

# Welcome

## *Information Architecture*

Abbas Moallem, Ph.D.



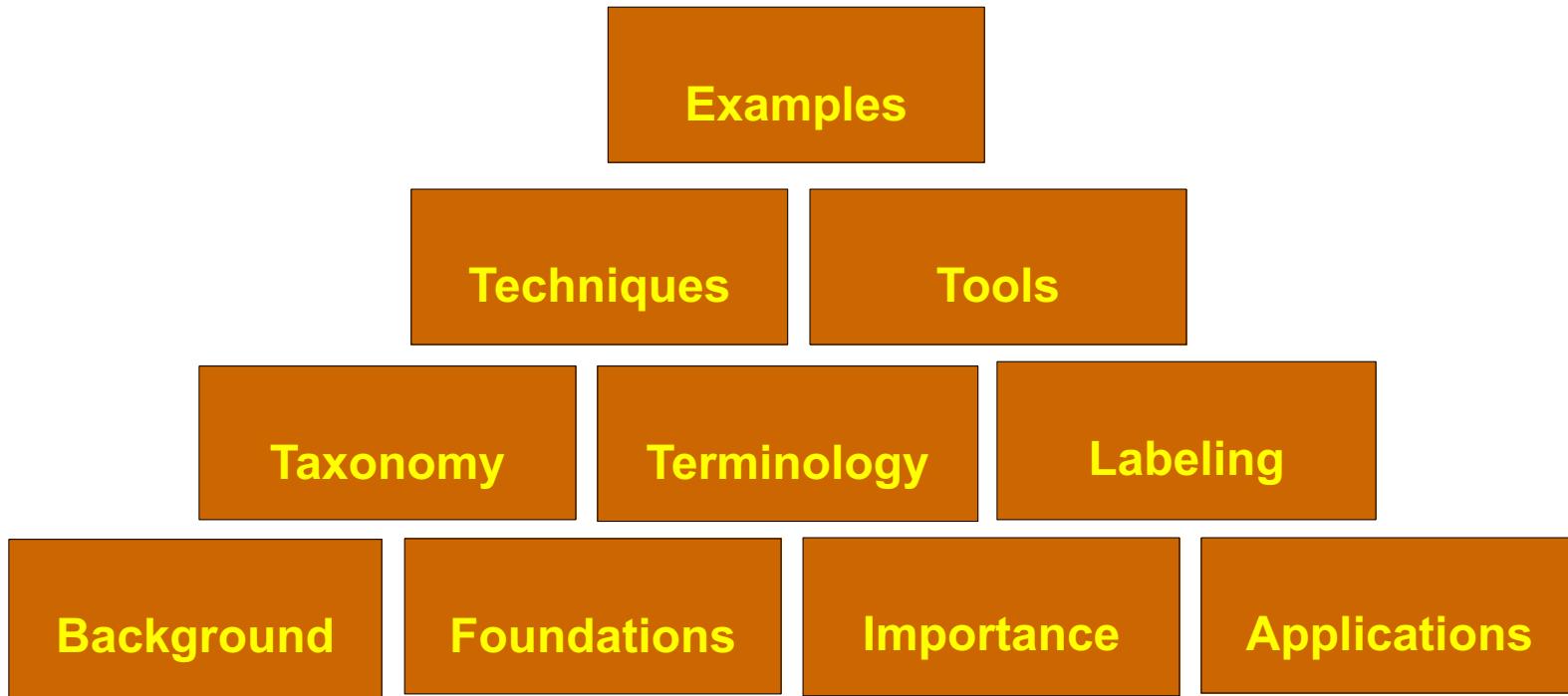
**I think; therefore I am.**

Rene Descartes

# Overview

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2



# • OBJECTIVES: GAINING UNDERSTANDING & SKILLS 3

---

About Information  
Architecture(IA)



IA Importance in human  
computer interaction



Taxonomy, Terminology  
and Labeling



Architecture(IA)  
Techniques



Architecture(IA)  
Tools



Practice Quick  
Activities



- QUESTION

4

# *What is Information Architecture* ?



- ARCHITECTURE

5

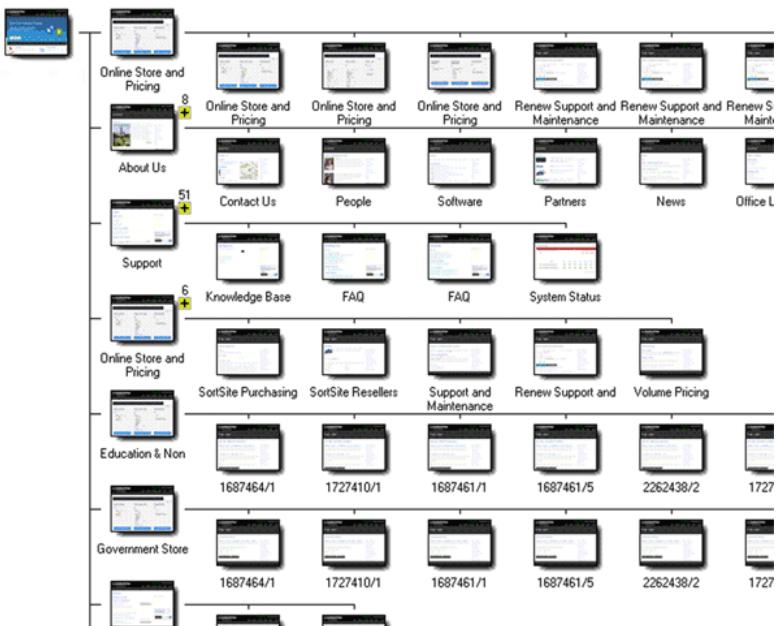


- INFORMATION ARCHITECTURE

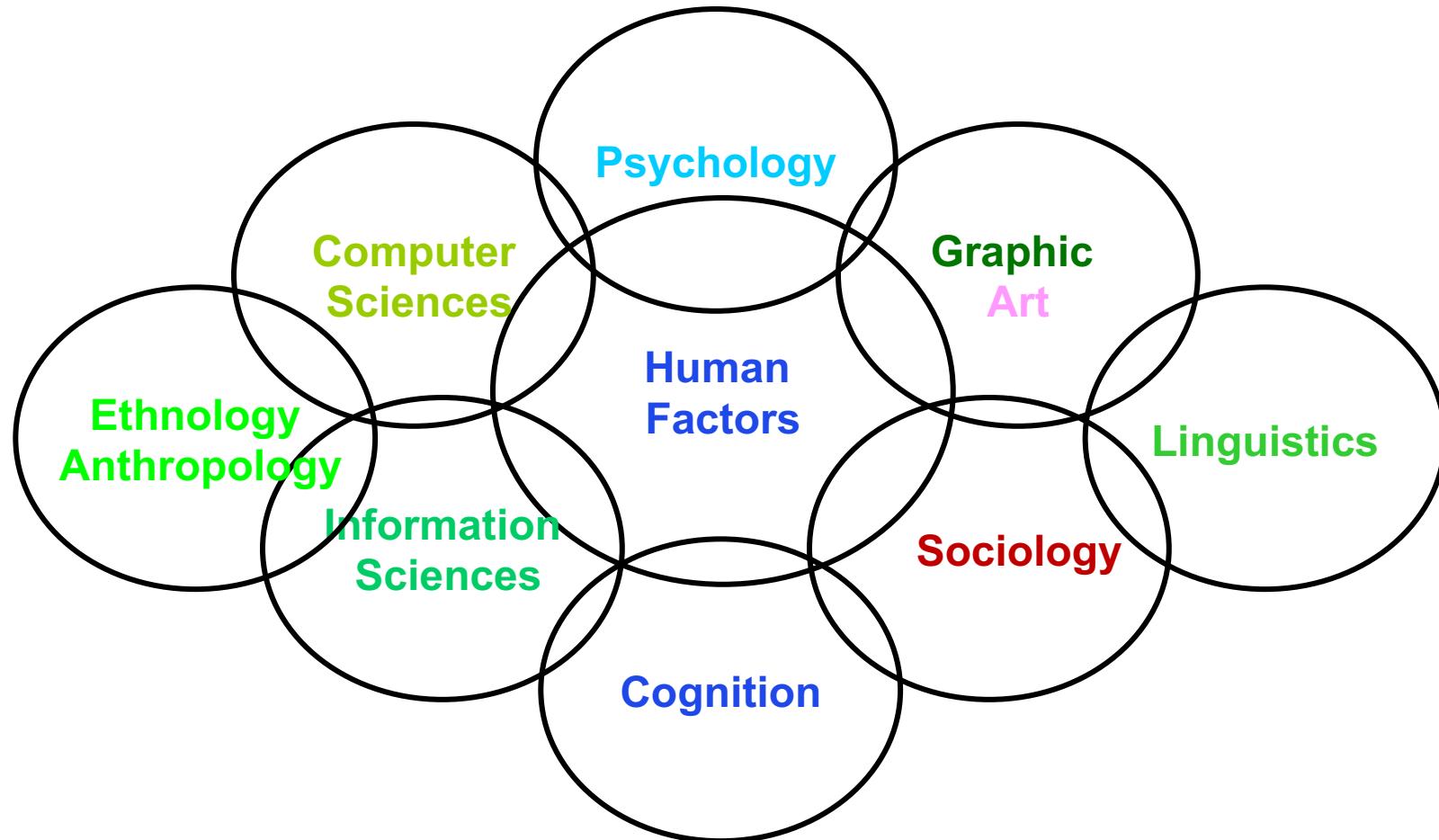


# • STRUCTURE

7



## • DISCIPLINES



# Historical Background

9

## Ancient Book

Cyrus Cylinder



## Hyalographic

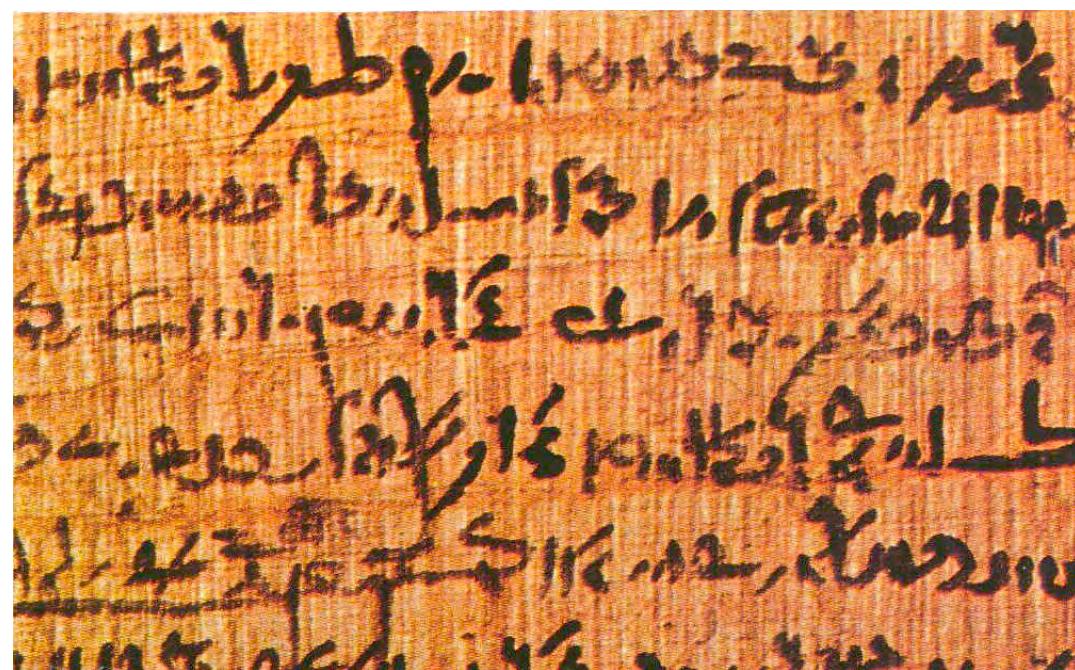
### THE HIEROGLYPHIC ALPHABET

Ch . Sh	Pool : Symbol of immortality.	L	Lion : symbol of strong character.
th	Tetherrope : Symbol of Loyality	m	Owl : Symbol of wisdom and knowledge.
A	Eagle : it : is : A s Symbol of goodtaste and good personality.	n	Water ripple : symbol of clean heart
B	Foot: Symbol of a Courageous Character. Brave personality	o	Lass. : Symbol of charity
CK	basket : Symbol of enjoying life and collecting its frutes	P	Mat: Symbol of eternity.
D	Hand : symbol of helping people and peace	Q	Hillslope : Symbol of a good omen.
E	reed flower : symbol of Justice	R	Mooth : Symbol of telling the truth and never lie
F.V	Horned viper. symbol of skillfulness.	S	Folded cloth Symbol of power.
G	stand for a jar : symbol of long life	T	Loaf Symbol of beauty

# *First papers: Papyrus*

---

- Papyrus was first manufactured in Egypt as far back as the fourth millennium BCE



# Old Book

## Old Books



xii	CONTENTS.
C H A P. XIX.	
Marries an old maid. Her death. Reflections. Reforms. Begins restitution.	262
C H A P. XX.	
Meets his <i>Ineognita</i> at a Play. Waits of her Home. Discovers her self. Engages Marriage.	281
C H A P. XXI.	
Preparations for the wedding. Osborn finds himself heir to his uncle. Discourse on that head.	297
C H A P. XXII.	
Marries. Enters on his estate, and makes full restitution. Adventures with his French wife.	309

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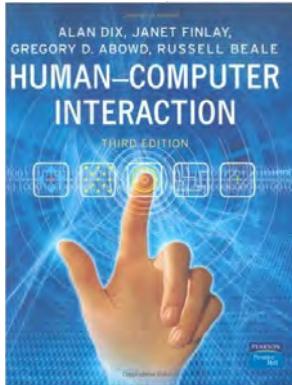
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2.	<i>The Wolf &amp; the Lamb</i>	2
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- **HISTORICAL BACKGROUND**

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# Publishing

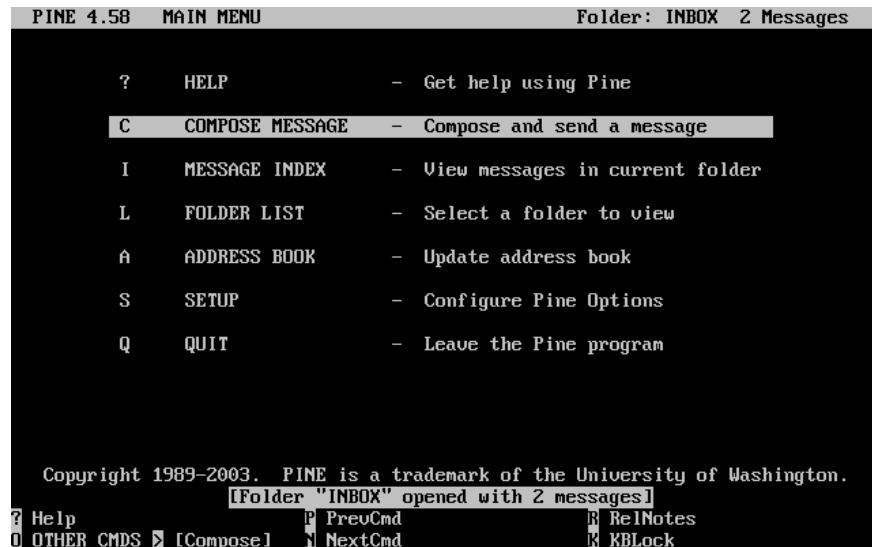


NET FINLAY, RUSSELL BEALE <b>COMPUTER ACTION</b> EDITION	<b>BRIEF CONTENTS</b>	
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# Printing Press

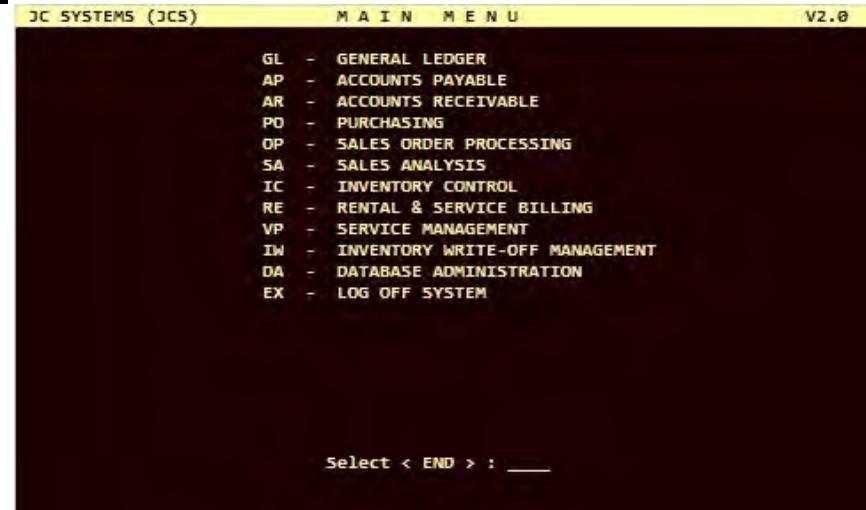


# • EARLY COMPUTER PROGRAMS



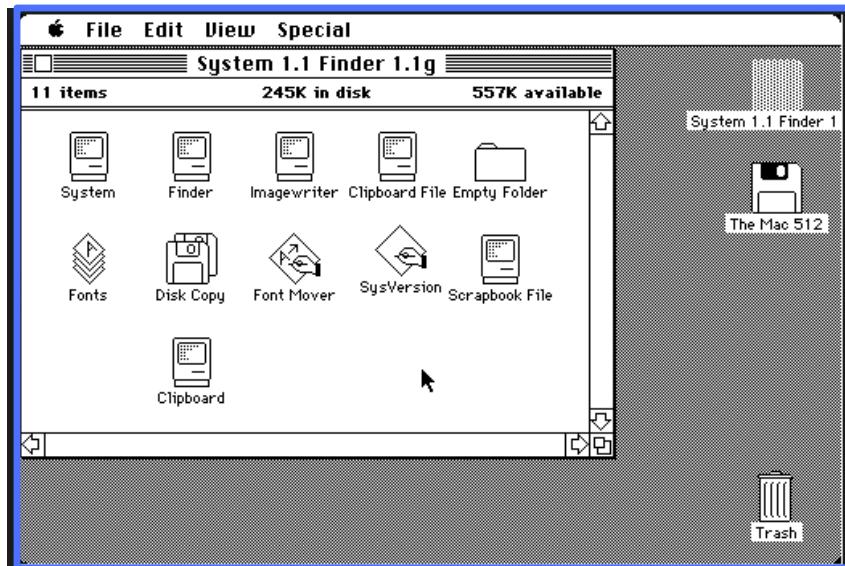
## Menu Structure

### Terminolog



# • GRAPHICAL USER INTERFACE

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Widows

Menu

Icons



WINDOWS 1.0

## • INTERNET

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BBC ONLINE NETWORK HOMEPAGE | SITEMAP | SCHEDULES | BBC INFORMATION | BBC EDUCATION | BBC WORLD SERVICE

**BBC NEWS** UPDATED EVERY MINUTE OF EVERY DAY

News in Audio News in Video Newsdienst Headlines Notícias 国际新闻 热播剧场

Tuesday, December 1, 1998 Published at 04:59 GMT

## Front Page

[World](#)  
[UK](#)  
[UK Politics](#)  
[Business](#)  
[Sci/Tech](#)  
[Health](#)  
[Education](#)  
[Sport](#)  
[Entertainment](#)  
[Talking Point](#)

[On Air](#)  
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### Tax splits EU

Plans to harmonise tax policies across the European Union are placing its members' finance ministers on a collision course.

ALSO:  
[EU finance ministers split](#)  
[Tax harmony within EU?](#)  
[Brown threatens veto over tax](#)

### Top of the class

Tables showing how English

One Hundred Years of C S Lewis



ids Day

nytimes.com - launched in 1995

A screenshot of the 'Welcome to Apple' website from 1996. The page features a red sidebar on the left with links like 'Find It', 'Product Information', 'Customer Support', 'Technology & Research', 'Developer World', 'Groups & Interests', 'Resources Online', and 'About Apple'. The main content area has a large Apple logo and the text 'Welcome to Apple'. A central banner says 'Introducing CyberDrive' with a CD-ROM icon. Below it, a call to action reads 'Register today for a free CD-ROM.' To the right, there's a section for 'iMATE 300' featuring a laptop icon and the text 'Mobile, Affordable, & Smart'. Another section for 'MOVIES FROM MARS' shows a movie camera icon and the text 'QuickTime VR Takes You Out of this World.' At the bottom, there's a 'What's Hot' section with news about Mac OS 8 and a 'Be the First to Know' section.

The screenshot shows the classic 1994 version of the Yahoo! homepage. At the top, there's a banner with various icons representing different categories like Sports, Weather, and Finance. The word "YAHOO!" is prominently displayed in its signature orange font. Below the banner, there's a search bar with the placeholder "Type here to search the Web". To the right of the search bar are buttons for "Search" and "Options". A navigation menu follows, featuring links such as "Home Page", "People Search", "City Maps", "Travel", "Business", "Stock Quotes", and "Auctions". On the left side, there's a large list of category links: Arts, Business and Economics, Computers and Internet, Education, Entertainment, Government, Health, News, Recreation and Sports, Reference, Regional, Science, Social Science, and Society and Culture. Each category link has a small description and a small icon next to it. The overall design is clean and minimalist for its time.

# • TODAY

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The image shows the Target website homepage. At the top, there's a red header bar with the Target logo, navigation links like "sign in / account", "my store" (set to "Mountain View"), "weekly ad", "gift cards", "lists / registries", "REDcard", and "email offers". Below the header is a search bar with a magnifying glass icon and a "your cart" button.

The main content area features a large promotional banner. On the left, a vertical sidebar lists categories: clothing, shoes & jewelry; baby & kids; home, furniture & patio; electronics & office; toys & video games; movies, music & books; sports, fitness & outdoors; beauty, health & pharmacy; grocery, household & pets; gifts, parties & holiday; clearance & deals; and all categories. A young boy is shown on the left side of the banner, holding a broom.

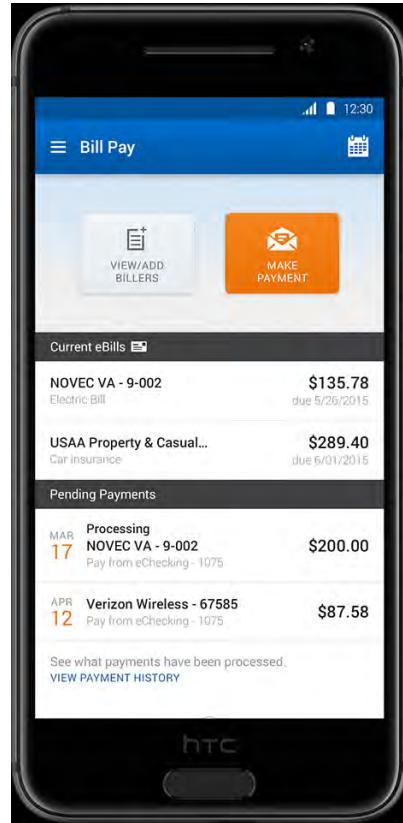
The central banner has a white background with a woman in a pink polo shirt and khaki shorts on the right. Text on the banner includes "free shipping on orders of \$25+ & free returns on every order. view details", "online only", "save 20% when you spend \$75 on outfits for the family.\*", and "clothing | shoes | accessories". To the right, a teal-colored section promotes "BOGO 50% off women's swimwear.\*", "up to 20% off patio furniture & accessories.\*", and "everything you need at Spring Central." A small link "view details" is at the bottom right of the teal section.

At the bottom of the page, there are two promotional boxes: one for "introducing dv" with a deal for \$10 gift card when spending \$50 on women's dv shoes or handbags\*, and another for "free \$10 gift card" when spending \$40 on health essentials.\*

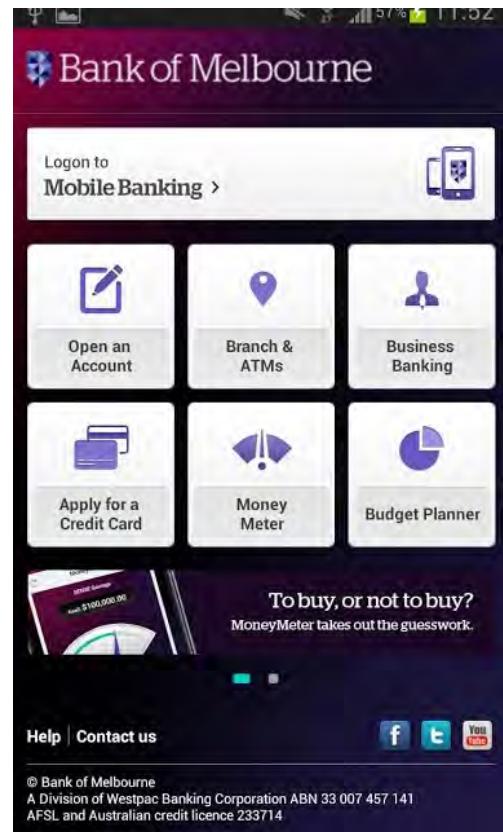
# • MOBILE



**Smaller Real State**



**Simpler Navigation**



**Less Terminology**

- *“The organization, search, and navigation systems that help people to complete tasks, find what they need, and understand what they’ve found.”*



**“Peter Morville”.** O'Reilly Media. Retrieved 13 April 2014.

- “*...the term information architect is "used in the words architect of foreign policy. I mean architect as in the creating of systemic, structural, and orderly principles to make something work — the thoughtful making of either artifact, or idea, or policy that informs because it is clear.*

**“Richard Saul Wurman ”.** *Information Architects.* p. 17.

- *Early Development*
  - *Conceptual Design*
  - *Paper Prototyping*
- *Mid Development*
  - *Navigation Design*
  - *High Fidelity Prototyping*

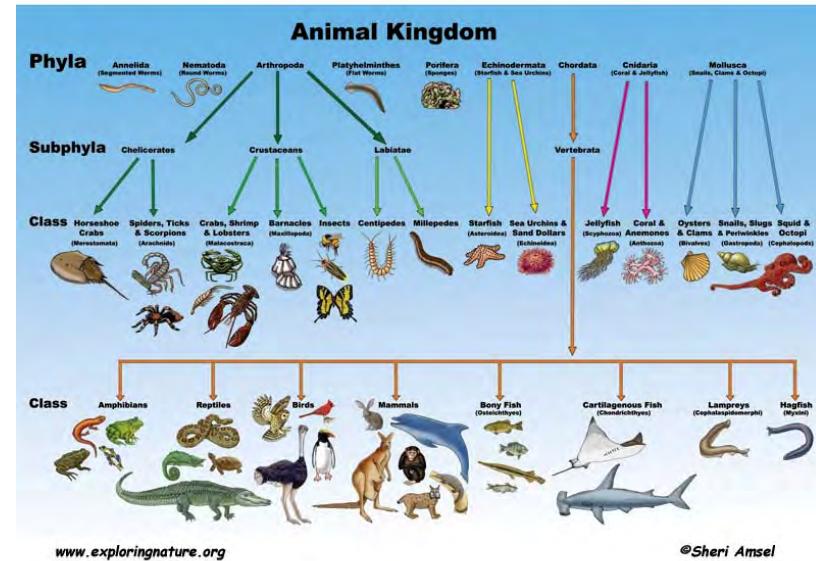


- **TAXONOMY**

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# *What is taxonomy?*

# The study and practice of classification.



Ga	V	Periodic Table																	
S	Ne	1A	2A	3B	4B	5B	6B	7B	8B	8B	1B	2B	3A	4A	5A	6A	7A	8A	
H																			He
Li	Be																		
Na	Mg																		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
Cs	Ba	57-71		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra	89-103		Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Uut	Fl	Uup	Lv	Uus		Uuo
Lanthanoids(57-71)																			
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			

## • EXAMPLE SITE NAVIGATION AND HIERARCHY

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Expert Service. Unbeatable Price.

Weekly Ad Credit Cards Gift Cards Gift Ideas Registry Order Status

**BEST BUY** PRODUCTS SERVICES DEALS

Search Best Buy 

Sign In | Create Account

Appliances

TV & Home Theater

Computers & Tablets

Cell Phones

Cameras & Camcorders

Audio

Car Electronics & GPS

Video Games, Movies & Music

Health, Fitness & Beauty

Connected Home & Housewares

Toys, Games & Drones

Wearable Technology

Shop by Brand

**SAVE UP TO \$200**  
ON SELECT HP COMPUTERS  
[Shop Computers](#)



***The words used in UI do matter.***

Terminology must be understandable to users.



# • STUDY

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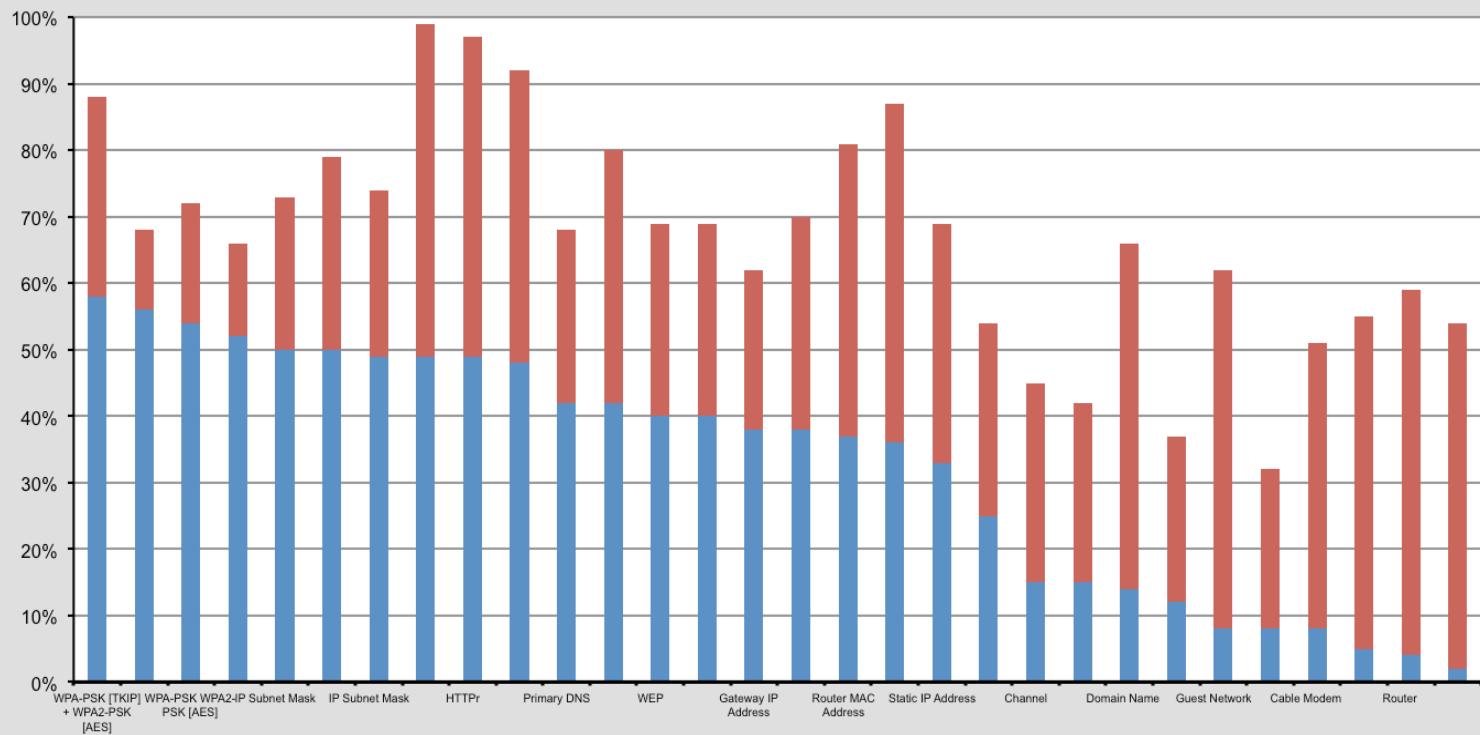
NETGEAR	Linksys	D-Link
<b>Home</b> Internet Wireless Parental Controls ReadySHARE Guest Network <b>Home</b> Internet Wireless Parental Controls ReadySHARE Guest Network <b>Router Information</b> Internet Port Wireless Settings (2.4GHz) Wireless Settings (5.0GHz) Guest Network (2.4GHz) Guest Network (5.0GHz) <b>Setup Wizard</b> WPS Wizard <b>Wireless</b> Internet Setup Wireless Setup Guest Network WAN Setup LAN Setup QoS Setup <b>USB Storage</b> ReadySHARE Advanced Settings	<b>Setup</b> Basic Setup IPv6 Setup Mac Address Clone Advanced Routing <b>Wireless</b> Wireless Settings Guest Access Wireless Mac Filter Security Firewall VPN Passthrough <b>Storage</b> Disk Media Server FTP server Administration Access Restriction Parental Control Applications & Gaming Single Port Forwarding Port Range Forwarding Port Range Triggering DMZ IPv6 Firewall QoS	<b>SETUP</b> <b>INTERNET</b> <b>WIRELESS</b> <b>SETTINGS</b> <b>MEDIA SERVER</b> <b>IPV6</b> <b>PARENTAL CONROL</b> <b>ADVANCED</b> <b>VIRTUAL SERVER</b> <b>APPLICATION RULES</b> <b>QOS ENGINE</b> <b>NETWORK FILTER</b> <b>ACCESS CONTROL</b> <b>WEBSITE FILTER</b> <b>FIREWALL SETTINGS</b> <b>ROUTING</b> <b>ADVANCED WIRELESS</b> <b>WISH</b> <b>WI-FI PROTECTED SETUP</b> <b>ADVACNED NETWORK</b> <b>GUEST ZONE</b> <b>IPV6 FIREWALL</b> <b>IPV6 ROUTING</b> <b>TOOLS</b> <b>ADMIN</b> <b>TIME</b> <b>SYSLOG</b>

# ***30 common terms used in configuration and setting of major Wi-Fi router brands.***

## **Labeling terms used in most router user interfaces**

Cable Modem, Channel, DNS Servers, Domain Name, DSL Modem, Enable SSID Broadcast, FTP (via internet), Gateway IP Address, Guest Network, HTTP (via internet), Hitter, Internet IP Address, IP Address, IP Subnet Mask, IP Subnet Mask, IPv6, Media Server, Modem, Passphrase, Primary DNS, Router, Router MAC Address, Secondary DNS, Static IP Address, USB Settings, WEP, WPA/WPA2 Enterprise, WPA-PSK [TKIP], WPA-PSK [TKIP] + WPA2-PSK [AES], WPA-PSK WPA2-PSK [AES],

- UNDERSTANDABILITY OF THE TERMINOLOGY USED ON HOME NETWORKING DEVICE UI



■ No sure at all ■ Know what it means but not sure.

# • TRANSFORMING INFORMATION ARCHITECTURE

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Wireless Network(2.4GHz b/g/n)

Enable SSID Broadcast  
 Enable Wireless Isolation

Name (SSID): NETGEAR30

Channel: Auto

Mode: Up to 130 Mbps

Security Options

None  
 WPA2-PSK [AES]  
 WPA-PSK [TKIP] + WPA2-PSK [AES]  
 WPA/WPA2 Enterprise

Security Options (WPA2-PSK)

Passphrase: dynamictrumpet879 (8-63 characters or 64 hex digits)

Wireless Network (5GHz a/n)

Enable SSID Broadcast  
 Enable Wireless Isolation  
 Enable Video Network

Name (SSID): NETGEAR30-5G

Channel: 44

Mode: Up to 300 Mbps

Security Options

None  
 WPA2-PSK [AES]  
 WPA-PSK [TKIP] + WPA2-PSK [AES]  
 WPA/WPA2 Enterprise

mictrumpet879 (8-63 characters or 64 hex digits)

Before

NETGEAR® Smart Network

Tom Griffin

Devices Applications WiFi Settings

Today: Wednesday March 15, 2012 10:15am Network on:

My Home Router: Online

2.4 GHz b/g/n 5 GHz a/n

Network Settings

Your Network Name: (Use Your Name) Hamilton  
Both Bands

Password: jessicajones1 Network Best Secure

Network Settings

Security Settings

Security Type

WEP WPA2-PSK WPA-PSK [TKIP] & WEP2-AES

After

Save

---

- **LABELING**

---

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***Labels are the static text used on screens to identify edit boxes, list boxes, images, group boxes, or other graphical user interface controls.***

***Labels are not editable.***

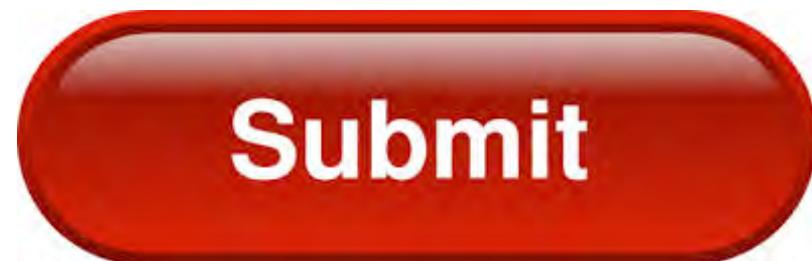
- **LABELS ARE ESSENTIAL FOR USER SUCCESS**

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***If users do not understand a label,  
they are unable to perform the task.***

All of us have probably experienced problems with confusing labels.

***What is the difference between these field labels?  
“Save”, “Submit” and “Apply”***



- EXAMPLE

31

**What is the difference between these field labels?**

- “Find” and another field labeled “Search”.



## • EXAMPLES

Parks & Destinations

**North America**

- Walt Disney World Resort, Florida
- Disneyland Resort, California
- Disney Cruise Line
- Aulani Resort, Hawai'i
- Disney Vacation Club
- Adventures by Disney

**International**

- Disneyland Resort Paris
- Tokyo Disney Resort
- Hong Kong Disneyland Resort
- Shanghai Disney Resort
- Disney Cruise Line
- Adventures by Disney

What's New

Special Offers

North America

Walt Disney World  
Resort, Florida

Disneyland Resort,  
California

Disney Cruise Line

Disney Vacation Club

This is a Disney site therefore repeating "Disney" so many times is not needed.

Show Disney.com

Disney.com

Store Parks & Travel Video Movies Share

DisneyParks

Parks & Destinations

What's New

North America

Inconsistent terms are used here:  
"Parks & Travel" vs.  
"Parks & Destinations"

Castaway Club

Search For...

Cruises & Destinations

Ships & Activities

Search For A Cruise

Planning Center

Find a Cruise

Where do you want to go?

Alaska

Bahamas

California Coast

Caribbean

Europe

Panama Canal

Transatlantic

Departure Ports

When do

2014

Apr Aug Dec

2015

Jan Feb Mar Apr May Jun Jul Aug

Value of a Disney Cruise

New! Holidays

For Adults

For Family

Disney's Castaway Cay

Dover, England

Miami, Florida

Port Canaveral

San Diego, California

San Juan, Puerto Rico

Vancouver, Canada

Inconsistent terms "Search" & "Find"

## • EXAMPLES

33

The screenshot shows the Disney.com homepage with a red dashed circle highlighting the "Cruise Search" button in the main search bar. Another red dashed circle highlights the "Search For A Cruise" button in the top right menu. A blue callout box on the right side contains the text: "Search for a Cruise" and "Cruise Search" are both used. Better to be consistent.

A modal window titled "Warning" displays two error messages: "Please choose a date." and "Please choose a destination." Below the messages are dropdown menus for "Adults", "Children (0-17)", and "More than 5 Guests?", and a currency selector for "US Dollars (USD)". At the bottom are "Okay" and "Find Cruises" buttons.

Terms "Please" and "Choose" are repeated 4 times in 7 warning messages.

- \*Where do you want to go?
- Alaska
- Bahamas
- California Coast
- Caribbean
- Europe
- Panama Canal Cruises
- Transatlantic

These are all cruises. Why is this one labeled differently?

- **METHODS/TECHNIQUES**

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Wire framing

Card Sorting

Organization  
Schemes

Organization  
Structures

Content  
Inventory

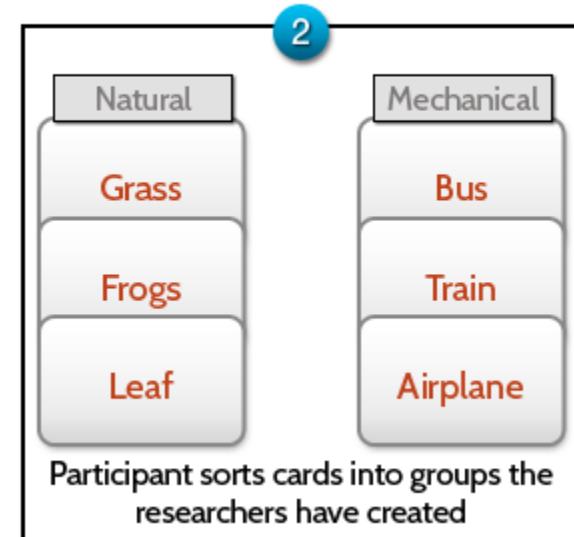
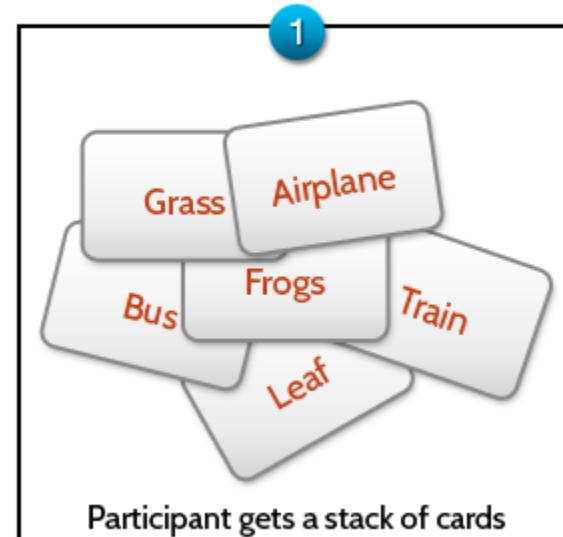
## • CARD SORTING

35

# ***conducting a card sort***

- Write each item on an index card or Post-It
- Ask participants to arrange them into logical categories
- Observe and inquire about their rationale
- Analyze similarities and differences between people

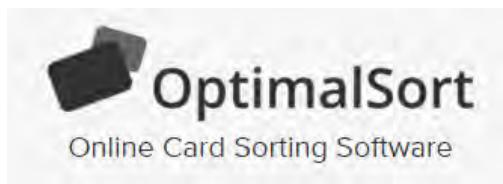
### Closed Card Sort



- **TOOLS**

---

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- **Prototyping Tools**

---



- CONCLUSION

37

***Appling IA rules and principles  
should help you build applications  
that are:***



# Example

---

## Candidate eSignature

I hereby certify the accuracy of the information given on this application and on my accompanying resume. I understand that, if hired, providing false information may be grounds for termination. Additionally, I understand that, if hired, my employment is at-will and may be terminated at any time, with or without cause.

Candidate  
eSignature:  
\*

Candidate  
eSignature  
Date:  
Format:  
M/D/YY \*

**Submit**

# Example

---





# *Summary*

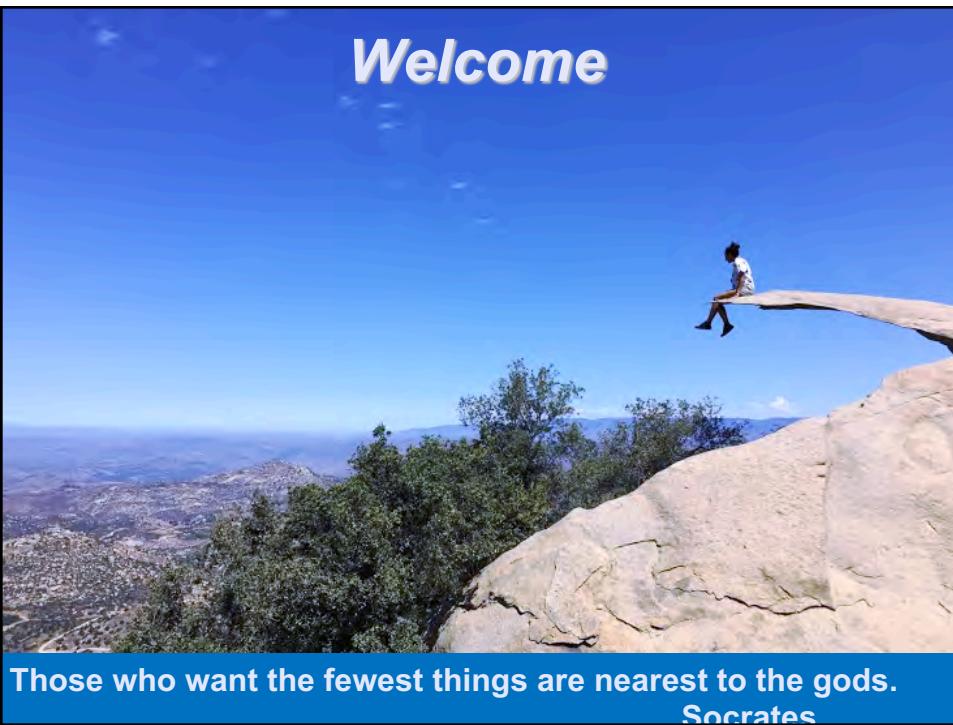
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**Information architecture (IA) focuses on organizing, structuring, and labeling content in an effective and sustainable way.**

**The goal is to help users find information and complete tasks.**

A scenic view of the Aegean Sea under a clear blue sky with scattered white clouds. In the distance, two islands are visible: a smaller one on the left and a larger, more prominent one on the right. The water is a deep, vibrant blue. In the foreground, the tops of some green plants and leaves are visible.

***Thank You For Your  
Participation***



Those who want the fewest things are nearest to the gods.  
Socrates

1

A presentation slide with a red signature mark on the left. At the top right, it says "ISE 164 - HCI". Below that is a photograph of a river flowing through a narrow, rocky canyon. The main title is "Prototyping, UI standards and Guidelines" in bold black font, followed by the author's name "Abbas Moallem, Ph.D.". At the bottom left is the copyright notice "A.Moallem ©" and the number "2" at the bottom right.

2

*1*

ISE 164 - HCI

# **Prototyping**

Session 9

A.Moallem ©

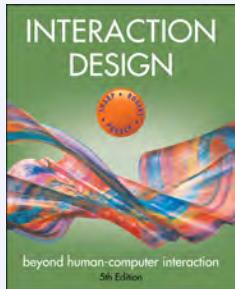
3

3

*1*

## **Required Reading**

ISE 164 - HCI



The cover of the book 'Interaction Design' by Steve Kellogg, 5th Edition. The title 'INTERACTION DESIGN' is at the top. Below it is a circular logo with the words 'STEVE KELLOGG' and 'INTERACTION DESIGN'. The background of the cover features abstract, colorful, flowing lines in shades of blue, green, and orange. At the bottom, it says 'beyond human-computer interaction' and '5th Edition'.

Chapter 12  
Design Prototyping and construction

A.Moallem ©

4

4

# **Prototyping**

ISE 164 - HCI

- What is a prototype?
- Why prototype?
- Different kinds of prototyping
  - Low fidelity
  - High fidelity
- Compromises in prototyping
  - Vertical
  - Horizontal
- Final product needs to be engineered

# **What is a prototype?**

ISE 164 - HCI

In interaction design a prototype is a

- series of screen sketches
- storyboard, i.e. a cartoon-like series of scenes
- PowerPoint slide show
- video simulating the use of a system
- cardboard mock-up
- piece of software with limited functionality written in the target language or in another language

# **What is a prototype?**

ISE 164 - HCI

In other design fields a prototype is a small-scale model:

- a miniature car
- a miniature building or town
- the examples here come from a 3D printer



Figure 11.1 (a) Color output from a 3D printer: all the gears and rods in this model were 'printed' in one pass from bottom to top, and when one gear is turned, the others turn too.

Source: (a) The Computer Language Company, Inc., courtesy of Alan Freedman

## **Prototyping User Interface**

ISE 164 - HCI

- Prototyping is an iterative analysis technique in which users are actively involved in the mocking-up of screens and reports.
- The purpose of a prototype is to show people the possible design(s) for the user interface of an application.
- Prototyping helps create more intuitive user interfaces.



## **Why prototype?**

ISE 164 - HCI

- Evaluation and feedback are central to interaction design
- Stakeholders can see, hold, interact with a prototype more easily than a document or a drawing
- Team members can communicate effectively
- You can test out ideas for yourself
- It encourages reflection: very important aspect of design
- Prototypes answer questions, and support designers in choosing between alternatives

A.Moallem ©

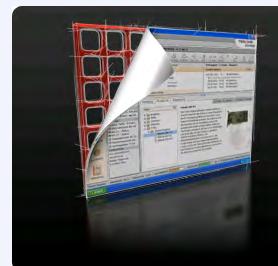
9

9

## **Iterative Design and Prototyping**

ISE 164 - HCI

- Iterative design overcomes inherent problems of incomplete requirements.
- Prototypes
  - simulate or animate some features of intended system
  - different types of prototypes
  - throw-away
  - incremental
  - evolutionary
- Management Issues
  - time
  - planning
  - non-functional features
  - contracts



A.Moallem ©

10

10

# **Techniques for Prototyping**

ISE 164 - HCI

- **Storyboards**

- need not be computer-based
- can be animated

- **Limited functionality simulations**

- some part of system functionality provided by designers
- tools like HyperCard are common for these
- Wizard of Oz technique

- **Warning about iterative design**

- design inertia – early bad decisions stay bad
- diagnosing real usability problems in prototypes....
- .... and not just the symptoms



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# **Building Prototypes**

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- **Prototyping Methods**
- **Prototyping Type**
- **Prototyping Techniques**
- **Prototyping Tools**
- **Prototyping Design Guidelines**



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## **Prototyping Methods**

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- **Low Fidelity Prototyping (paper prototyping):**
  - A hand-drawn prototype that shows its basic/rough functionality.
- **High Fidelity Prototyping (Electronic prototyping)**
  - Shows the screens but not the data that will be displayed on them,
  - Screens with data.



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## **Conceptual Design**

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- **Transform user requirements/needs into a conceptual model**
- **A conceptual model is an outline of what people can do with a product and what concepts are needed to understand and interact with it**
- **Mood board may be used to capture feel**
- **Consider alternatives: prototyping helps**

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## **Low-fidelity Prototyping**

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- Uses a medium which is unlike the final medium, e.g. paper, cardboard
- Is quick, cheap and easily changed
- Examples:
  - sketches of screens, task sequences, etc
  - ‘post-it’ notes
  - storyboards
  - ‘Wizard-of-Oz’

## **Paper Prototyping Benefits**

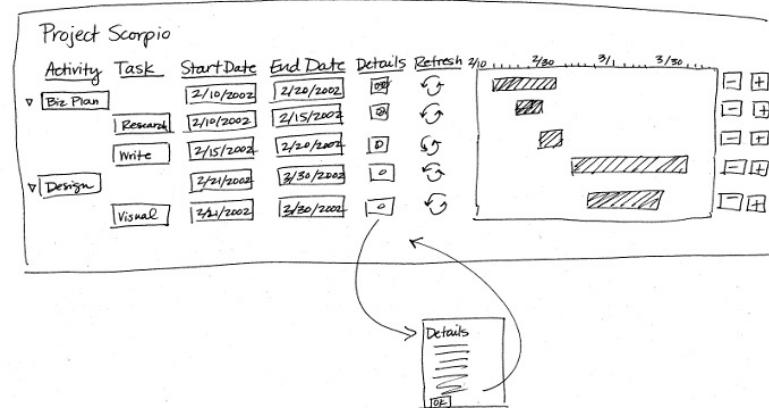
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- Tests the design with users before coding.
- Makes fast changes possible.
- Finds out what users really want.
- Eliminates technology variables from the equation.
- Gives complete control over how the interface should behaves.
- Provides a faster and cheaper approach



## Examples of Paper Prototypes

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## Examples of Paper Prototypes

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A hand-drawn paper prototype titled "Project Scorpio Activities". It features a table with columns for Activity, Task, Start Date, End Date, Actual Start Date, Actual Complete Date, Details, Status, Issues, and Run Reports. A separate "Details" box is shown with arrows pointing to specific task rows.

Activity	Task	Start Date	End Date	Actual Start Date	Actual Complete Date	Details	Status	Issues	Run Reports
Biz Plan	Write	2/10/2002	2/20/2002	2/10/2002	2/20/2002	60	10	0	2
	Research	2/15/2002	2/20/2002	2/15/2002	2/20/2002	60	0	0	0
	Visual	2/21/2002	2/28/2002	2/21/2002	2/28/2002	60	0	0	0
Prototype	HTML	3/1/2002	3/1/2002	3/1/2002	3/1/2002	60	1	0	2
	Icons	3/1/2002	3/1/2002	3/1/2002	3/1/2002	60	0	0	0
	Design	3/1/2002	3/1/2002	3/1/2002	3/1/2002	60	0	0	0
Development	Code	3/1/2002	4/1/2002	3/1/2002	4/1/2002	60	1	0	2
	UI	3/1/2002	4/1/2002	3/1/2002	4/1/2002	60	1	0	2
	GA	3/15/2002	3/28/2002	3/15/2002	3/28/2002	60	0	0	0

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## ***Creating a Paper Prototype***

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- Use screen shots of an existing design or hand-sketch them, especially in the early stages of design.
- Hand-drawn elements are actually more readable than screen shots that use a dark background color.
- Mix and match screen shots and hand-drawn components.

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## ***Paper Prototyping Tools***

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- Simple office supplies
  - Flip-chart, felt pens, construction paper, and acetate (overhead), screen shots of an existing design
- Visio
  - Diagramming and Drawing Tool for Business and Technical Professionals



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## **Use Paper Prototyping For:**

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- Concepts and terminology
- Navigation/workflow
- Content
- Page layout
- Functionality



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## **Paper Prototyping Is Not Ideal for:**

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- Technical feasibility
- Download time or other response time
- Colors and fonts



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## *Tips for creating Paper Prototypes*

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- Use words instead of images or icons.
- Use grayscale printouts of screen shots, or sketches using any dark-colored marker.
- Consistent sizing of components is not an absolute necessity.
- Use of straight lines or typed text is not necessary.



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## *Is there a suitable metaphor?*

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- Interface metaphors combine familiar knowledge with new knowledge in a way that will help the user understand the product.
- Three steps: understand functionality, identify potential problem areas, generate metaphors
  - Evaluate metaphors:
    - How much structure does it provide?
    - How much is relevant to the problem?
    - Is it easy to represent?
    - Will the audience understand it?
    - How extensible is it?

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## **Explore the user's experience**

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- Use personas, card-based prototypes to model the user experience
- Visual representation called:
  - design map
  - customer/user journey map
  - experience map
- Two common representations
  - wheel
  - timeline

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## **Generate card-based Prototype from Use Case**

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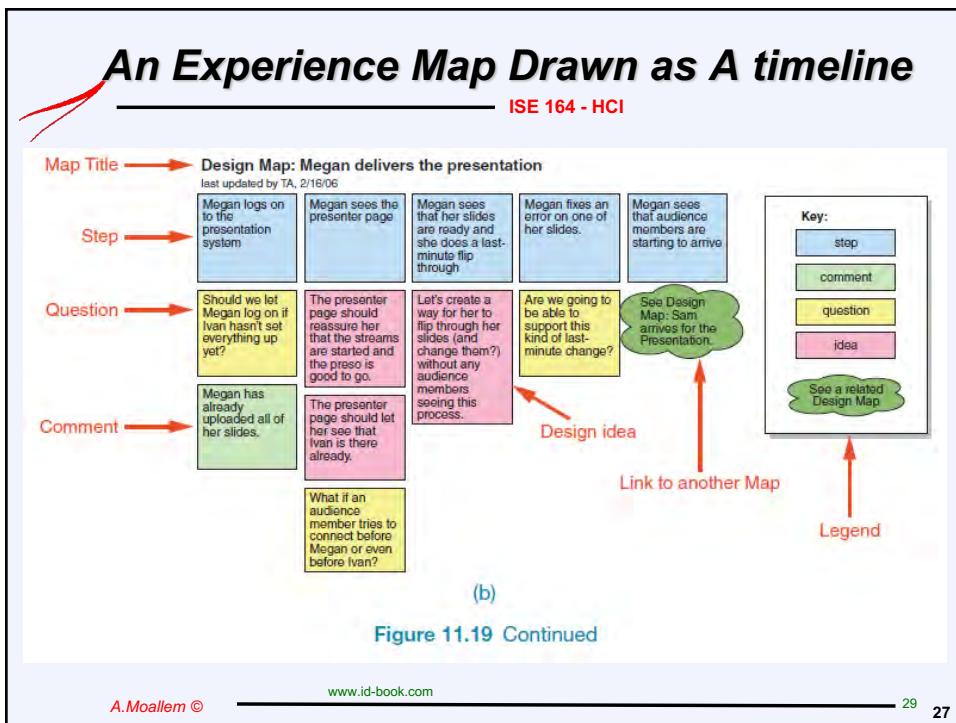
Figure 11.6 Prototype developed for cell phone user interface

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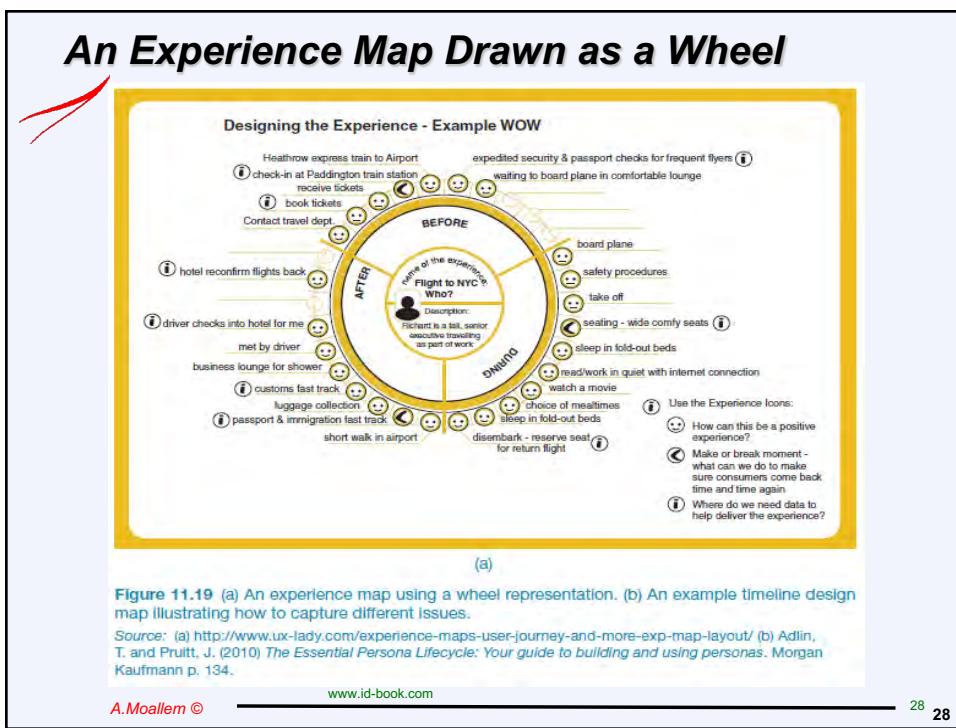
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## Storyboards

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- Often used with scenarios, bringing more detail, and a chance to role play
- It is a series of sketches showing how a user might progress through a task using the device
- Used early in design

## Storyboards

ISE 164 - HCI

- Often used with scenarios, bringing more detail, and a chance to role play
- It is a series of sketches showing how a user might progress through a task using the device
- Used early in design

## Example storyboard

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Type	Advantages	Disadvantages
Low-fidelity prototype	Lower development cost Evaluates multiple design concepts Useful communication device Addresses screen layout issues Useful for identifying market requirements Proof of concept	Limited error checking Poor detailed specification to code to Facilitator-driven Limited utility after requirements established Limited usefulness for usability tests Navigational and flow limitations
High-fidelity prototype	Complete functionality Fully interactive User-driven Clearly defines navigational scheme Use for exploration and test Look and feel of final product Serves as a living specification Marketing and sales tool	More resource-intensive to develop Time-consuming to create Inefficient for proof-of-concept designs Not effective for requirements gathering

Table 11.3 Advantages and disadvantages of low- and high-fidelity prototypes

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## Sketching

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- Sketching is important to low-fidelity prototyping
- Don't be inhibited about drawing ability. Practice simple symbols

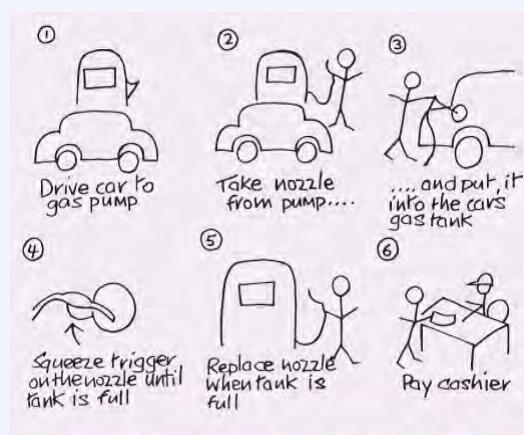


Figure 11.5 A storyboard depicting how to fill a car with gas

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# Card-based prototypes

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- Index cards (3 X 5 inches)
- Each card represents one screen or part of screen
- Often used in website development

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## Generate storyboard from scenario

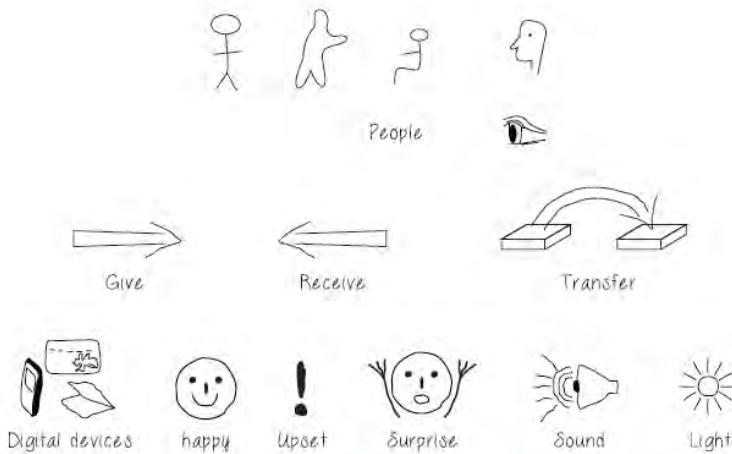


Figure 11.4 Some simple sketches for low-fidelity prototyping

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## Generate Storyboard from Scenario

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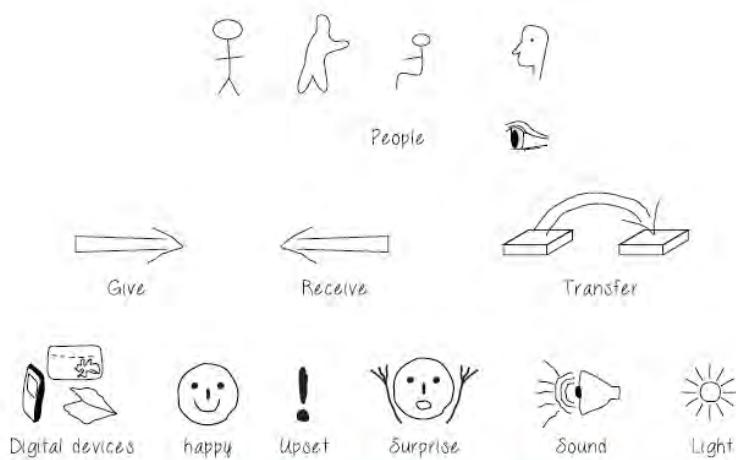


Figure 11.4 Some simple sketches for low-fidelity prototyping

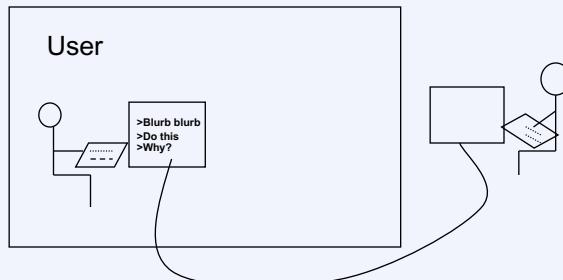
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## 'Wizard-of-Oz' prototyping

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- The user thinks they are interacting with a computer, but a developer is responding to output rather than the system.
- Usually done early in design to understand users' expectations
- What is 'wrong' with this approach?



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## **High-fidelity prototyping**

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- Uses materials that you would expect to be in the final product
- Prototype looks more like the final system than a low-fidelity version
- High-fidelity prototypes can be developed by integrating existing hardware and software components
- Danger that users think they have a complete system.....see compromises

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## **Concrete Design**

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- Many aspects to concrete design
  - Color, icons, buttons, interaction devices etc.
- User characteristics and context
  - Accessibility, cross-cultural design
- Cultural website guidelines
- successful products
  - “are ... bundles of social solutions. Inventors succeed in a particular culture because they understand the values, institutional arrangements, and economic notions of that culture.”

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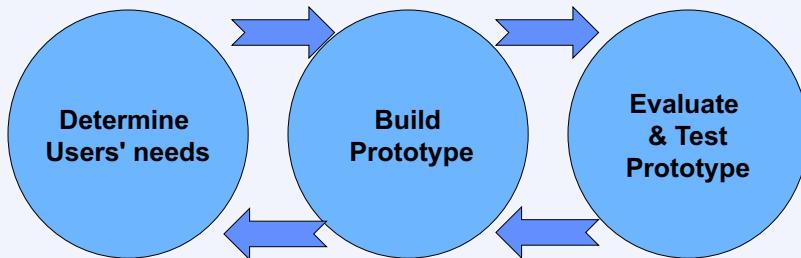
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## **Prototyping process**

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**There are three steps to the prototyping process:**



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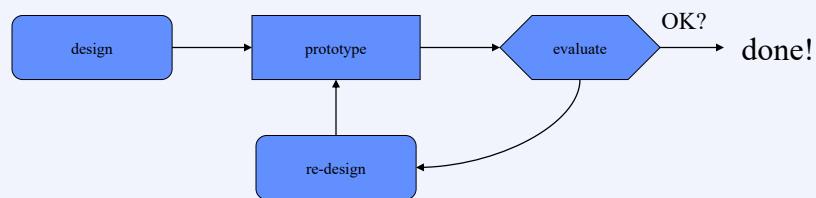
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## **Prototyping**

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- You never get it right first time
- if at first you don't succeed ...



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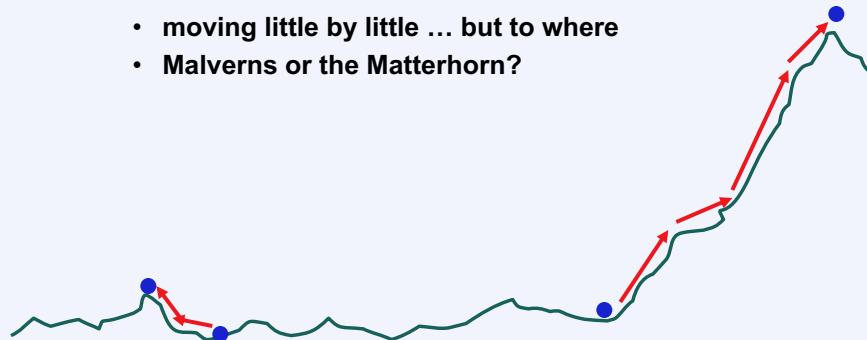
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## Pitfalls of Prototyping

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- moving little by little ... but to where
- Malverns or the Matterhorn?



1. need a good start point
2. need to understand what is wrong

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## Prototyping Tools

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- Low Fidelity Prototyping Tools
  - Paper and Pencil
  - Visio or any other similar applications
- Hi Fidelity Prototyping
  - PowerPoint
  - Excel
  - Axure Software - Home - wireframe, prototype ...
    - <http://www.axure.com/>
- JIM-Justinmind
  - <https://www.justinmind.com/>
- ADOBE
  - InDesign, Dreamweaver

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## **What to prototype?**

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- Technical issues
- Work flow, task design
- Screen layouts and information display
- Difficult, controversial, critical areas

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## **Overview**

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- Design rules
  - Introduction
  - Principles to support usability
  - Standards
  - Guidelines
  - Golden rules and heuristics
  - HCI patterns
  - Summary Exercises
  - Required Reading
- QA

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# Design Rules

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Designing for maximum usability  
– the goal of interaction design

- Principles of usability
  - general understanding
- Standards and guidelines
  - direction for design
- Design patterns
  - capture and reuse design knowledge

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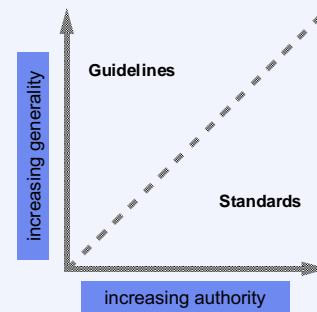
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# Types of Design Rules

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- Principles
  - abstract design rules
  - low authority
  - high generality
- Standards
  - specific design rules
  - high authority
  - limited application
- Guidelines
  - lower authority
  - more general application



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# Filtering dimensions of prototyping

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Filtering dimension	Example variables
Appearance	size; color; shape; margin; form; weight; texture; proportion; hardness; transparency; gradation; haptic; sound
Data	data size; data type (e.g., number; string; media); data use; privacy type; hierarchy; organization
Functionality	system function; users' functionality need
Interactivity	input behavior; output behavior; feedback behavior; information behavior
Spatial structure	arrangement of interface or information elements; relationship among interface or information elements – which can be either two- or three-dimensional, intangible or tangible, or mixed

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## Considering Interaction and Interface Types

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- Which interaction type?
- How the user invokes actions
- Instructing, conversing, manipulating or exploring
- Do different interface types provide insight?
- shareable, tangible, augmented reality, etc.

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## **Manifestation dimensions of prototyping**

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Manifestation dimension	Definition	Example variables
Material	Medium (either visible or invisible) used to form a prototype	Physical media, e.g. paper, wood, and plastic; tools for manipulating physical matters, e.g. knife, scissors, pen, and sandpaper; computational prototyping tools, e.g. Macromedia Flash and Visual Basic; physical computing tools, e.g. Phidgets and Basic Stamps; available existing artifacts, e.g. a beeper to simulate a heart attack
Resolution	Level of detail or sophistication of what is manifested (corresponding to fidelity)	Accuracy of performance, e.g. feedback time responding to an input by a user (giving user feedback in a paper prototype is slower than in a computer-based one); appearance details; interactivity details; realistic versus faked data
Scope	Range of what is covered to be manifested	Level of contextualization, e.g. website color scheme testing with only color scheme charts or color schemes placed in a website layout structure; book search navigation usability testing with only the book search related interface or the whole navigation interface

Table 11.2 The definition and variables of each manifestation dimension

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## **Using Scenarios**

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- **Express proposed or imagined situations**
  - Used throughout design in various ways
  - as a basis for overall design
  - scripts for user evaluation of prototypes
  - concrete examples of tasks
  - as a means of co-operation across professional boundaries
- **Plus and minus scenarios to explore extreme cases**

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## **Construction: SDKs**

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- Express proposed or imagined situations
- Used throughout design in various ways
  - as a basis for overall design
  - scripts for user evaluation of prototypes
  - concrete examples of tasks
  - as a means of co-operation across professional boundaries
- Plus and minus scenarios to explore extreme cases

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## **Expanding the initial conceptual model**

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- What functions will the product perform?
  - - What will the product do and what will the human do (task allocation)?
- How are the functions related to each other?
  - Sequential or parallel?
  - Categorizations, e.g. all actions related to privacy on a smartphone
- What information is needed?
  - - What data is required to perform the task?
  - - How is this data to be transformed by the system?

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## **Compromises in Prototyping**

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- All prototypes involve compromises
- For software-based prototyping maybe there is a slow response? sketchy icons? limited functionality?
- Two common types of compromise
  - horizontal: provide a wide range of functions, but with little detail
  - vertical: provide a lot of detail for only a few functions
- Compromises in prototypes mustn't be ignored. Product needs engineering

## **Questions**

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## **Summary**

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- Different kinds of prototyping are used for different purposes and at different stages
- Prototypes answer questions
- The final product must be engineered appropriately
- Two aspects of design: conceptual and concrete
- To generate conceptual design, consider interface metaphors, interaction types and interface types
- Storyboards can be generated from scenarios
- Card-based prototypes can be generated from use cases
- Physical computing kits and SDKs facilitate transition from design to construction

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See You Next Week

Thank You For Your Participation

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## ***Construction: physical computing***

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- Build and code prototypes using electronics
- Toolkits available include
  - Arduino
  - LilyPad (for fabrics)
  - Senseboard
  - MaKey MaKey
- Designed for use by wide range of people

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## ***Construction: Physical Computing***

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- Build and code prototypes using electronics
- Toolkits available include
  - Arduino
  - LilyPad (for fabrics)
  - Senseboard
  - MaKey MaKey
- Designed for use by wide range of people

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## ***Physical computing kits***

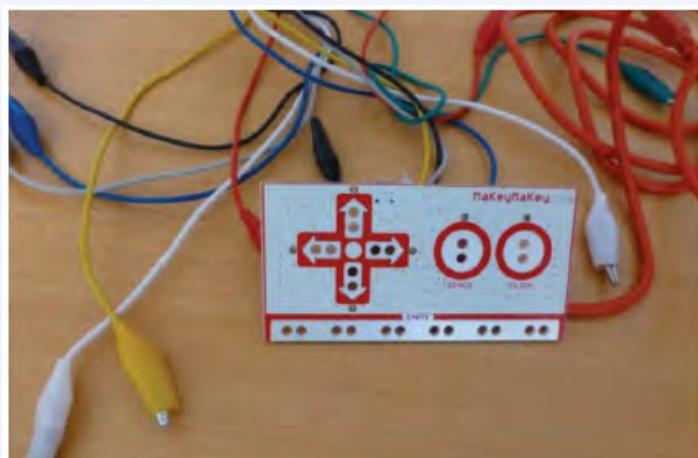


**Figure 11.22** The Arduino board

Source: Courtesy of Nicolai Marquardt

## ***Physical computing kits***

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**Figure 11.24** The MaKey MaKey toolkit

## Physical computing kits

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Figure 11.25 A group of retired friends playing with a MaKey MaKey toolkit

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