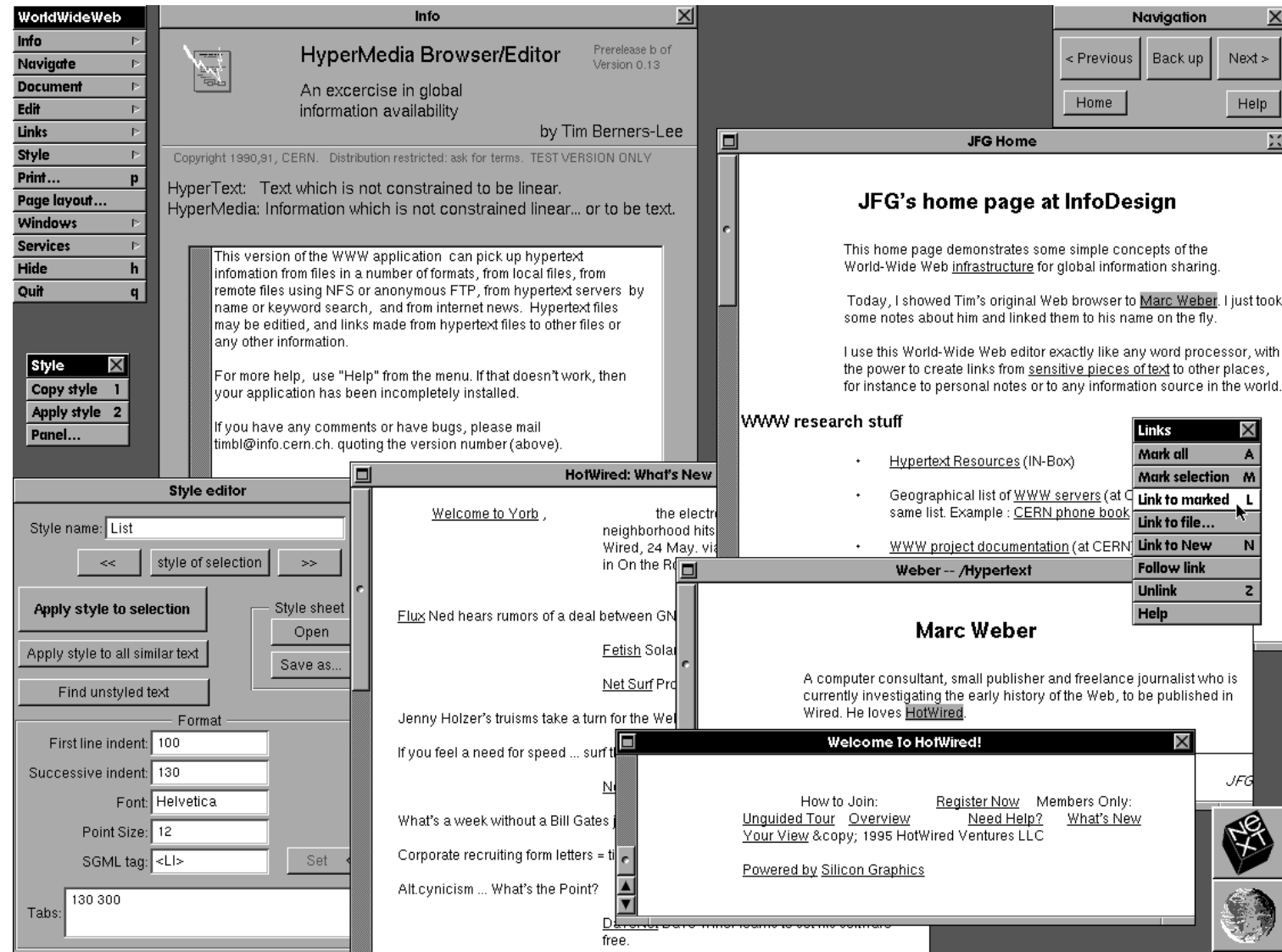
The screenshot displays a web interface titled "19C HEALTH OVERVIEW". On the left, a hierarchical menu structure is visible under the heading "Nineteenth Century Public Health". The menu includes categories like "Biology and Medicine", "Women and Children", "Working Class", "Political & Social Background", "Sanitation and Its Absence", "Addiction" (with sub-items "Alcoholism" and "Opium"), "Nutrition" (with sub-item "Adulteration of Food"), and "Diseases". Below "Diseases", specific diseases are listed: "Typhus", "Cholera", "Typhoid", "Ricketts", and "Tuberculosis".

The main content area is divided into two sections. The top section, titled "Disease in Rich and Poor", contains a text excerpt from Anthony S. Wohl, pages 1-2, discussing the health hazards of the day, including pollution, lack of sanitary appliances, and the consequences of poor drainage systems. The bottom section, titled "Tuberculosis in Victorian England", features a text excerpt from M.W. Flynn, in Edwin Chadwick, page 11, discussing the impact of tuberculosis on Victorian society. Below the text is an illustration of a deathbed scene, showing a person lying in bed, surrounded by family members, with a window in the background.

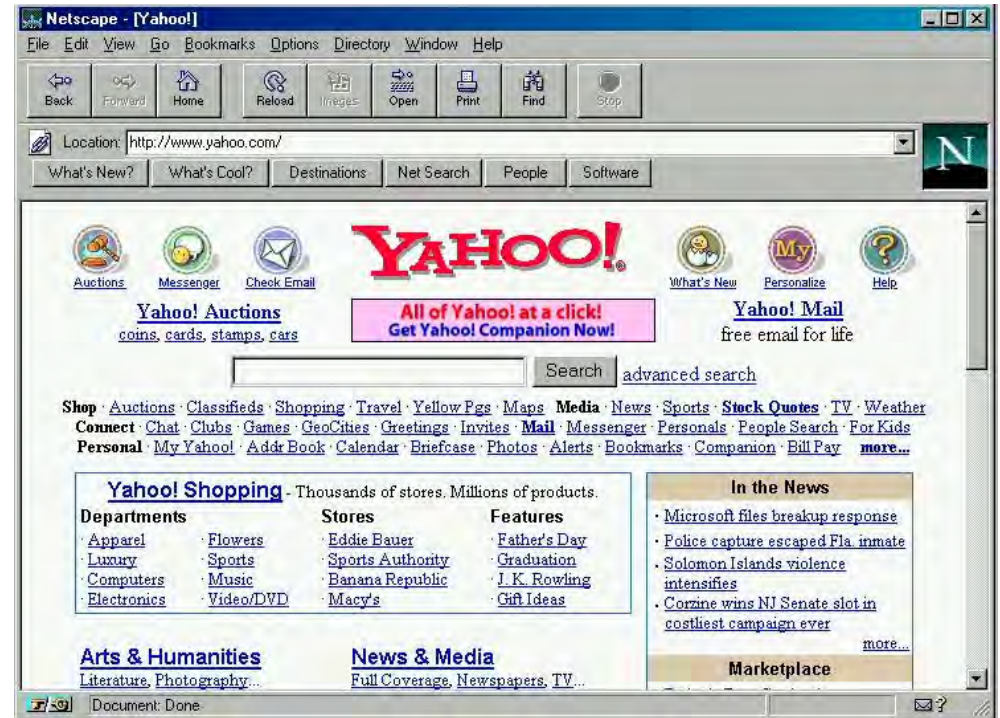
On the right side of the interface, there is a sidebar titled "Dickens: Web view" showing a list of documents and links, including "19C HEALTH OVERVIEW", "Tuberculosis", "Victorian Deathbed", "19C HEALTH OVERVIEW", "Victorian Deathbed", "19C HEALTH OVERVIEW", "Disease", "19C HEALTH OVERVIEW", "Victorian Deathbed", "19C HEALTH OVERVIEW", "19C HISTORY OVERVIEW", "Childbirth Risks", "DICKENS OVERVIEW", "Death", "Death of Little Nell", "Deathbed Detail", "Disease", "Fitts", "Food Adulteration", "GREAT EXPECTATIONS OVERVIEW", "Milk", "Opium", "Overviews", "Tuberculosis", "Typhus & Cholera", and "Typhus & Cholera".

World Wide Web at CERN (from 1989)

- Hypertext Transport Protocol (HTTP)
- Hypertext Markup Language (HTML)
- First browser implemented on the NeXT computer
- All software in public domain



Early Web browsers: Mosaic and Netscape



Fast-forward 25+ years

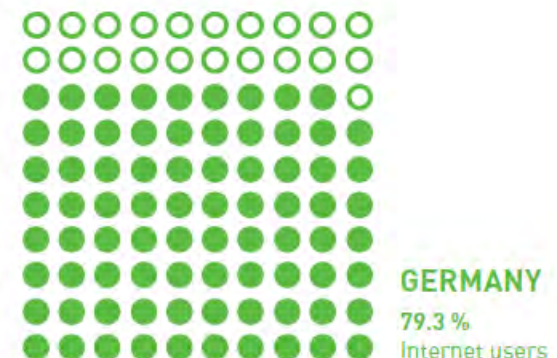
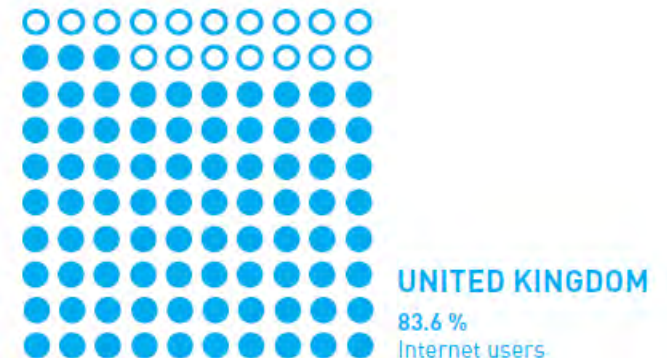
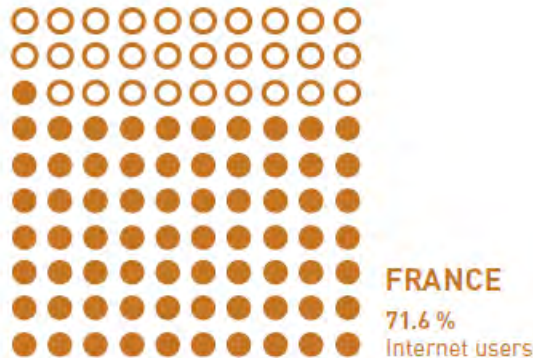
- All newly created music, books, photographs, film/video are digital
- Over 70% of population in North America and EU countries have internet access
- **Integrated telephony was the Missing Link to universal access**
- Over 90% have a mobile device: a mobile phone
- 50% of that population have a “Smartphone”
- The Internet is becoming the “Cloud”

“La télévision oeil de demain” (1947), a vision of social disruption and distraction caused by mobile devices.



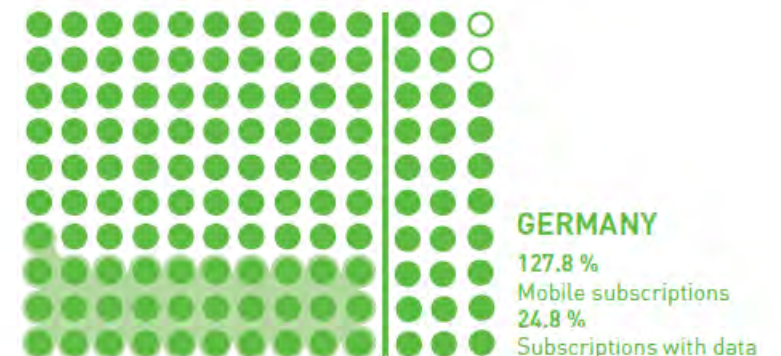
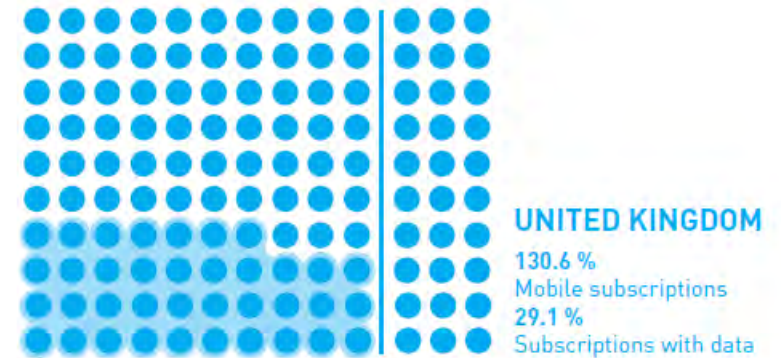
— Growth of internet + mobile connectivity

Internet users (per 100 people) 2010 - 2011



— Growth of internet + mobile connectivity

Mobile cellular subscription (per 100 people) 2010 - 2011



The Digital Library Today

- Wikipedia collectively written in many languages
- Random things you can find via search engines and links on the public Web (depending on what is or is not blocked in your country)
- National Digital Libraries and Archives: collections of bibliographical records, images, audio-visual archives and scanned pages accessed via various Boolean database search user interfaces
- Private digital libraries by subscription: news, business, science, law, finance, medical records, genetics and pharmaceutical research databases

The Digital Library Today

- Most “free” digital content supported by advertisements
- Most people view content on journalism sites, blogs, social networks, tweets and video clips
- Google Books (books.google.com)
Nearly every book I have written is in Google Books, but the author does not have the right to view them – access is limited to “snippet” view
- Digital rights issues and payment schemes are complex and unresolved

Contact Information



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