Building User Interfaces Designing for Web & Desktop **Professor Yuhang Zhao**

Adapted from Prof. Mutlu's slides



What we will learn today?

- A brief history of user interfaces
- Platform-specific design
 - Designing for the desktop
 - Designing for the web

A Brief History of User Interfaces

A "proto-hypertext" system that connected documents using associated trails embedded into a desk, developed by Vannevar Bush.

¹Wikipedia: Memex

² The Atlantic: As We May Think

³Image Source: <u>Monoskop</u>



MEMEX in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.

"Consider a future device ... in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory." — Vannevar Bush, 1945

⁴ The Atlantic: As We May Think

⁵Image Source: <u>Monoskop</u>



MEMEX IN USE is shown here. On one transparent screen the operator of the future writes notes and commentary dealing with reference material which is projected on the screen at left. Insertion of the proper code symbols at the bottom of right-hand screen will tie the new item to the earlier one after notes are photographed on supermicrofilm.

Milestone 2: Sketchpad, 1963⁶⁷

The first program to utilize a complete graphical user interface and that implemented object-oriented programming, non-procedural programming, constraints, pen input, etc. Sketchpad was developed by Ivan Sutherland.

⁶Wikipedia: <u>Sketchpad</u>

⁷Image source





A conceptual portable educational device for children (i.e., the first laptop/ tablet computer) developed by Alan Kay.





¹⁰ Image sources: <u>left</u>, <u>right</u>

¹¹<u>A talk by Alan Kay on the history of Dynabook</u>

(1968) The Dynabook

The first computer to support an OS based on a GUI that integrated the ideas developed for Dynabook. It was developed at the Xerox PARC (Palo Alto Research Center).

¹²Wikipedia: Dynabook

¹³Image source



14



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First commercial system with a user interface that integrates today's technologies, including windows, icons, folders, mouse, etc.

¹⁵Wikipedia: <u>Xerox Star</u>

¹⁶Videos of the Star Interface: Part 1, Part 2

¹⁷Image source





¹⁸ Image source: <u>Left</u>, <u>Right</u>







floppy disk directory user mag. card group cassette recorder calculator mag. tape

folder

file drawer

in-basket

in-basket

(with mail)

Designing for the Desktop

The WIMP Paradigm²⁰

Definition: *Windows*, *icons*, *menus*, and *pointer*, or *WIMP*, is a design paradigm that current desktop interfaces follow that dates back to the Xerox Alto (1973).

²⁰ Image source



(*) HIGH (ADA)	

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Definition: Windows are resizable containers of individual applications.

Primary windows contain elements for the main functionality of the application, such as a canvas. Secondary windows support main windows through modal panes, dialog boxes, etc.



²¹Image source: <u>Left</u>, <u>Right</u>

Definition: Windows can be organized in a way that overlaps several windows or tiles them across the screen.





²² Image source: <u>Left</u>, <u>Right</u>

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²³ Image source: <u>Left</u>, <u>Right</u>





²⁴ Image source: <u>Left</u>, <u>Right</u>

Window Structures²⁵

Windows bring together dedicated *panes* in different configurations.





²⁵ Image source: <u>Left</u>, <u>Right</u>

Secondary windows can be *docked*, *stacked*, and *floating*.²⁶



²⁶ Image source: <u>Left</u>, <u>Right</u>

Menus²⁷

Definition: Menus list all the functions of the an application. Menu lists serve *educational* and *reference* purposes.



²⁷ Image source: <u>Left</u>, <u>Center</u>, <u>Right</u>

Toolbars, Palettes, Sidebars, & Tooltips²⁸

Definition: *Toolbars, palettes, sidebars,* and *tooltips* facilitate (visual and manipulation) access to frequently used functions.



²⁸ Image source: <u>Left</u>, <u>Center</u>, <u>Right</u>

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Definition: Tool palettes provide *advanced controls* for a particular function rather than frequently accessed functions.



²⁹ Image source: <u>Left</u>, <u>Center</u>, <u>Right</u>

Pointing³⁰

Definition: *Pointing* on an application canvas enables a range of advanced capabilities for *direct manipulation*.



³⁰ Image source: <u>Left</u>, <u>Center</u>, <u>Right</u>

In-Class Activity 1: Desktop Application Deconstruction

Image Source



Link to Google Drawings

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Designing for the Web

Desktop applications: Dynamic, persistent *screens* and supporting *components* that enable users to perform complex tasks.

Webpages: Interconnected *pages* with *aids* that help users navigate and access a large body of content.

Web Applications³¹

Definition: Single-page applications (SPAs) provide the functions of a desktop application on a webpage following the conventions of desktop applications.

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³¹Image source: Left, Right

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The Page

Since its inception, the *page*, has been the building block of web content.

If the web is made out of pages, how do we organize and help users navigate them?

Using *primary* and *secondary* navigation aids.



Primary Navigation Aids³²

Definition: Primary navigation aids take the form of menus/ menubars and reflect the major areas or sections of a website.





³² Image source: <u>Left</u>, <u>Right</u>

Definition: Secondary navigation aids provide comprehensive links to specific content on the site as fat navigation, left-hand navigation, footer navigation, etc.

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How do we get home?

A key problem in complex sites is to get back to previous pages or other pages that are higher in the navigation hierarchy. Breadcrumbs and *hierarchical lists* are solutions to this problem.





Definition: The *fold* is the dividing line between the area that is visible when a page first loads and the remainder of the page.



³³ Image Source

36Building User Interfaces | Professor Mutlu | Lecture 08: Designing for the Web & Desktop

THE HEADLINE

LOREM IPSUM DOLOR SIT AMET. CONSECTETUER ADIPISCING ELIT. AENEAN COMMODO LIGULA EGET DOLOR. AENEAN MASSA. CUM SOCIIS NATOQUE PENATIBUS ET MAGNIS DIS PARTURIENT MONTES, NASCETUR RIDICULUS MUS. DONEC QUAM.

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VIVAMUS ELEMENTUM SEMPER NISI. AENEAN VULPUTATE ELEIFEND TELLUS. AENEAN LEO LIGULA, PORTTITOR EU, CONSEQUAT VITAE, ELEIFEND AC, ENIM. ALIQUAM LOREM ANTE, DAPIBUS IN, VIVERRA QUIS, FEUGIAT A, TELLUS. PHASELLUS VIVERRA NULLA UT METUS VARIUS LAOREET. QUISQUE RUTRUM.

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MAYBE ANOTHER FOOTER LINK AND ONE MORE

THE FOLD

ABOVE

THE FOLD

BELOW THE FOLD



WHERE WE SPEND TIME READING

65.7% OF ENGAGEMENT BELOW THE FOLD

HIGH

TOP OF PAGE
DIGITAL FOLD
END OF CONTENT

Data from 1 million visitors on 10 publishers over a 24 hour period

Organizing Page Content: Fitting It All in³⁵

Large volumes of content is either broken into discrete pages through *pagination* or incrementally loaded through *infinite scroll*.



³⁵ Image Source



Examples of pagination and infinite scroll:³⁶



³⁶ Image source: <u>Left</u>, <u>Center</u>. <u>Right</u>

Search

Definition: Search, an alternative to page navigation, provides users with listings of content based on a search query.



Faceted search helps users narrow down a search once results are returned based on a simple query by providing functions to sort and filter the results.



In-Class Activity 2: Web Application Deconstruction

Image Source

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Link to Google Drawings



What we learned today?

- A brief history of user interfaces
- Platform-specific design
 - Designing for the desktop
 - Designing for the web