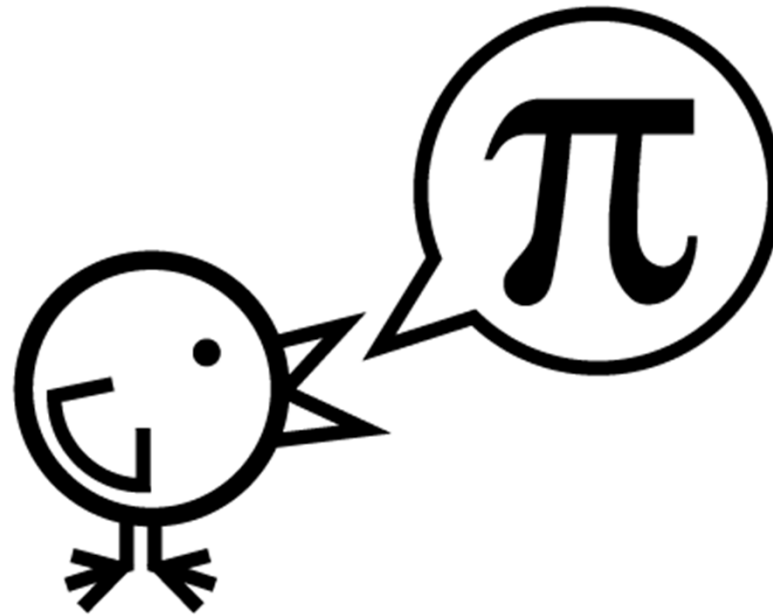


Usability Bites

Information Architecture



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University of Oviedo, Spain

www.hci.uniovi.es

How to Read this Book

Special symbols used in this document



Bibliographic References:

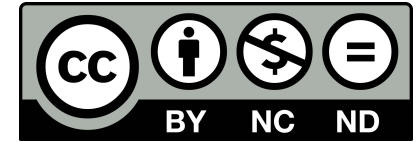
- Quick references are included in the footer of the slides where the cited text appears.
 - Full bibliographic references are included at the end of the book in the Appendix C: *References*.



Technological Terror
(Video [00:52])

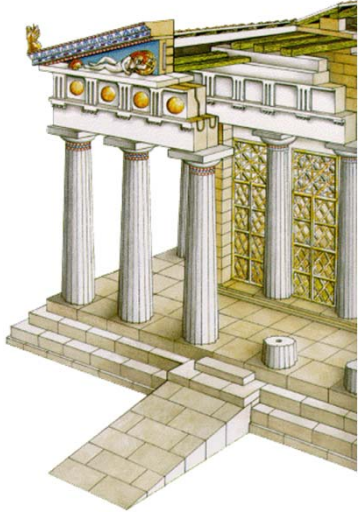
Videos:

- All videos included in this multimedia presentation are available at the *Usability Bites's play list*.
 - You can play them at www.youtube.com from www.martin-gonzalez.es ► academics ► resources.



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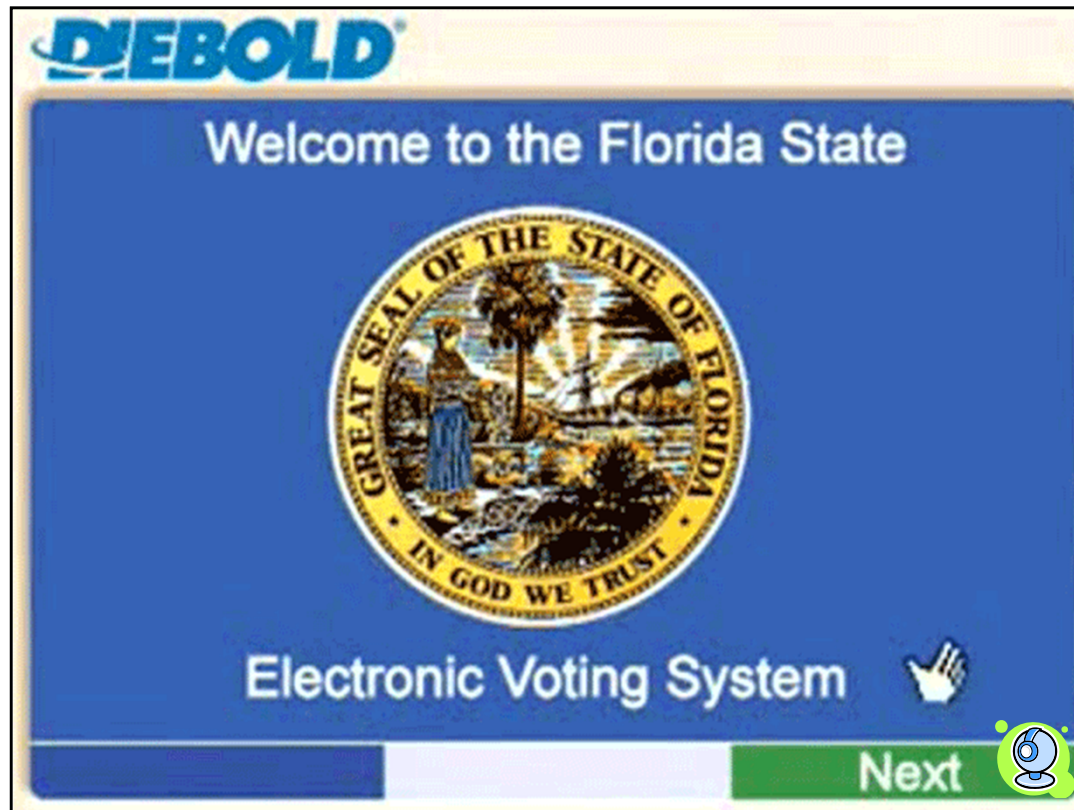


Information Architecture

Intuitive Interaction

Good design doesn't happen by chance

❖ Bad design probably neither 😊



Boom Chicago of Amsterdam (2004) *Vote for Bush* (Video [01:18])

Intuitive Interaction

Bad design has a social cost

- ❖ People become frustrated when they are not capable of doing what they are required to.



Bad day (Video [00:26]) and *Bad Day, the Revenge* (Video [00:32])



Bad Day at the Office (Video [01:31])

Should I care about it?

Bad design has a huge economic cost

- ❖ If users experience interaction problems:
 - They could never come back to the site¹.
 - They might avoid visiting similar sites in the future².
- ❖ Usability plays a crucial role in the quality of a product.
 - Profit obtained when investing in usability could be more than 5,000 times the cost³.

¹Nielsen, Jakob; (2000). *Designing Web Usability*.

²Krug, Steve; (2005). *Don't make me think!*

³Nielsen, Jakob; (1993). *A Mathematical model for the Finding of Usability Problems*.



Should I care about it?

Human Dimension of Innovation rules

❖ iPod versus Segway (circa 2001).



Bad Design: Case of Study

Shortest distance between two points...

- ❖ Good designs do not require user manuals!



www.michaelsalomon.com



Bad Designs (2007) www.baddesigns.com

Bad Design: Case of Study

This toy didn't seem to work

- ❖ It was massively returned by customers!
 - The toy was supposed to speak when the hand was pushed.



Bad Designs (2007) www.baddesigns.com



First time in use, battery protection had to be removed!

It was hidden in behind the toy's back, so nobody noticed it even existed!

Bad Design: Case of Study

Bad design costs lives too

Helios Airways Ghost Flight 522¹

14 August 2005. Flight from Larnaca (Cyprus) was in route to Athens, scheduled to continue to Prague.

After flight failed to contact air traffic control upon entering Greek air space, two F-16 fighters were scrambled to establish visual contact.

Aircraft appeared to be on **autopilot**.

The fighter pilot saw that the first officer was slumped motionless on the controls, and that the captain was not in the cockpit.

Oxygen masks were seen dangling in the passenger cabin.



¹Wikipedia; (2012). *Helios Airways Flight 522*.

Bad Design: Case of Study

Bad design cost lives too

Helios Airways Ghost Flight 522

F-16 pilots saw a flight attendant enter the cockpit and sit at the controls, seemingly trying to regain control of the aircraft.

He eventually noticed the F-16, and signaled him. The F-16 Pilot pointed forward as if to say, *can you carry on flying?*

Flight attendant shook his head and pointed down as if to say, *no, we're going down.*

Within minutes, first engine, then the second engine, stopped and the aircraft began to descend. The flight attendant grabbed the yoke and tried to steer the aircraft clear of the mountain...



Bad Design: Case of Study

Bad design cost lives too

Helios Airways Ghost Flight 522

The plane continued to descend, hitting the ground and exploding. All 121 people on board were killed.

Accident Research

Before take-off the crew failed to set the pressurization system to *Auto*.

Minutes after take-off the cabin altitude horn was activated.

This model of Boeing 737 has a warning horn **which is used both** to signal loss of pressurization and incorrect take-off configuration such as incorrect flap or trim settings.



Bad Design: Case of Study

Bad design cost lives too



Discovery Channel (2006) *Helios Ghost Flight* (Video [08:50])

Helios Airways Ghost Flight 522

Decompression would have been fairly gradual as the aircraft climbed under the control of the flight management system.

The crew may have failed to realize that the warning horn indicated pressurization failure and became incapacitated by hypoxia.

Two major faulty designs:

1. Using the same horn to provide **two different** kinds of information.
2. Pressurization system allowed taking off on *manual* mode **without any warning signal**.



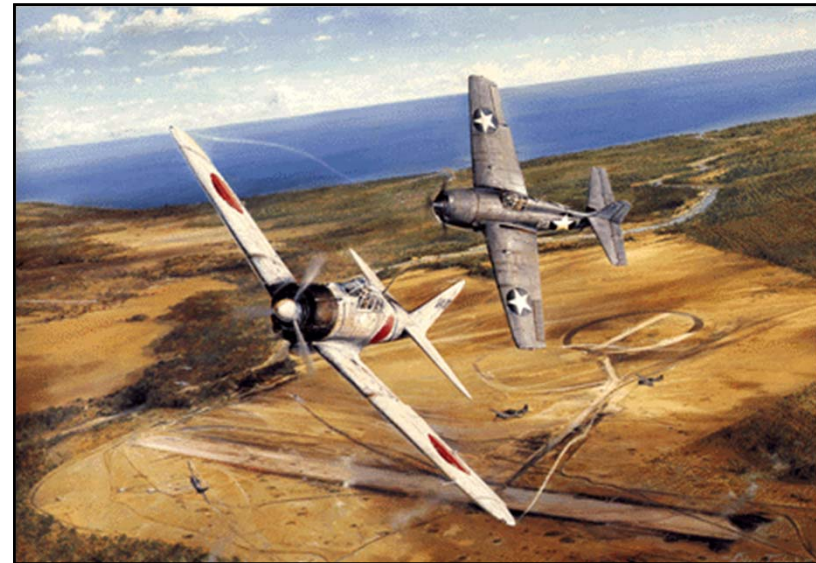
The Origin of the Human Factors Engineering

This discipline was born during WW II

- ❖ Campaign of the Pacific (late 1943).
 - Americans are winning the air warfare.
 - Japanese *Zeros* aren't rivals for the new American *Hellcat* fighters.



Dave's war birds; (2007) www.daveswarbirds.com



Dave's war birds; (2007) www.daveswarbirds.com

The Origin of the Human Factors Engineering

However, the number of accidents increased

- ❖ Veteran pilots were killed on routine tasks
 - Aircraft lost on patrol or escort duties.
 - Most of the accidents took place during landings and take offs.



Carrier Crash (Video [02:20])

The Origin of the Human Factors Engineering

Main accident cause: lack of standardization

- ❖ Large list of aircraft companies.
 - Curtiss, Boeing, Northrop, Grumman, Beechcraft, Vough, Huff-Daland, Douglas, etc.
 - Controls and displays were located in different positions depending on each manufacturer and model!



Grumman's Hellcat



Vough's Corsair



Grumman's Willcat

The Origin of the Human Factors Engineering

Interaction changes under pressure

- ❖ Landing on a carrier is a very difficult task.
 - In case of emergency, veteran pilots tried to use the controls learnt in their first aircraft.



Grumman's Hellcat



Stupid Thief (Video [00:43])

Standards: Case of Study

Did the manufacturers learn the lesson?

- ❖ Standards is the safest design guideline.
 - Airliners under testing:
 - Boeing 737NG series.
 - Airbus A32x series.
 - MacDonnell Douglas MD-80 series.



Ronny Busch; (2007) *US Airways Boeing 737-3S3*
www.airliners.net



James Mepsted; (2007) *Airfrance Airbus A319-111*
www.airliners.net



Martin Djupenstrom; (2007) *Alitalia McDonnell Douglas MD-82*
www.airliners.net

Standards: Case of Study

Boeing B737 NG cockpit



Photo Copyright B. Robert

www.airliners.net

DISCUSSION: Look for the differences between B737 and A320 cockpits

[20] Jan-14

Standards: Case of Study

Airbus A320 cockpit



www.airliners.net

NEXT: MD-80 series

[21] Jan-14

Standards: Case of Study

McDonnell Douglas MD-80 cockpit



www.airliners.net

Standards in Web Design: Search Box

www.apple.com



Apple Computer; (2007) www.apple.com

HOMEWORK: Is the Search Box location (top-right corner) Standard?

[23] Jan-14

Standards in Web Design: Search Box

www.ebay.com

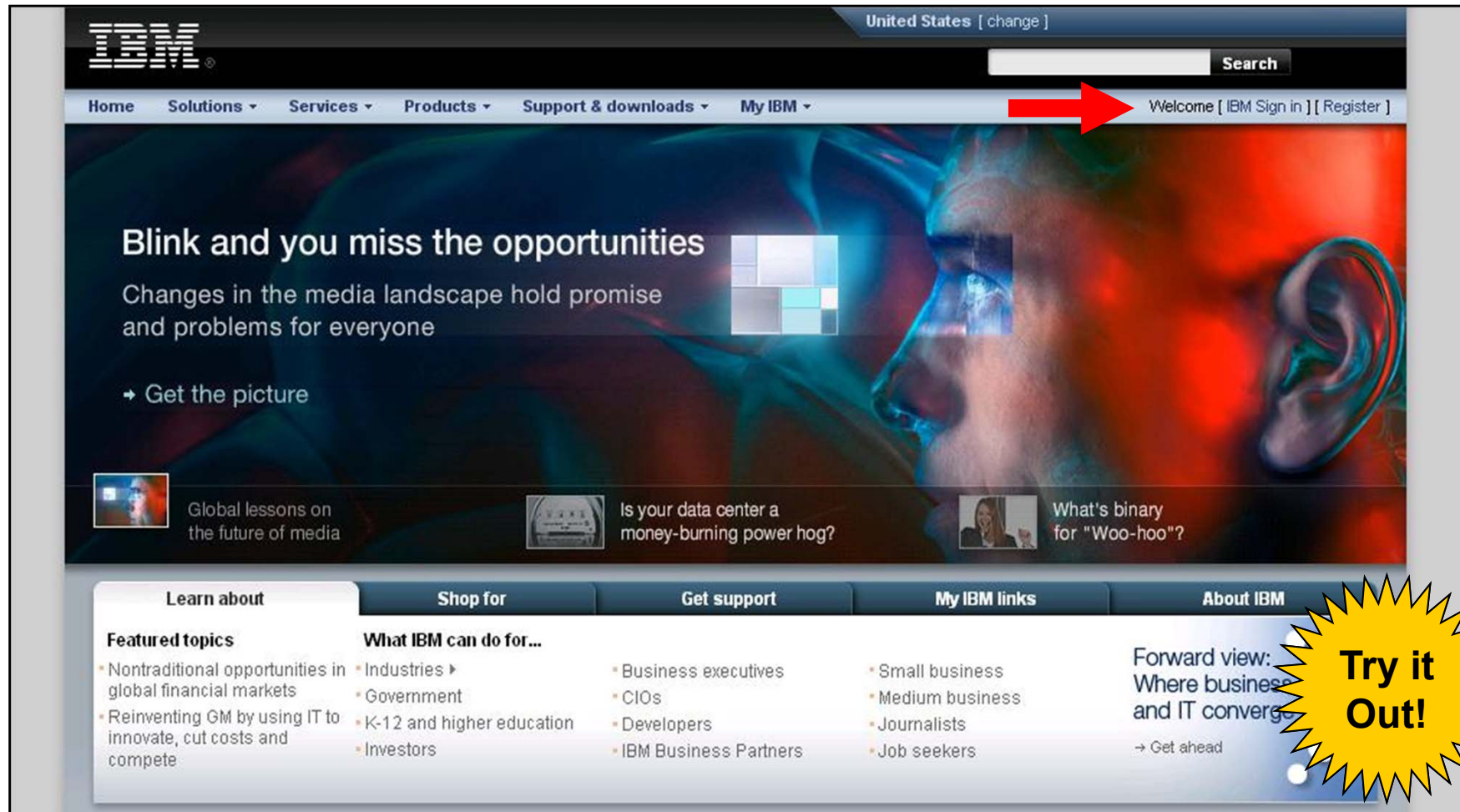
Location of Searching Boxes is **NOT** standard

The screenshot shows the eBay homepage layout. At the top right, there are navigation links: Buy, Sell, My eBay, Community, and Help. Below these, the user is greeted with "Hi, martincetel (Not you? Sign in)" and "Live help | Site Map". The search bar is located in the top left, with a red arrow pointing to it. It includes a search input field, a dropdown menu for "All Categories", a "Search" button, and a link to "Advanced Search". Below the search bar, there are links for "Categories", "Motors", "Express", and "Stores", along with a "Holiday Savings with eBay MasterCard" banner. The main content area is divided into two columns. The left column is titled "Shop your Favorite Categories" and lists various product categories such as Antiques, Art, Baby, Books, Business & Industrial, Cameras & Photo, Cars, Boats, Vehicles & Parts, Cell Phones & PDAs, Clothing, Shoes & Accessories, Coins & Paper Money, Collectibles, Computers & Networking, Consumer Electronics, Crafts, Dolls & Bears, DVDs & Movies, Entertainment Memorabilia, Gift Certificates, and Health & Beauty. The right column is titled "Welcome to eBay" and features a "Welcome" message, a "Sign In" button, a "New to eBay?" link with the text "Registration is fast and free", and a "Register" button. Below this, there is a section titled "'Tis better when you win it" featuring a "Oh what fun" banner and a grid of product images, including Wii consoles and games.

eBay; (2007) www.ebay.com

Standards in Web Design: Log in Box

www.ibm.com



IBM; (2007) www.ibm.com

HOMEWORK: Is the Login Box location (top-right corner) Standard?

[25] Jan-14

Standards in Web Design: Search Box

Location of Log in Boxes is **NOT** standard

www.barnesandnoble.com

The screenshot shows the Barnes & Noble website header. At the top left is the logo "BARNES & NOBLE" with the URL "www.bn.com" below it. To the right of the logo is a red arrow pointing to the "Account | Sign in" link. Further right are links for "FAST & FREE DELIVERY", "B&N Review", "B&N Media", "Stores & Events", and "Book Clubs". Below these are links for "Cart (0 items)", "Checkout", "Order Status", and "Wish List". A navigation bar contains "Books", "DVDs", "Music", "Textbooks", "Toys, Office, & More", "SEARCH", a dropdown menu set to "Books", and a "Go" button. Below the navigation bar are links for "Browse Books", "Bestsellers", "New Releases", "Coming Soon", "Recommended", "Children's Books", "Used & Out of Print", "Bargain-Priced Books", "Holiday Catalog", and "ADVANCED SEARCH". A promotional banner for a "Free \$25 Gift Card Offer" is visible. Below the banner is a "OUR HOLIDAY PICKS" section with four featured items: "RIDE RIDER" by Anthony Horowitz, "CARTOGRAPHIA: Mapping Civilizations" by Vincent Virga, "Disney Tigger & Pooh Super Sleuth CHRISTMAS MOVIE", and "RESCUE DAWN". At the bottom left is a "Browse" section with links for "Books", "Audiobooks", "B&N Classics", "Bargain Books", and "Bestsellers". At the bottom right is a "Perfect Presents" banner and a "BARNES & NOBLE media" section.

Barnes & Noble; (2007) www.barnesandnoble.com

Standards in Web Design: Navigation Bar

www.amazon.com

The screenshot shows the Amazon.com homepage with a navigation bar on the left side. The navigation bar includes a search bar, a shopping cart icon, and a 'Your Lists' dropdown. Below the navigation bar is a list of department links: Shop All Departments, Books, Movies, Music & Games, Digital Downloads, Electronics & Computers, Home & Garden, Grocery, Toys, Kids & Baby, Apparel, Shoes & Jewelry, Health & Beauty, Sports & Outdoors, and Tools, Auto & Industrial. The main content area features a large advertisement for the Kindle device, titled 'Introducing Kindle: Amazon's Revolutionary Wireless Reading Device'. A red arrow points to the Kindle device in the advertisement. To the right of the Kindle advertisement is a promotional banner for 'Amazon Customers Vote' with a table of deals. Below the Kindle advertisement is a section for 'We've Got Webkinz' and a 'Check This Out' section with links to 'Holiday Toy List' and 'Holidays at Home'. A yellow starburst graphic with the text 'Try it Out!' is overlaid on the bottom right of the screenshot.

amazon.com Hello. Sign in to get [personalized recommendations](#). New customer? [Start here](#). It's never too early to shop and get FREE Super Saver Shipping [Restrictions Apply](#)

Your Amazon.com Today's Deals Gifts & Wish Lists Gift Cards Your Account | Help

Search Amazon.com Your Lists

Shop All Departments

- Books >
- Movies, Music & Games >
- Digital Downloads >
- Electronics & Computers >
- Home & Garden >
- Grocery >
- Toys, Kids & Baby >
- Apparel, Shoes & Jewelry >
- Health & Beauty >
- Sports & Outdoors >
- Tools, Auto & Industrial >

Introducing Kindle: Amazon's Revolutionary Wireless Reading Device

Amazon is excited to introduce Kindle—a wireless, portable reading device with instant access to more than 90,000 books, blogs, newspapers, and magazines. Whether you're in bed or on the train, Kindle lets you think of a book and get it in less than a minute.

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Amazon Customers Vote
6 rounds. 18 ridiculous deals.

\$2199.99 \$499	\$1149.95 \$499	\$39.97 \$14	\$249.99 \$99	\$412.22 \$149
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[Vote now](#)

Are You Ready for Some Football?

We are--and Amazon.com Toys & Games is ready to help you cheer for your favorite team. Go, Saints!

[See all NFL toys and games](#)

Check This Out

- Holiday Toy List**
See videos of our favorite holiday toys.
- Holidays at Home**
Dress your home in holiday style.

We've Got Webkinz

Try it Out!

Amazon; (2007) www.amazon.com

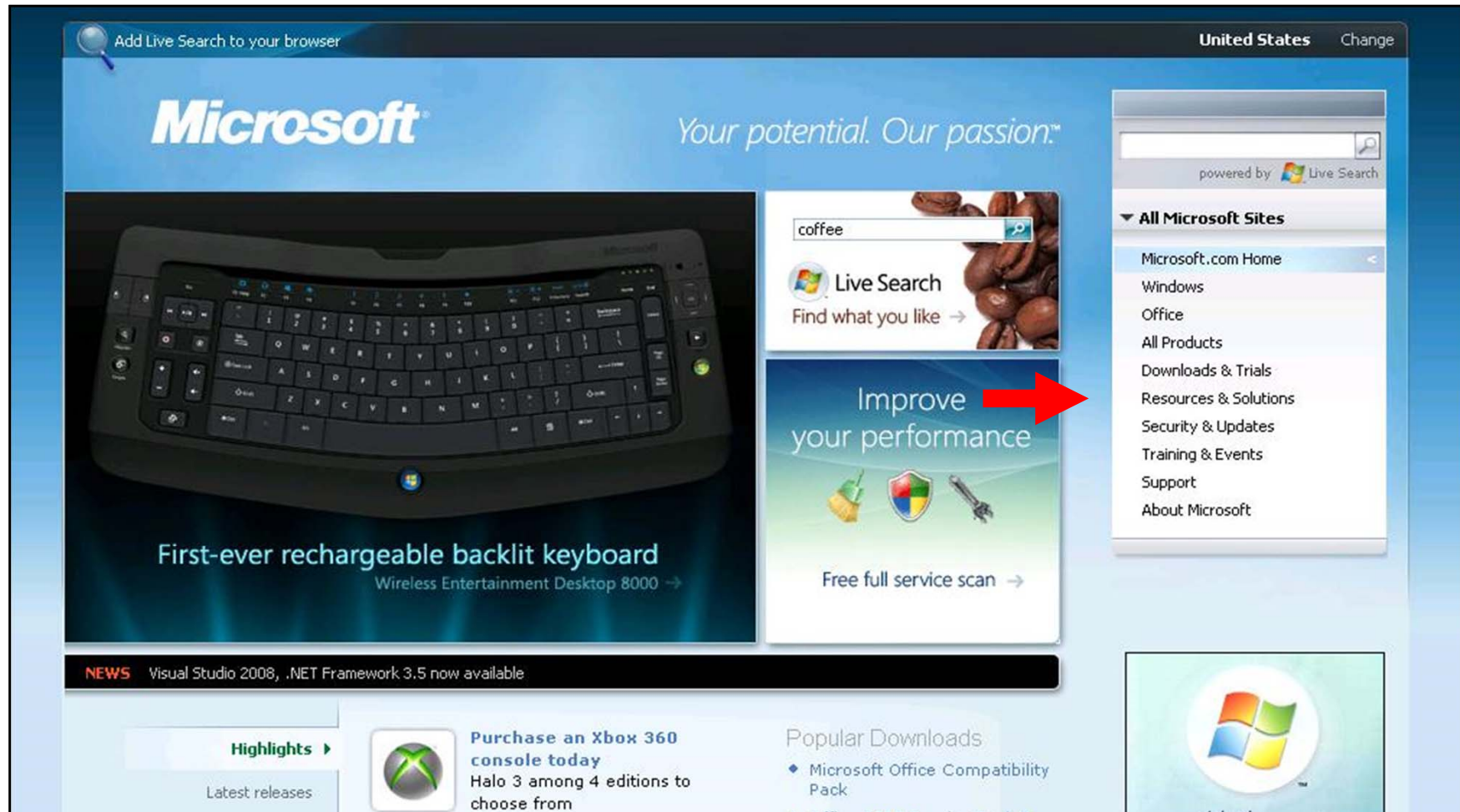
HOMEWORK: Is the Navigation bar location (left hand side) Standard?

[27] Jan-14

Standards in Web Design: Navigation Bar

Location of Navigation Bar is **NOT** standard

www.microsoft.com



Microsoft; (2007) www.microsoft.com

UI Design Patterns

There is no such thing as standards

- ❖ But you can try user interface design patterns.



UI Design Patterns

Problem summary – Shopping Chart¹

The user wants to buy multiple products, which is collected over time through a shopping session.

The screenshot shows the 'Realmac Online Store' shopping cart. At the top, a notification bar states 'You have 1 item in your shopping cart: View Cart'. Below this, the 'Shopping Cart' section contains a table with the following data:

Product	Qty*	Remove	Price	Total
RapidWeaver Upgrade	1		\$30.00	\$30.00
			Sub Total	\$30.00
			Coupon	-\$0.00
			Tax (0.00%)	\$0.00
			Grand Total	\$30.00

Below the table, there is a 'Coupon Code:' input field, a 'Continue Shopping' button, and an 'Update Cart' button. At the bottom, a promotional message reads 'Save Money on Extra Themes Now!' followed by three theme packs: 'Freelancer Pro Theme' (\$14.95 save \$5.00), 'Business Theme Pack' (\$14.95 save \$10.00), and 'Blog Theme Pack' (\$14.95 save \$10.00), each with an 'Add to Cart' button.



¹ui-patterns.com

UI Patterns
User Interface Design Pattern Library

TRY IT OUT: ui-patterns.com

[30] Jan-14

Information Architecture: Definitions

Good navigation doesn't happen by chance

First definition coined by architect Richard Saul Wurman in 1975¹

Organizing the patterns in data, making the complex clear.

Seized in 1996 by library scientists, Lou Rosenfeld and Peter Morville²

1. *The combination of organization, labeling, and navigation schemes within an information system.*
2. *The structural design of an information space to facilitate task completion and intuitive access to content.*
3. *The art and science of structuring and classifying web sites and intranets to help people find and manage information.*
4. *An emerging discipline and community of practice focused on bringing principles of design and architecture to the digital landscape.*

¹Barker, Ian; (2005). *What is information architecture?*

²Rosenfeld, Louis; Morville, Peter; (2006) *Information Architecture for the World Wide Web.*



Information Architecture: Definitions

Different meanings for different Disciplines

- ❖ Information architecture is used in:
 - Library systems, web development, user interaction, database development, etc.
 - Information architecture has somewhat different meanings in these different areas.

Definition provided by the Information Architecture Institute¹

1. *The structural design of shared information environments.*
2. *The art and science of organizing and labeling web sites, intranets, online communities and software to support findability and usability.*
3. *An emerging community of practice focused on bringing principles of design and architecture to the digital landscape.*

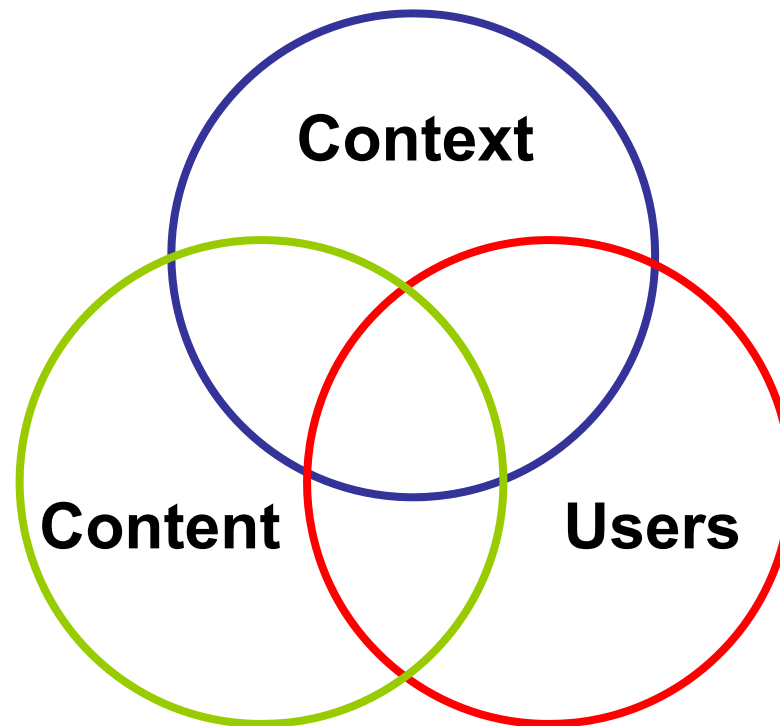


¹The Information Architecture Institute; (2007) www.iainstitute.com.

Information Architecture

Basics of Information Architecture

- ❖ An effective information architecture comes from understanding the requirements of:



Information Architecture in a Nutshell

What Information Architects obtain

Main Products

- **Storyboards:** Sketches showing how a user would interact with the system to complete common tasks in different scenarios.
- **Mockups (Page Templates):** Layout for common page elements (including global and local navigation).
- **Wireframes¹:** Define page level navigation, content types and functional elements.
- **Site Maps:** High level diagram showing the hierarchy the information architecture.
- **Content Matrix:** Lists each page in the system identifying its content.

Mockups and wireframes **are just as effective** as fully interactive systems!

¹AKA *Annotated Page Layouts* , *Blue prints* or *Screen details*.

Information Architecture in a Nutshell

Storyboards

- ❖ Courses of action described in certain scenarios.
 - Get members of the development team on the same page.

Breaking Bad 506 Scene 29 Page 3



Close-up of wires sparking and flaming on wrist and zip cuff.



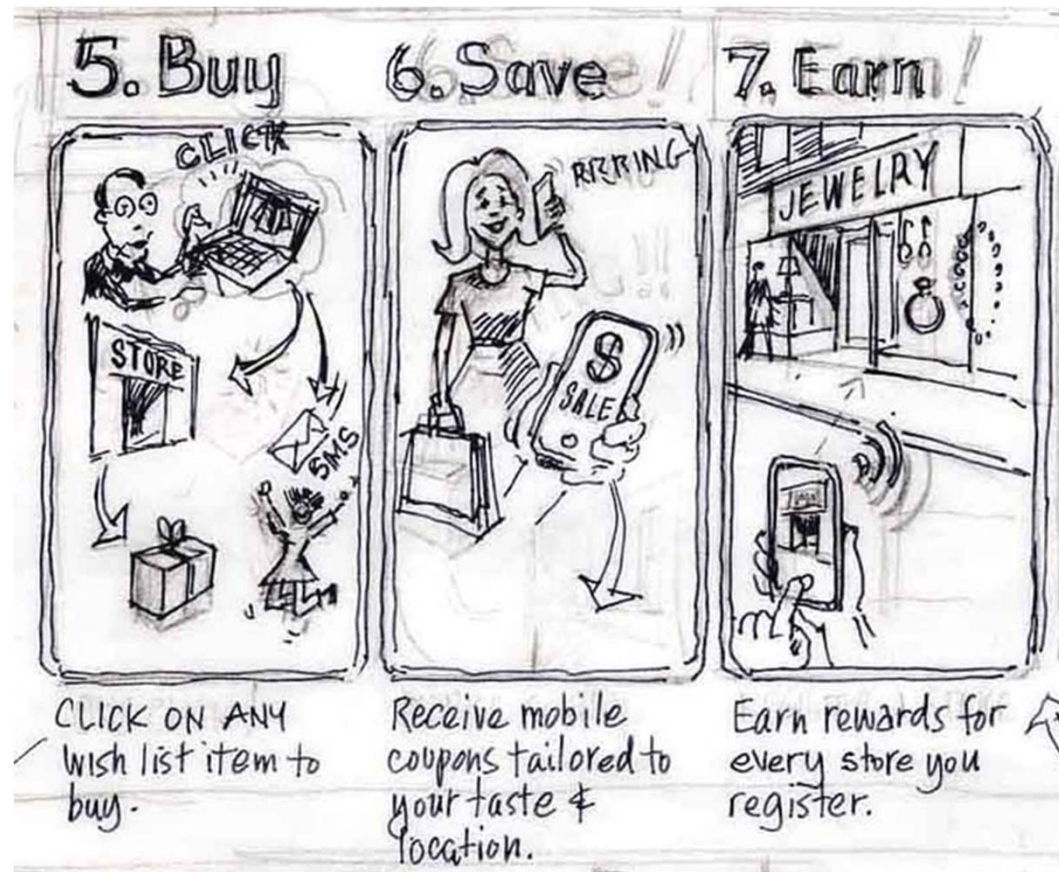
Walt screams in pain, slowly pulls wires down as they cut zip cuff.



Information Architecture in a Nutshell

Storyboards

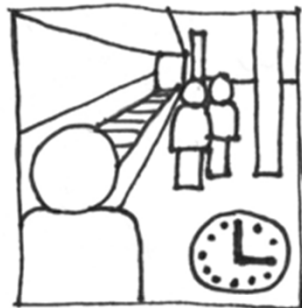
- ❖ Describes specific features of the application in a certain scenario.



Information Architecture in a Nutshell

Storyboards

- ❖ Helps communicate to investors new ideas and startups.
 - Identifies new requirements.
 - Defines steps to be done in each user process.



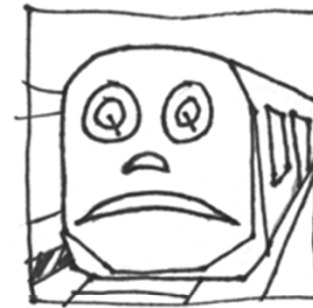
1. Waiting for
NYC subway



2. Arrival info
is scarce or
inaccurate



3. Unknown leads
to frustration
& anxiety



4. Train's digital
signage emotes
its feelings about
ontime status

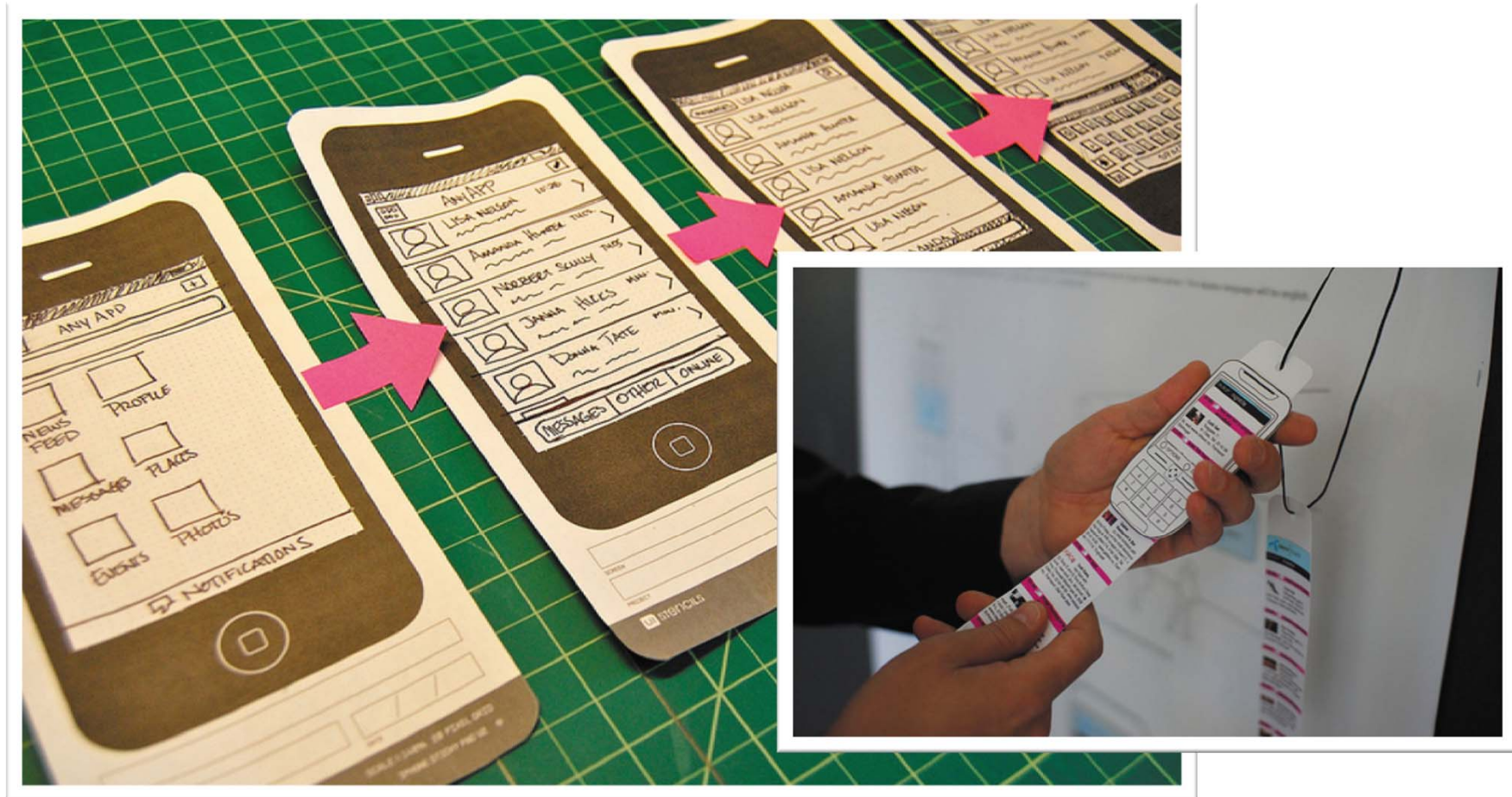


5. Riders
immediately
grasp status &
feel empathy for
train

Information Architecture in a Nutshell

Mockups

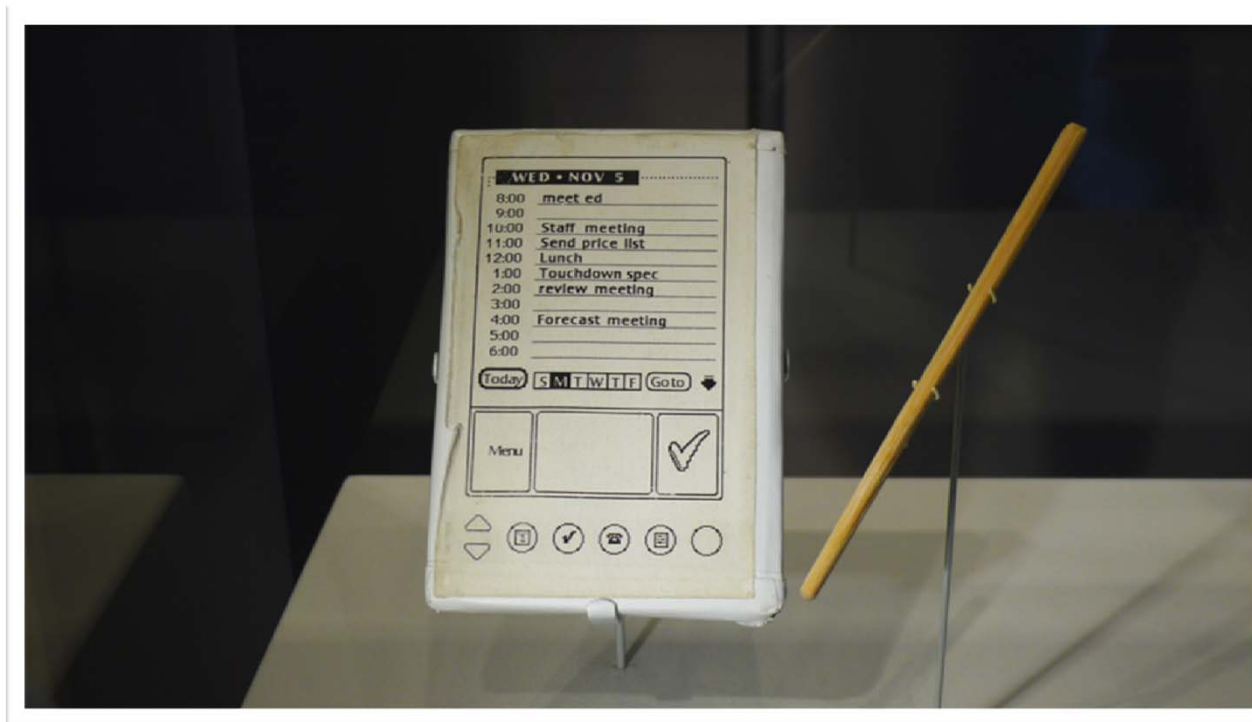
- ❖ Allows quick and cheap prototyping.



Information Architecture in a Nutshell

Mockups

- ❖ During the creation of Palm Pilot, Jeff Hawkins designed wood prototypes to test his design.

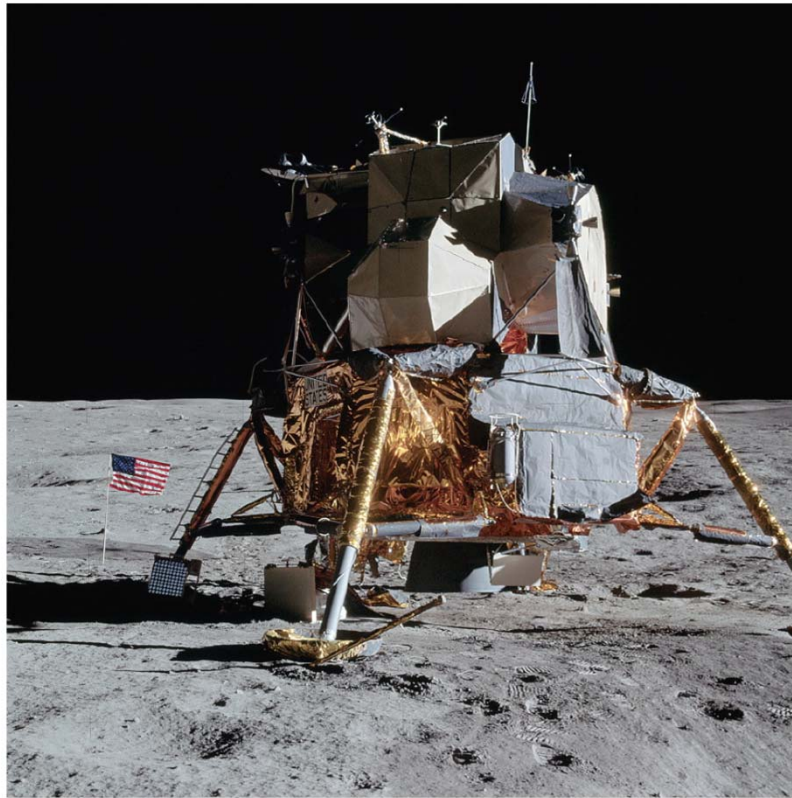


He carried a block of wood, the size of the potential PDA, in his pocket for weeks

Information Architecture in a Nutshell

Mockups

- ❖ Man landed on the Moon using hand drawn prototypes...!

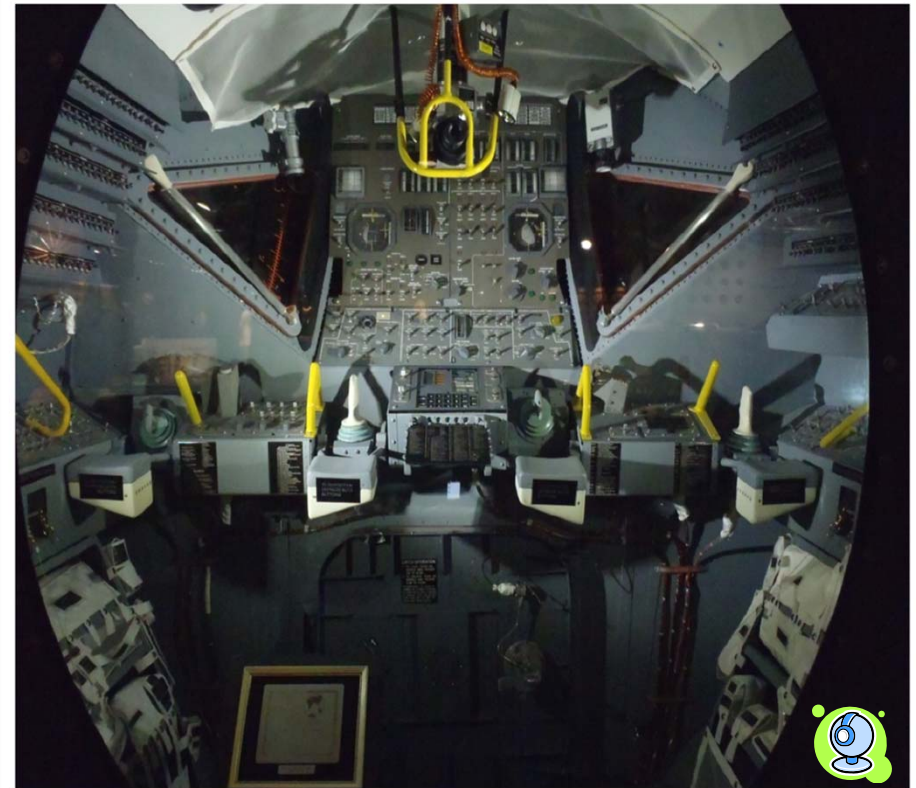
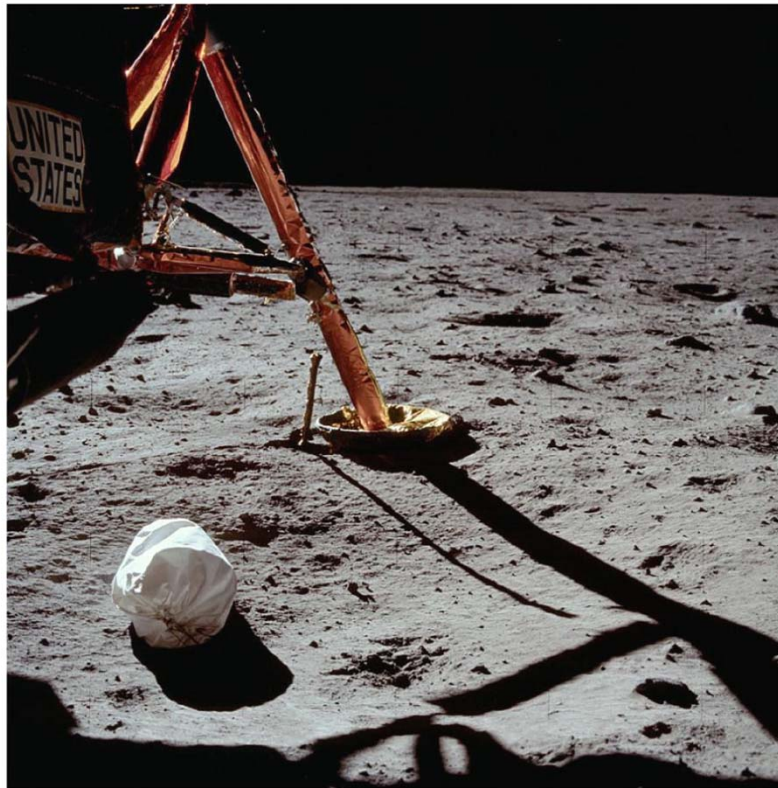


Ralph Morse; (1963)

Information Architecture in a Nutshell

Mockups

- ❖ ...and building 1:1 scale wooden mockups of the Lunar Module!

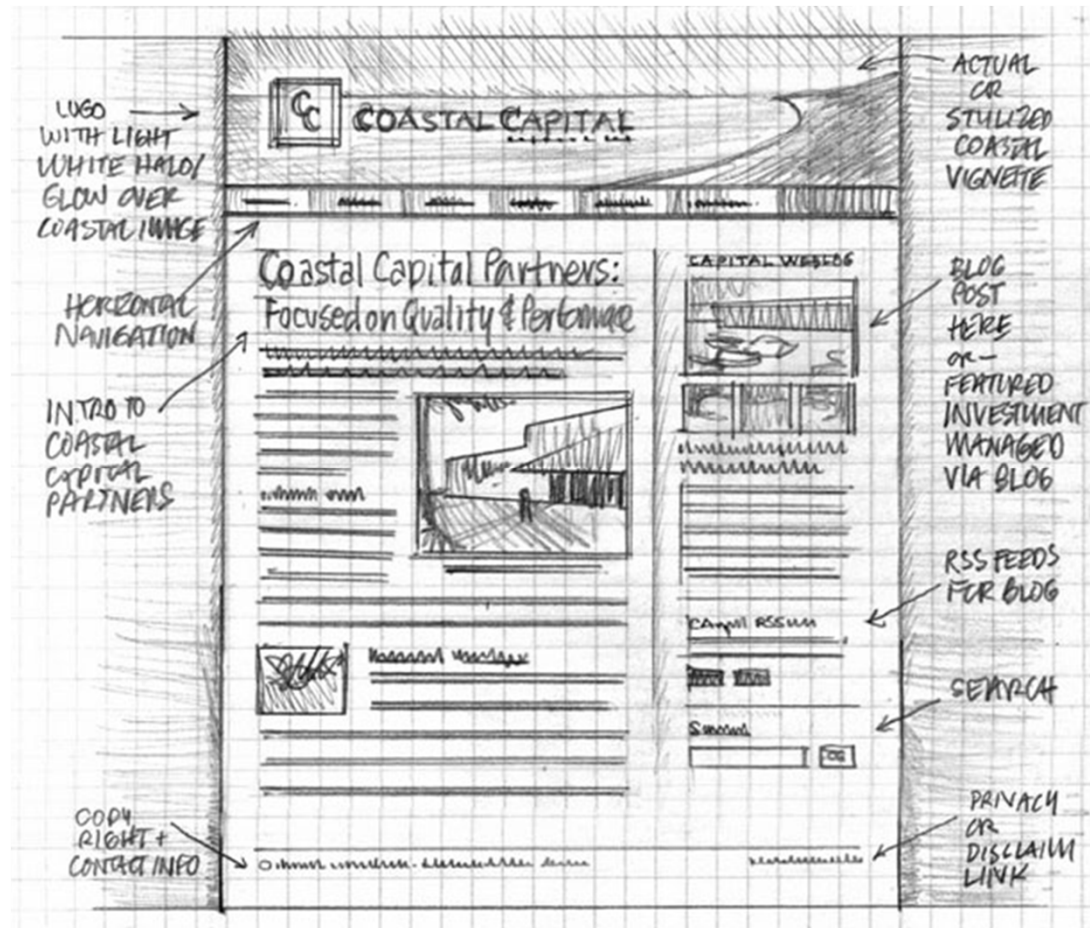


Discovery Channel Moon Machines: The Lunar Module (Video [02:50])

Information Architecture in a Nutshell

Mockups

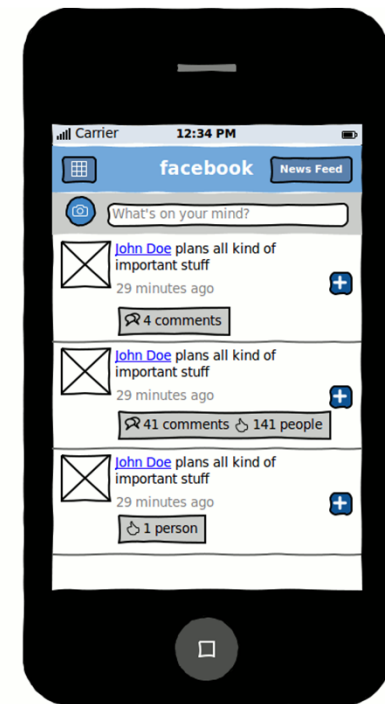
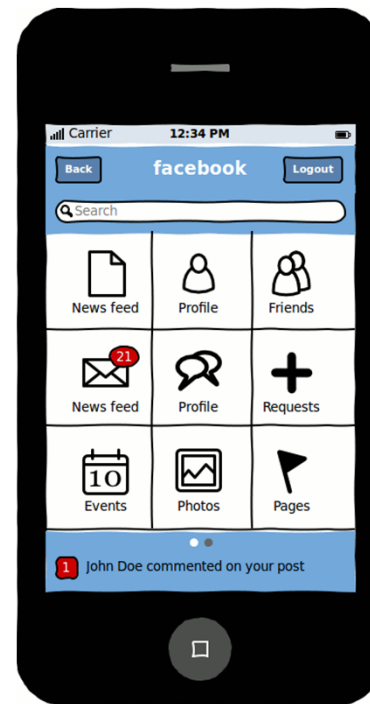
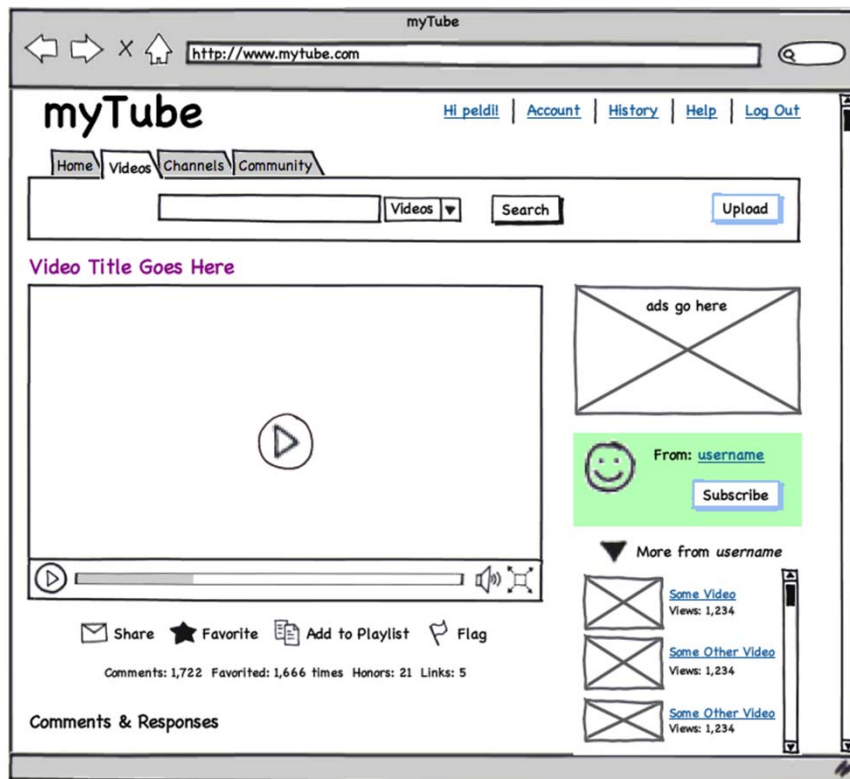
- ❖ The use of paper and pencil are the easiest mockup tools...



Information Architecture in a Nutshell

Mockups

❖ ... but there are software tools too.

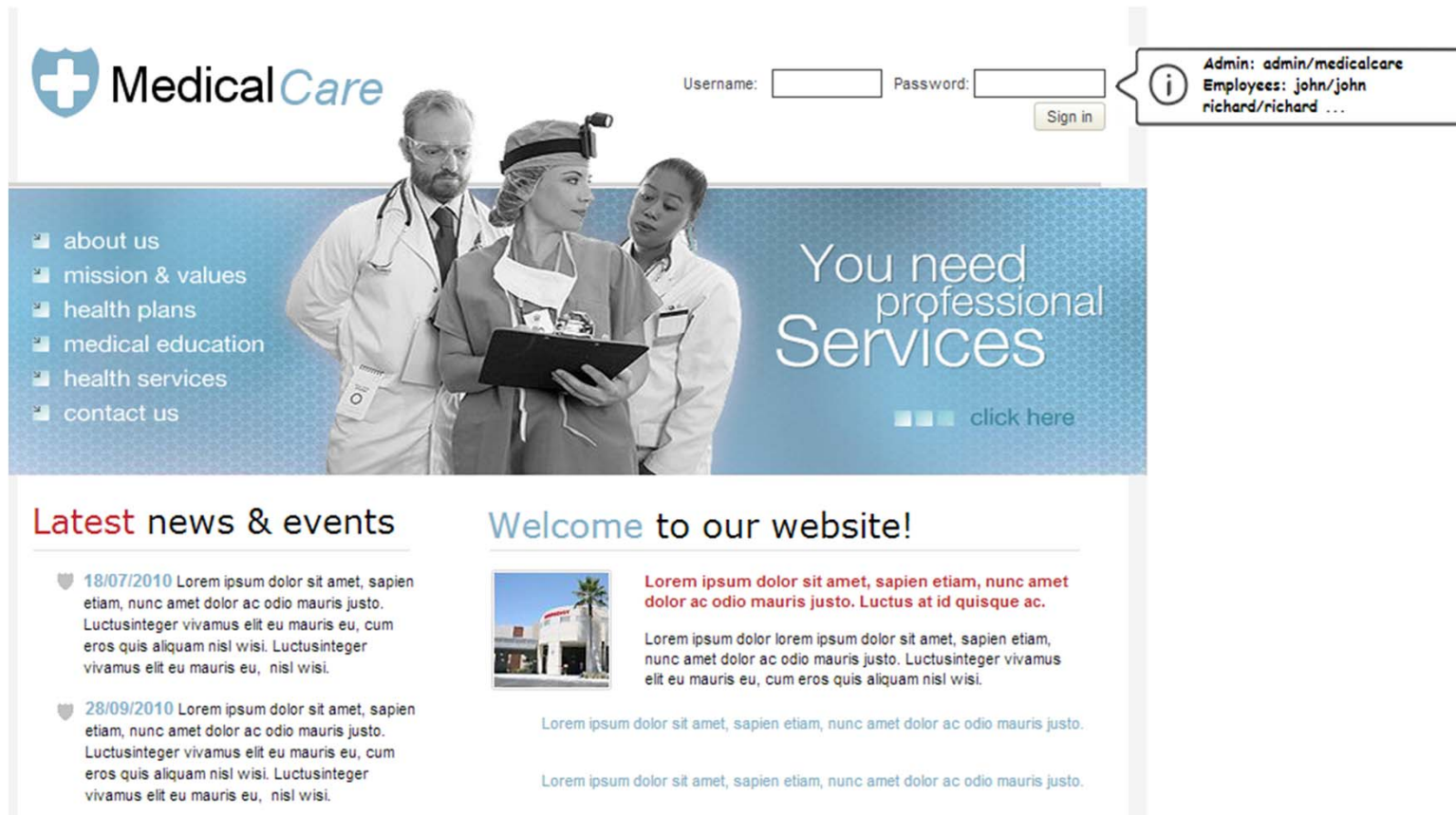


Balsamiq, Lumzy, Proto.io or the Pencil Project are great mockup tools.

Information Architecture in a Nutshell

Wireframing

- ❖ Transform your mockups into interacting prototypes.



Users are asked to interact with these prototypes as if they were the final product.

Information Architecture in a Nutshell

Wireframing

- ❖ Simulates the functionality of the intended

The image shows a screenshot of the MockFlow website on the left and the MockFlow software interface on the right. The website features a yellow header with the MockFlow logo and navigation links (Samples, Help, Login, Signup, Desktop). Below the header, there is a section titled "Super-easy Wireframing" with a description: "Design and collaborate (in real-time) user interface mockups for your software and websites." A "Create Account" button is visible. Below this, there is a section for "MockStore - Design Library" and two columns: "Online/Offline" and "Interactive". The software interface on the right shows a "music store" wireframe with a search bar, artist information for "PHOENIX", and a list of tracks. The interface includes various toolbars and panels for editing and simulation.

Mockflow, Axure and JustinMind are great applications to create online wireframes.

Information Architecture in a Nutshell

The Development Lifecycle

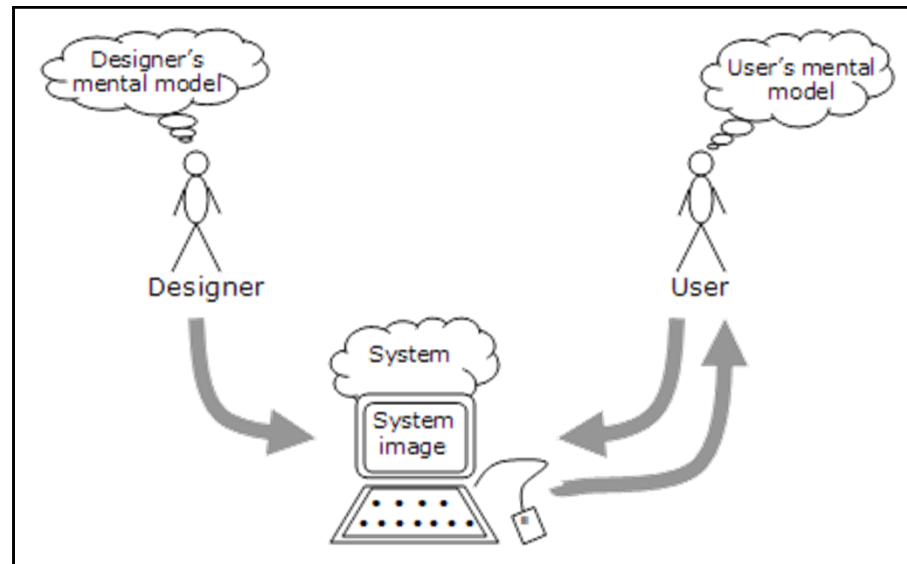
Interactive Development Process in Information Architecture

1. Define context requirements interviewing stakeholders.
2. Understand proposed content conducting content inventories.
3. Define detailed **user models**.
4. Design **storyboards**, defining how the user will step through the application for a number of common user tasks.
5. Develop the Information Architecture, documenting it in a annotated **mockup** or a **paper prototype**.
6. Create **detailed wireframes** to support and testing key user tasks.
7. Evaluate the Information Architecture going back to step 3 (when required).
 - Conduct task-based usability tests, card-based classifications, etc.

Mental Models

The main goal is to get the way people think

- ❖ Humans develop mental models of how they thinking system works¹.
- Designers materialize their mental models in a given design, which is interpreted by the users.



Norman Donald; (2002) *The Design of Everyday Things*.



¹Norman, Donald; (2002) *The Design of Everyday Things*.

Mental Models

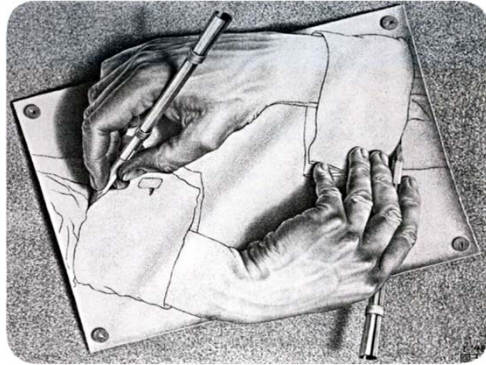
Mental Models

- ❖ Effective designs **must** match the user's mental models.



La Cámara Invisible (Video [00:44] – [00:58])

Defining a robust **User Model** is crucial



Appendix

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