HUST

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

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SOICT

School of Information and Communication Technology

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IT3180 – Introduction to Software Engineering

10 – User Experience

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The importance of User Experience

A computer sytem is only as good as the experience it provides to its users

- If a system is hard to use:
 - Users may fail to find important results
 - They may give up

Developing good user interfaces needs skill and time



Terminology

User Experience (UX)

 The user experience is the total of all factors that contribute to the usability of a computer and its systems

Human Computer Interaction (HCI)

 HCI is the academic discipline that studies how people interact with computers



Development Processes for User Interfaces

It is almost impossible to specify an interactive or graphical interface in a written document

- Requirements benefit from sketches, comparison with existing system
- Designs should include graphical elements and benefit from various forms of prototype
- User interfaces must be tested with users.
- Expect to change the requirements and design as the result of testing
- Schedules should include user testing and time to make changes



Prototypes

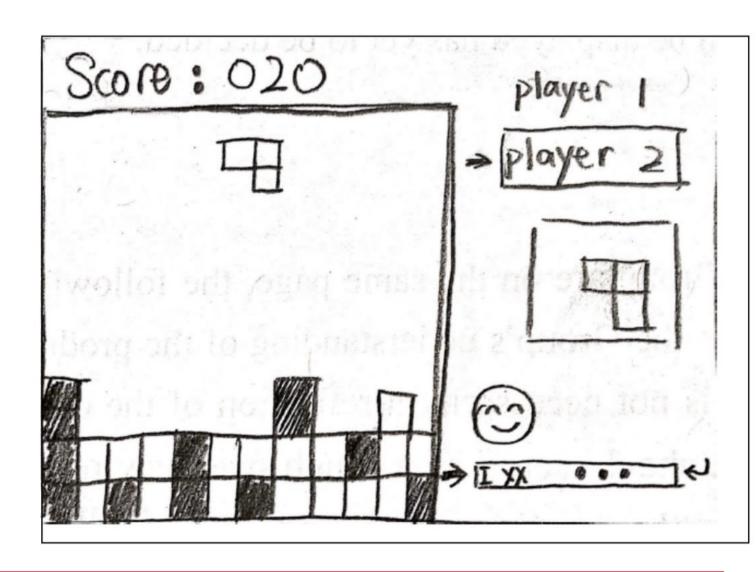
A prototype is a preliminary version that can be used to iterate rapidly between requirements and design

- Paper prototype
 - Quick sketches
- Wireframe
 - Online layout
- Mock-up
 - Graphical designs to show details of layout, colors, etc.
- Operational prototype
 - Include controls to test interaction and navigation



Paper Prototype

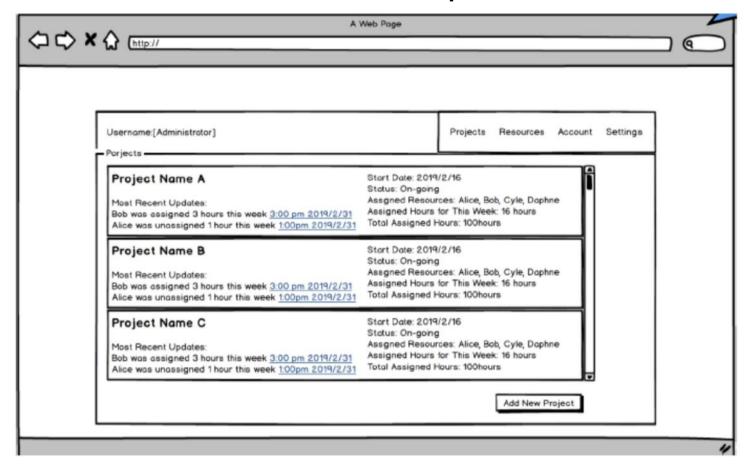
- Little effort has been spent on drawing the paper prototype
- People do not hesitate to propose major changes
- Changes can be made at low cost





Wireframe

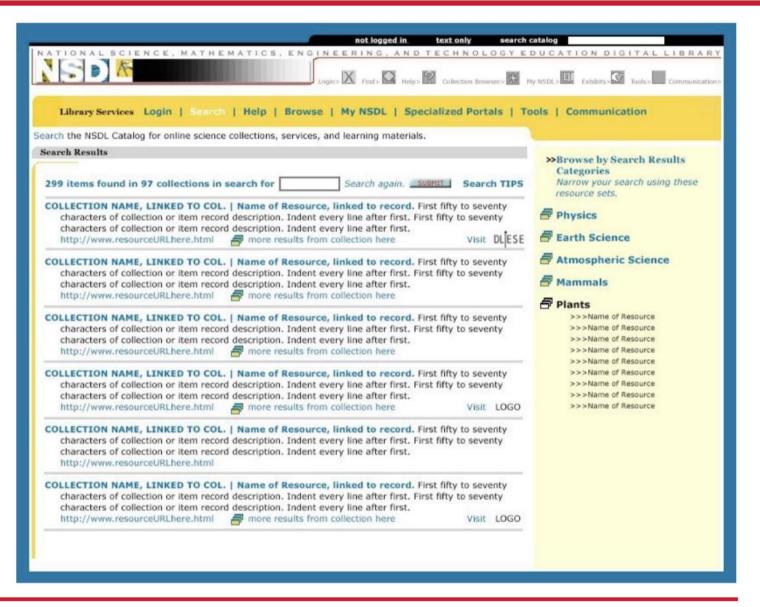
- A wireframe shows the layout of information and controls on a display
- This wireframe is created with Balsamiq





Mock-up

- A mock-up shows
 suggested layout and
 graphical design elements,
 such as icons, colors, fonts,
 etc.
- This mock-up was drawn with Photoshop





Mental Model and Computer Model

mental model

Mental Model

The mental model is the user's view of the system and the user experience that it provides.

computer model

Computer Model

The computer model is the functions, data, content, etc. provided by the system.



Mental Model and Computer Model (2)

- The mental model is the user's model of what the system provides
- The computer model may be quite different from the user's mental model

Example: A board game, e.g., chess

- Mental model: pieces on a board
- Computer model: data and logic that describe the game

Example: The desktop metaphor, e.g., Windows and Mac OS

- Mental model: files and folders on a desktop
- Computer model: file system and metadata about the items visible on screen

Mental Model vs. Computer Model



Bodies were recovered on Tuesday after a plane crash in Colombia killed dozens, including members of a Brazilian socret team.

JOY, THEN GRIEF, OVER RRAZII TEAM Despite Climate Vow, China Scrambles for Coal

Here in Lincheng, a smnggy

Late Edition

Today, periodic rain, afternoon arrent, hencey mild, high 82. Tonight, rain, cloudy, mild, lew 83. Tomorrow, clouds, socies stanbling, new 86. Woother med. New 881.

\$2.50

MOVIE FINANCIER IS SAID TO BE PIC

ROOTS ON WALL STREET

Trump Elevates Loyalist From Campaign to Pivotal Post

This article is by Julie Ricerbfeld Durls, Shyemin Appelbuum ond Messie Haberman

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The New York Times



INTERNATIONAL

Caught on Camera: Aide's 'Brexit' Notes

By KATRIN BENNHOLD

LONDON — It's official — or is it? The British strategy for its divorce from the European Union is to "have your cake and eat it," something critics have derided as delusional.

Ever since voting to leave the bloc, Britons have been trying to figure out whether their government has an actual plan for negotiating its exit, or "Brexit," and what that plan might be. This week, an open notepad, surreptitiously photographed in the grip of an aide leaving the aptly named Department for Exiting the European Union, has offered at least a glimpse into the fog.



From left: David Davies, secretary of state for exiting the European Union; Foreign Secretary Boris Johnson; and Prime Minister Theresa May at a cabinet meeting in London this week. Pool photo by Peter Nicholls

The mental model is that the photograph is embedded in the text of the document...

but in the computer model the text and photograph are independent files, which could be changed separately.



Mental Models and User Experience

The user experience is made up from several layers.

navigation mental content and data computer systems and networks

Collectively, these layers should provide a user experience that matches the mental model.



The Model View Control

The Model View Controller (MVC) is a computer model with layers that correspond to the layers of the mental model.

It is a very widely used model for interactive systems.

computer model	View: user interface	mental	
	Controller: navigation		
	Model: content and data	model	
	Computer systems and networks		

The Model View Controller

- The term Model View Control (MVC) is used with a wide variety of slightly different meanings
- In this lecture, we use MVC as a computer model for designing the user experience

- In other lectures, we may see it as:
 - a system architecture (system design)
 - a design pattern (program design)
 - a framework for program development



Model: Content and Data

View: user interface

Controller: navigation

Model: content and data

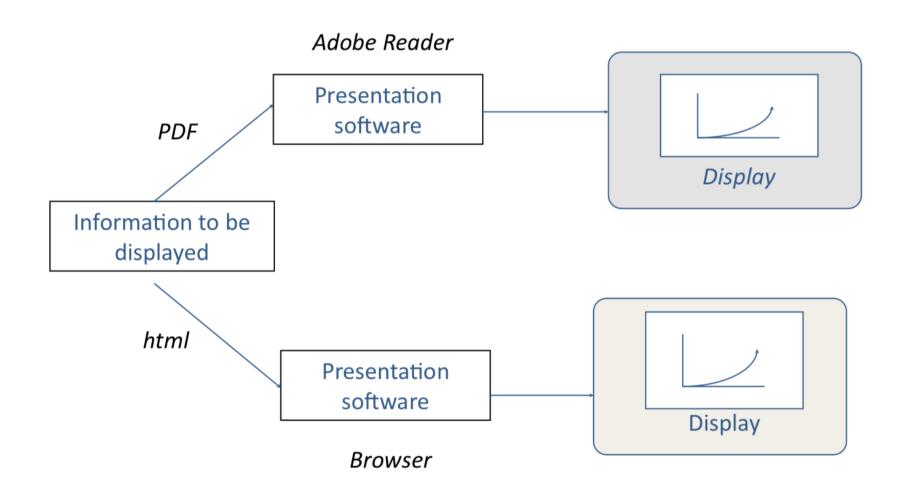
Computer systems and networks

In MVC, the **model** provides all the function of the program except for the interactions with the user. It includes:

- program logic
- data structures, file systems
- content, e.g., text, graphical data, audio, metadata, etc.



Model: Separation of Content from the View



Model: Separation of Content from View



	Auto-	Match	Playe	r	
	Edit	Game I	nfo		Ĭ
1	40 -	4	d7		dE.
1.	d2 - d		d7		
2.	c2 - c	4	e7	-	e6
3.	Nb1 - c	3	Ng8	-	f6
4.	Bc1 - g	5	Bf8	-	e7
5.	e2 - e	3	0	- ()
6.	Ng1 - f	3	Nb8	-	d7

Two different ways to display a chess position, using the same model.

Navigation

The controller manages the flow of the application

 Controls the navigation through the various displays that a system provides (forms, panels, pages of a web site, etc.)

 Manages the information that is saved when leaving a display and makes it available to other displays

 Invokes user interface functions that convey information between the model and the user interface

Different versions of MVC have different roles for the controller



View: User Interface

The user interface is the appearance on the screen and the manipulation by the user

- Graphical elements, e.g., fonts, colors, logos, icons
- Controls, e.g., mouse, touch screen, keyboard
- Input, e.g., forms, text boxes, menus, buttons

For user interface design, a team needs somebody who has skills in graphic design



Principles of User Interface Design

User interface design is partly an art, but there are general principles

- Consistency in appearance, controls, and function
- Feedback what is the computer system doing? Why does the user see certain results?
- Users should be able to interrupt or reverse actions
- Error handling should be simple and easy to comprehend



Navigation: Menus

Advantages

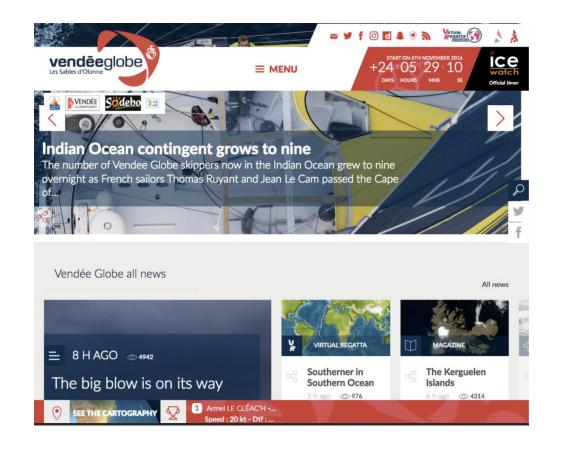
- Easy for users to learn and use
- Certain categories of error are avoided

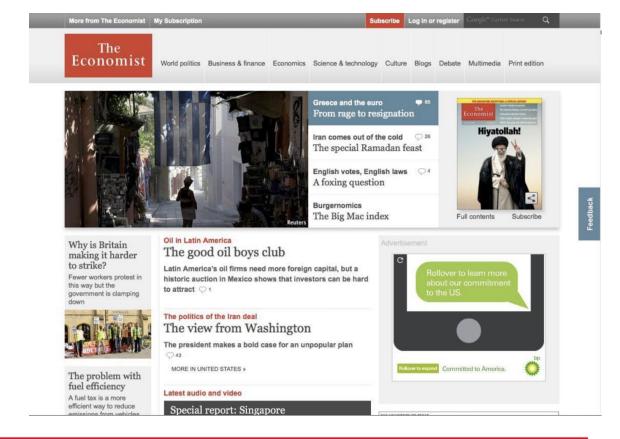
Major difficulty is structure of large number of choices

- Scrolling menus
- Hierarchical
- Associated control panels
- Menus plus command line



Simple is good







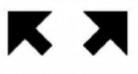
Choices in User Interface Design

For the same interface functions, there may be a choice of user interface designs.

Example: to leave full screen

Keyboard: escape key, control-F

lcon + mouse/touch:









Design choices: Information Presentation

Text

- Precise, unambiguous
- Fast to compute and transmit

Graphics

- Simple to comprehend / learn
- Uses of color
- Variations show different cases



Simple is good: Command line interfaces

Problems with graphical interfaces

- Not suitable for some complex interactions
- Only suitable for human users

Command line interfaces: users interact with computer by typing commands (e.g., Linux shell script)

- Allows complex instructions to be given to computer
- Can be adapted for people with disabilities
- Can be used for formal methods of specification and implementation
- Usually requires learning or training



10. Models for Requirements

(end of lecture)

