

INTERACTION DESIGN

(IxD)

CST315 – Fall 2015 Revision

Arizona State University



INTERACTION DESIGN

These are from the user modeling module - they are basic questions to consider when identifying the context of your design.

Users, Goals, and Tasks = Flows

Users

- Who are they?
- What are their work environments like?
- How experienced are they with the technologies?
- What are their mental models and vocabulary?
- What are their personal characteristics?
- What are their cultural differences?
- What are their motivational differences?
- Techniques we might use: *Personas, Scenarios*

Our interest now is to use the information we gathered to design the interactive 'flows' that occur during use.

Goals

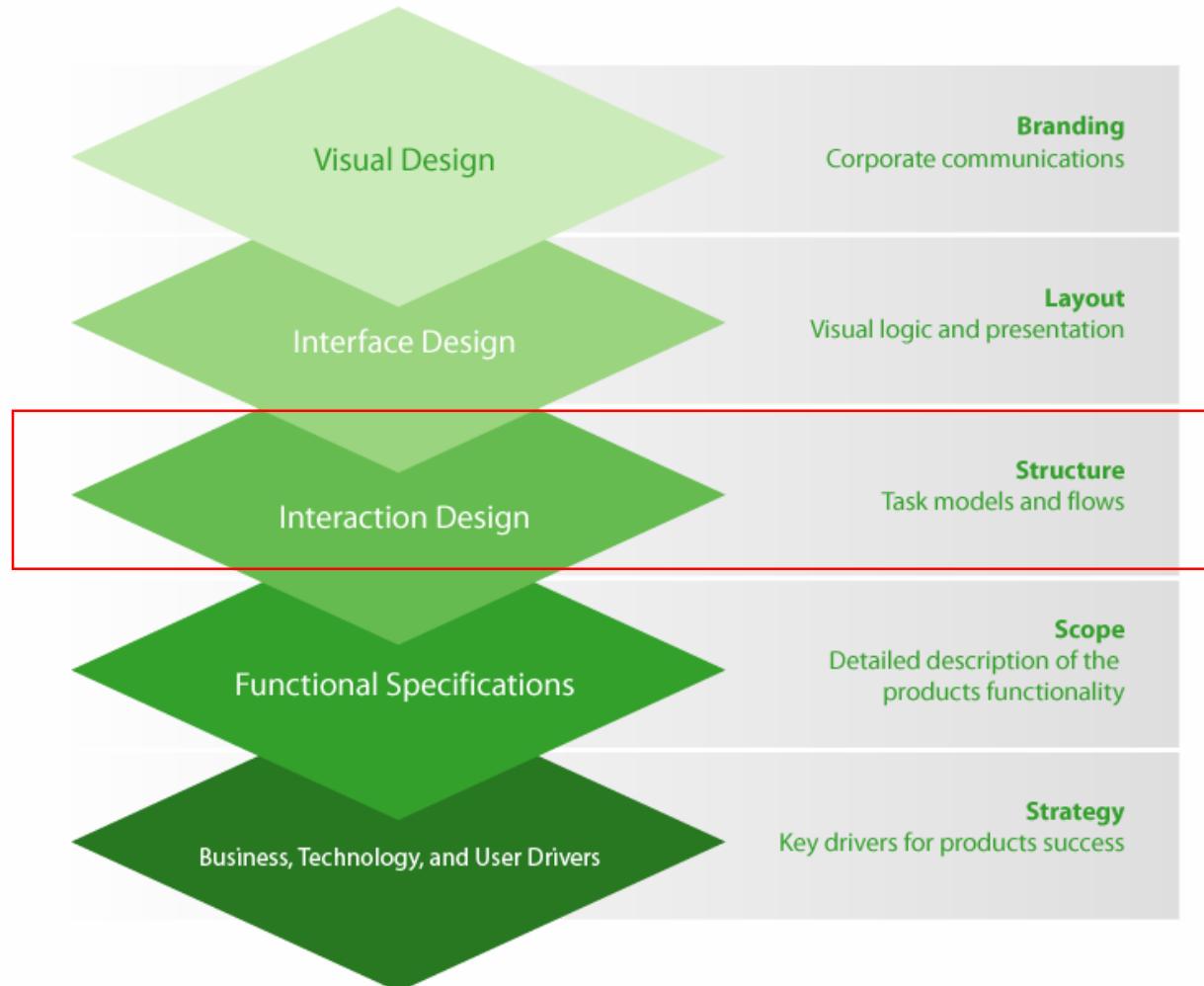
- The main thing users are trying to achieve
- Techniques we might use: *Interviews, Questionnaires, Reverse Engineer*

Tasks

- How users do things to achieve their Goals
- Business process analysis, Job analysis, Task sequences,
- Techniques we might use: *Observation, Task hierarchies, Research*



INTERACTION DESIGN



DIMENSIONS TO IxD

We can think of IxD as having five independent factors, or, dimensions. A dimension is a property of design that we should consider.

1D Words

From Smith & Silver (via Wikipedia).

- Dimension **defines the interactions**. Words embody *semantics* that users use to interact.

2D Visual Representations

- The visual representations are the **things that the user interacts with** in the interface. These may include but not limited to "typography, diagrams, icons, and other graphics"

3D Physical objects or space

- The **space with which the user interacts** is the third dimension of interaction design. It defines the space or objects "with which or within which users interact with"

4D Time

- The **time with which the user interacts with the interface**. Some examples of this are "content that changes over time such as sound, video, or animation"

5D Behavior

- Defines the **users actions reaction** to the interface and **how they respond to it**.
- (This is essential; the IxD must create an expectation of how to interact, yet be flexible enough to account for mis-interaction.)



IxD PRINCIPLES

- Know your Users! (review User Modeling)
- Factors from the Textbook:
 - People have limited short-term memory (Miller: +/- 7 items)
 - Tolerance – accounting for and anticipating human error
 - Physical manipulation limitations
 - There is also a field that emerged based on cognitive aspects, or information processing *modalities* (audio vs. written vs. video learners)
 - Individualized interaction preferences (mouse/icon vs. hotkey)
- IxD Principles
 - User familiarity – based on terms & concepts from users' experience
 - Consistency – perform similar operations similarly
 - Minimal Surprise - do not surprise users w/ behavior of the system
 - Recoverability – allow users to recover from errors
 - User Guidance – feedback and context-sensitive help (hmm...)
 - User Diversity – appropriate interactions for different types of users



PROCESS: IxD PROCESS

- How does this process compare to the UCD?

This diagram comes straight from your text. As an exercise, try identifying the four 'regions' in the diagram and find which align them with the UCD steps.

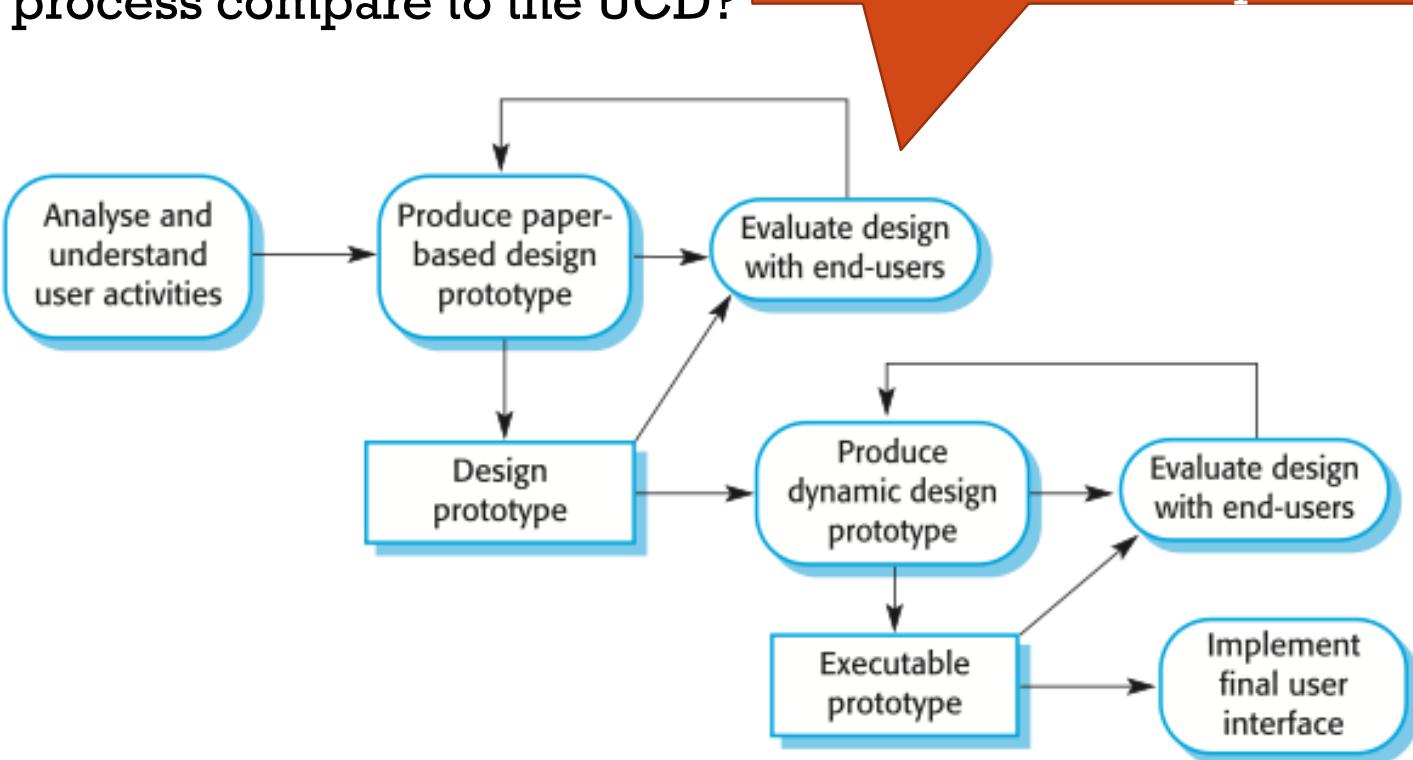


Figure 29.13
The interaction design process

The diagram suggests 4 phases:

1. Understand user activities
2. Produce design prototype (low-fidelity)
3. Produce executable prototype (high-fidelity)
4. Implement



We will now introduce two techniques (scenarios and HTNs), for understanding user tasks.

UNDERSTANDING USER TASKS: SCENARIOS

- If you don't understand *what the users want to do with a system*, you have no realistic prospect of designing an effective interface.
- Scenarios where you describe typical episodes of use, are one way of describing these analyses.
 - User analyses have to be described in terms that users and other designers can understand.
 - Complements, doesn't replace, our use of personas earlier.

Try identifying possible personas in this scenario.

Example Scenario:

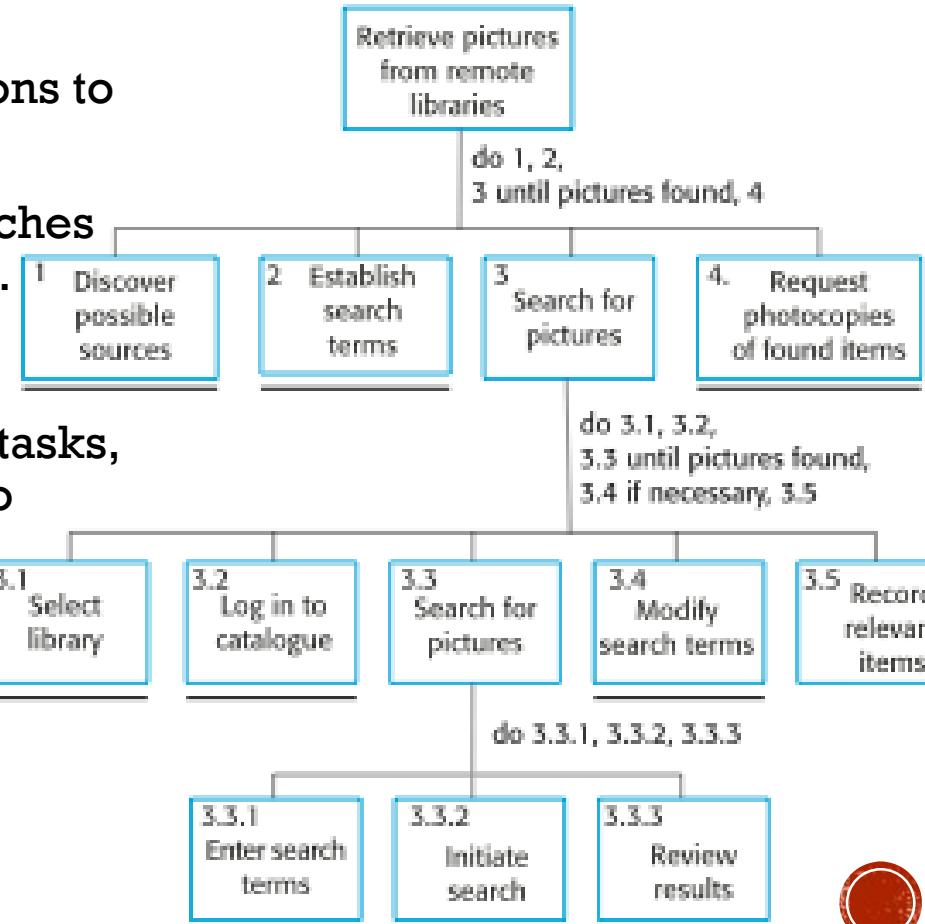
Jane is a student of Religious Studies and is working on an essay on Indian architecture and how it has been influenced by religious practices. To help her understand this, she would like to access some pictures of details on notable buildings but can't find anything in her local library.

She approaches the subject librarian to discuss her needs and he suggests some search terms that might be used. He also suggests some libraries in New Delhi and London that might have this material so they log on to the library catalogues and do some searching using these terms. They find some source material and place a request for photocopies of the pictures with architectural detail to be posted directly to Jane.

UNDERSTANDING USER TASKS: HTNs

Breaking down the scenario:

- Users may not be aware of appropriate search terms so need a way of helping them choose terms.
- Users have to be able to select collections to search.
- Users need to be able to carry out searches and request copies of relevant material.



One way to express this is a hierarchy of tasks, that shows how a task is decomposed into smaller, and more specific, sub-tasks.

Hierarchical Task Networks (HTNs) can be used to establish both a **decomposition** structure and a sequence of alternatives structure.

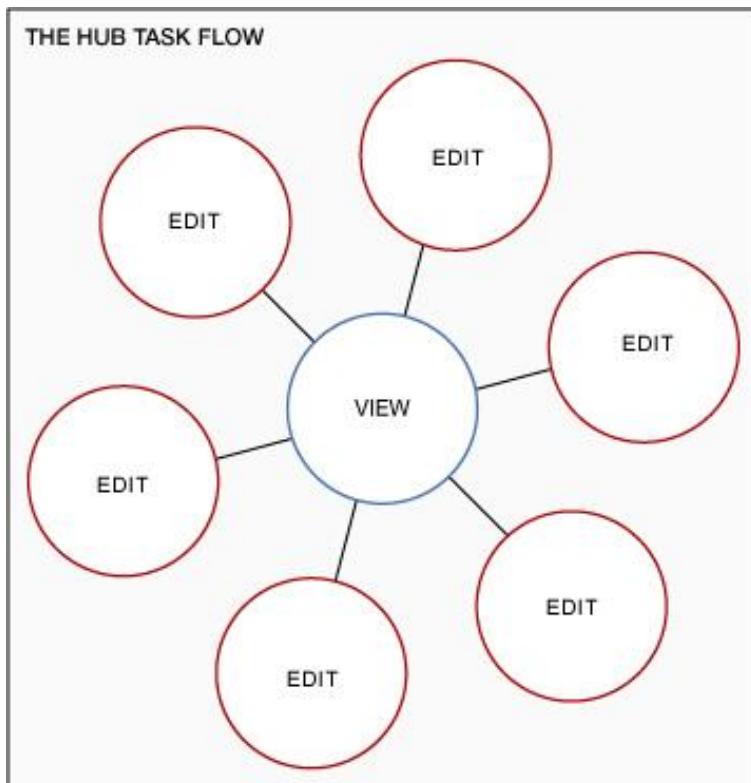


IXD PATTERNS

Three types of ‘flows’ are commonly used to model user task interface. These flows can define how users move between different screens of an application.

- Hubs, Wizards, and Guides

- In a hub, users start at a central position, and may branch out to any number of other pages. After they are done with that branch, they must return to the center (“hub”).
- A simple hub task flow based on a view/edit construct can be used for many basic web interactions designs.



IXD PATTERNS

▪ Hubs, Wizards, and Guides

- This is an example of a hub. The user is free to visit the Change Password, General Preferences, and Add External Mail Account pages, but must return to Account Options after exploring each one.

The image displays three screenshots of the mailblocks web application, illustrating a hub pattern where users can navigate between different account management options.

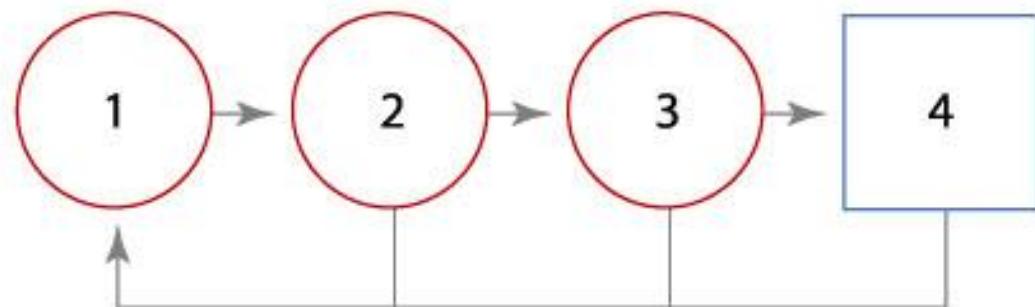
- Screenshot 1: Account Options**
This screenshot shows the main account management interface. It includes tabs for "mail", "addresses", and "trackers". Below these tabs, there are links for "Change Password", "General Preferences", and "Add External Mail Account". A table titled "Current Accounts" lists three accounts: goldman@hotmail.com, philg@yahoo.com, and pgoldman@aol.com, along with their last checked times. At the bottom, a copyright notice reads: "©2002 Mailblocks Inc. All Rights Reserved. Mailblocks is a service mark of Mailblocks, Inc."
- Screenshot 2: Options: Add/Edit External Mail Account**
This screenshot shows a modal dialog box titled "Options: Add/Edit External Mail Account". It contains fields for "Username", "Password", and "Mail server". There are also radio buttons for selecting the account type: POP (selected), IMAP, Hotmail, Yahoo! mail, and AOL. A note states: "Note: your username is not your email address... Typically it is the text before the @ sign in the address." At the bottom are "Submit" and "Cancel" buttons.
- Screenshot 3: Account Options**
This screenshot shows the "Account Options" page again. The "Add External Mail Account" link is highlighted in red, indicating it has been selected. The "Current Accounts" table is visible at the bottom.

IXD PATTERNS

- **Hubs, Wizards, and Guides**

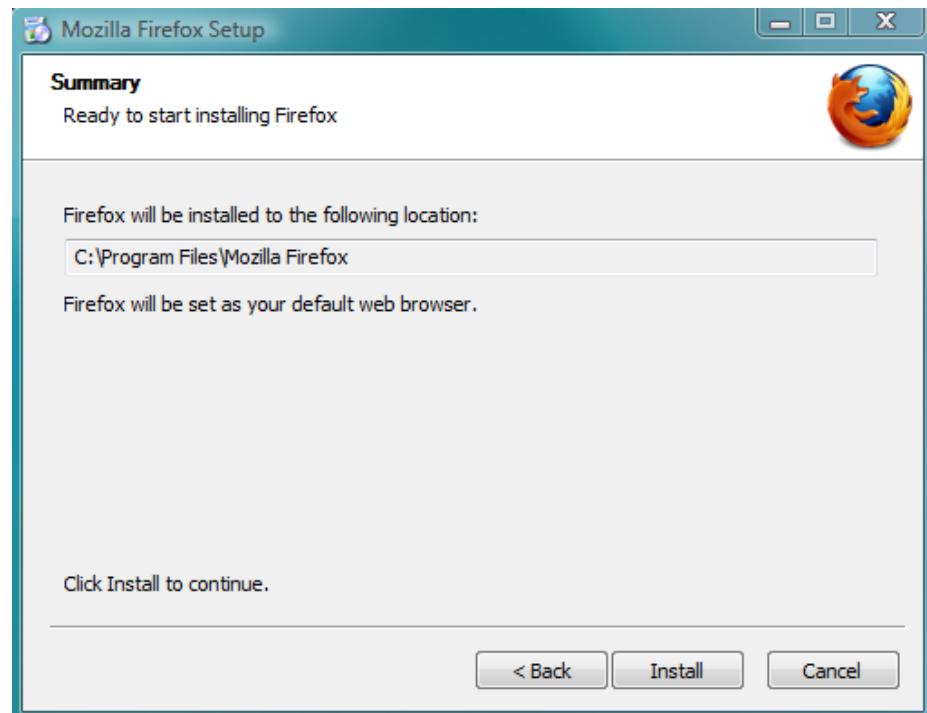
- Essentially, a predetermined sequence of screens, wizards provide a mechanism for guiding users through complex operations that can be completed in one and only one path.
- Task flow has built-in dependencies from one screen to the next.

THE WIZARD TASK FLOW



IXD PATTERNS

- Hubs, Wizards, and Guides
- This is (almost) an example of a wizard. In the past, many installers required the user to go next on each page. If they wanted to return to a previous page and edit an option, then they would have to restart the installer.
- These days, installers and other applications that use wizards are becoming more flexible.

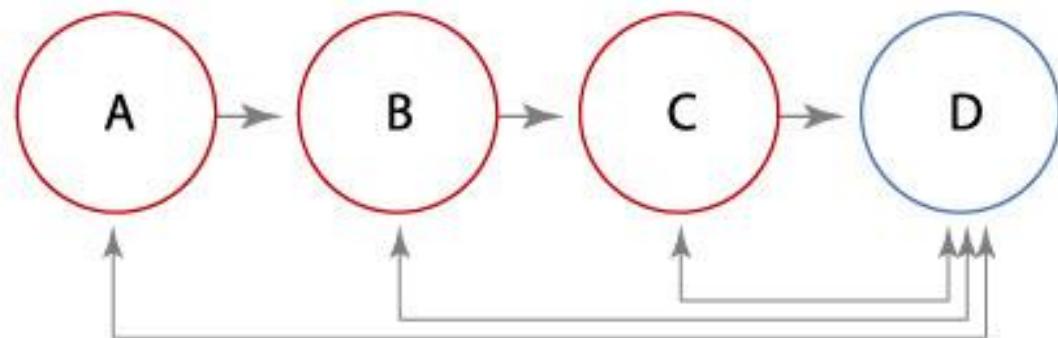


IXD PATTERNS

- **Hubs, Wizards, and Guides**

- Combining the structured sequence of a wizard with the navigational flexibility of a hub, guides are another type of task flow commonly used in web applications.
- Unlike wizards, guides do not assume any sort of strict interdependence between steps.

THE GUIDE TASK FLOW



IxD PATTERNS

- Hubs, Wizards, and Guides
- This is an example of a guide. There is a basic structure to the information displayed on the page but the user is free to jump around.

Flight Search - Yahoo! Travel - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Favorites Folders Search History Mail Print Preview Links >

Address http://edit.travel.yahoo.com/config/ytravel?source=YG&reform=YahooFlightsR

Yahoo! Travel

Home Travel Guides Flights Hotels Cars Vacation Packages Cruises Deals My Travel

Search for Flights

1 What type of trip is this?
 Round Trip One Way Multiple Destinations
└ Add a hotel and save!

2 Where would you like to go?
From
To

3 When do you prefer to travel?
 Search specific dates Search a date range
Depart Jun 16 Wednesday Anytime
Return Jun 23 Wednesday Anytime

4 How many travelers? (maximum 6) [Booking for children under 2?](#)
 Adult (15-64) Children (2-14) Senior (65+)
1 0 0

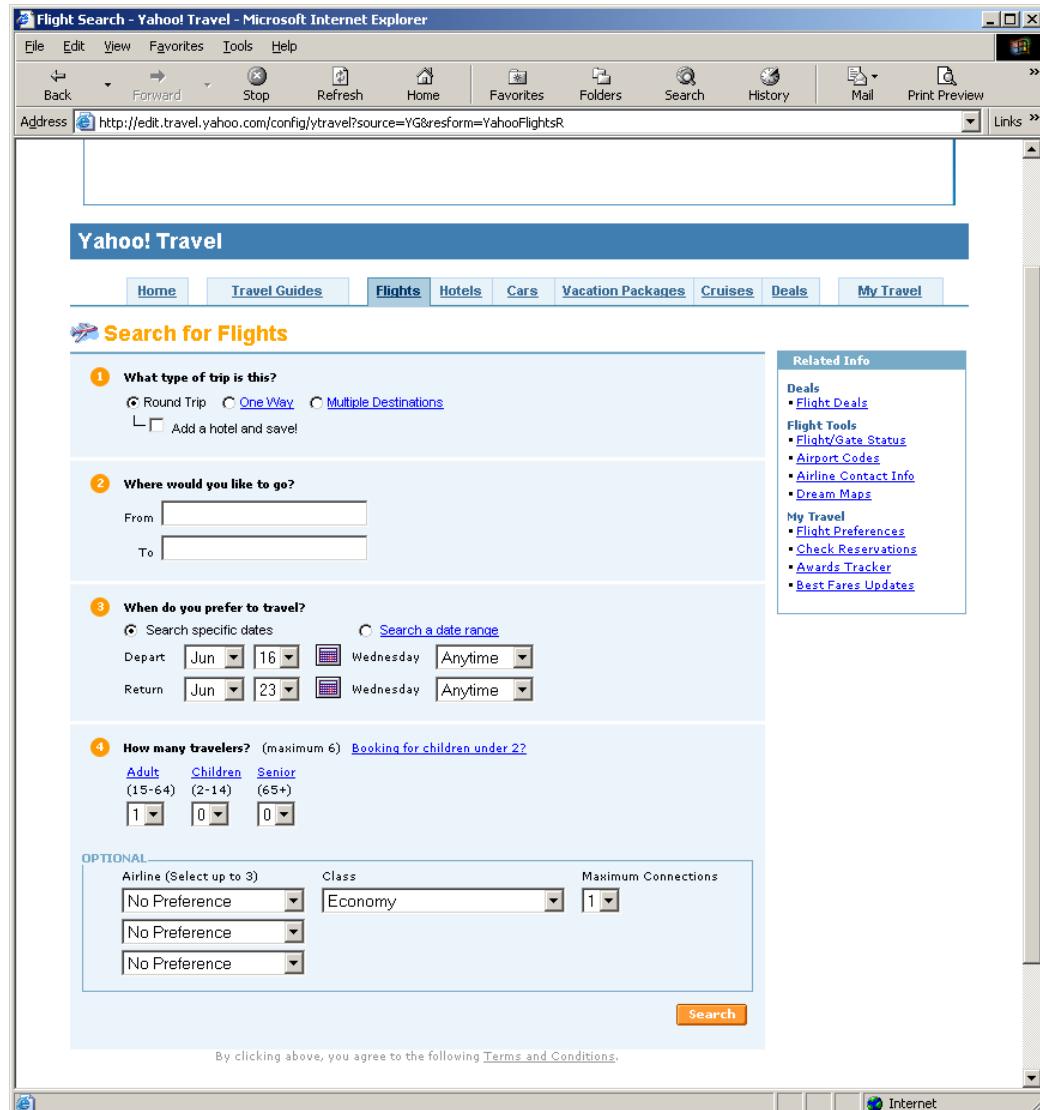
OPTIONAL

Airline (Select up to 3) Class Maximum Connections
No Preference Economy 1
No Preference
No Preference

Search

By clicking above, you agree to the following [Terms and Conditions](#).

Internet



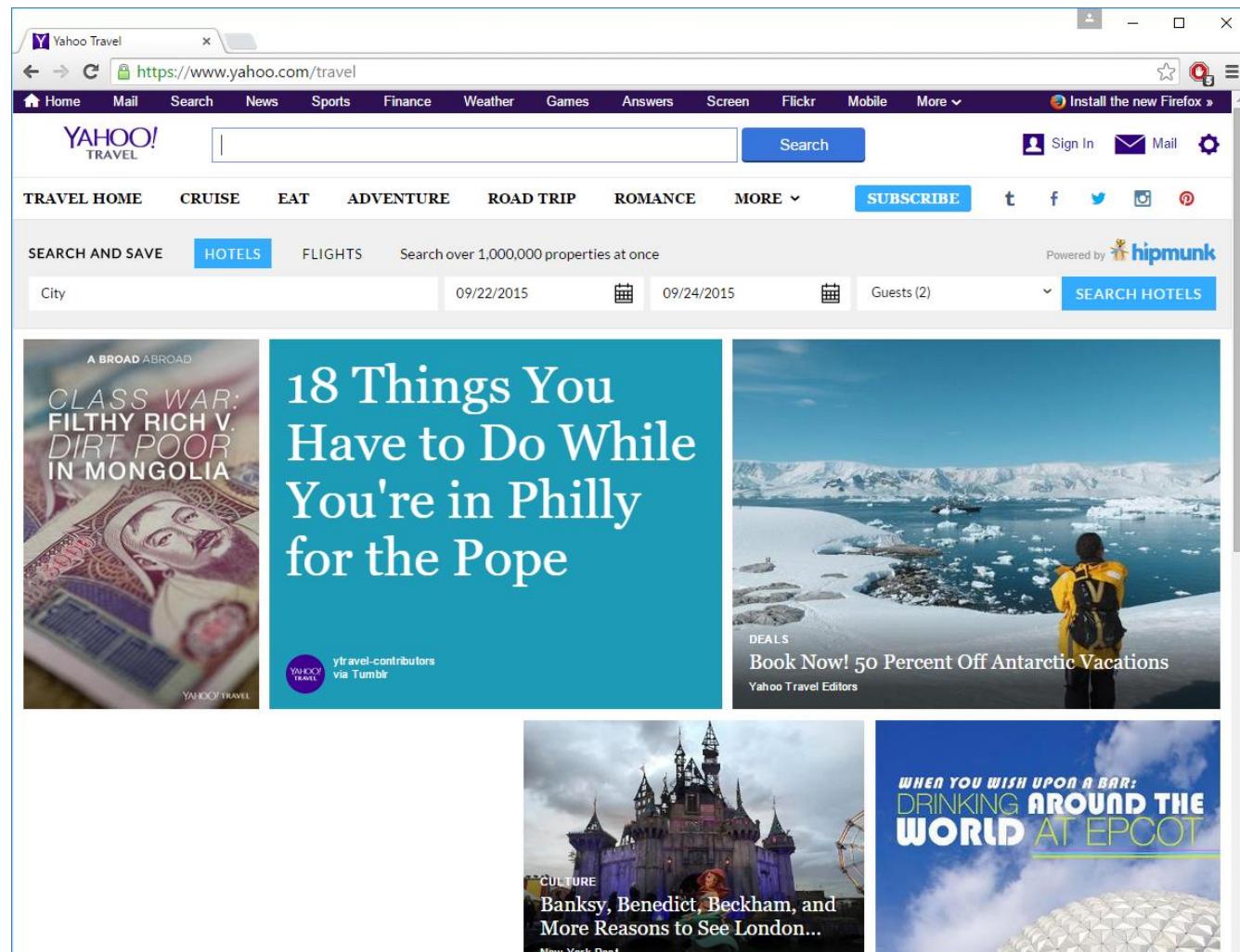
IxD PATTERNS

▪ Hubs, Wizards, and Guides

Here is a screenshot of the current Yahoo Travel site.
(with Adblock.)

- What's changed?
- What's the same?
- Are we making progress in usable designs.?

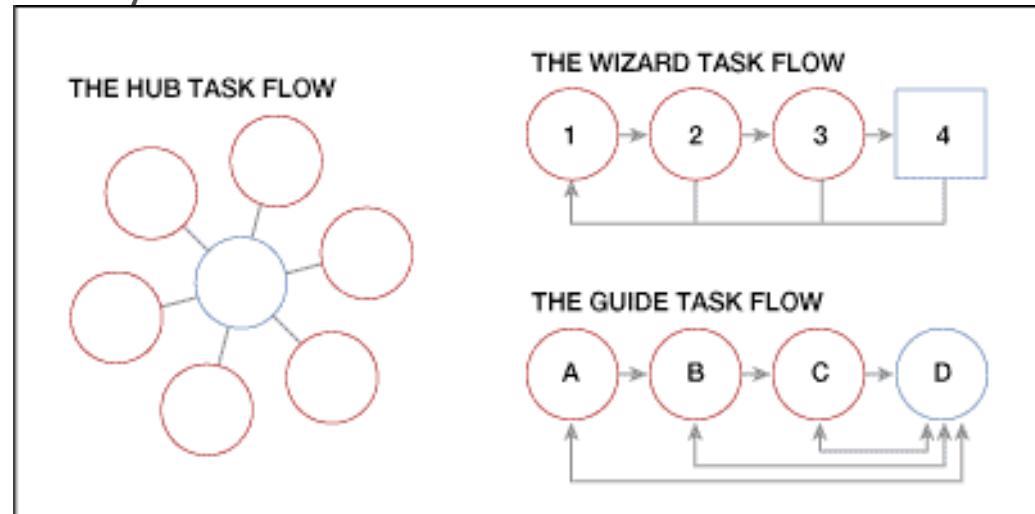
(Feel free to discuss in the forum.)



IXD PATTERNS SUMMARY

▪ Hubs, Wizards, and Guides

- **Hubs:** You go, you come back. Hubs are ideal for situations that use multiple, discreet, single-page forms.
- **Wizards:** Step one, two, three. Wizards are appropriate for multi-page procedures or operations that must be completed in a prescribed order.
- **Guides:** This way please! Guides are useful for complex, multi-part sequences that seek to combine the navigational guidance of a wizard with the navigational flexibility of a hub.



IXD BEST PRACTICES

We'll cover these four techniques over the next several slides.

▪ **Miscellaneous Interaction Techniques**

- Progressive Disclosure
- Use of Metaphors
- Modeling Interaction Styles
- Using Modalities

▪ **Progressive Disclosure**

- Basic idea: Move complex and less frequently used options out of the main user interface and into secondary screens.
- Benefits
 - Prevents user from getting overwhelmed by the UI.
 - Allows users to recognize what to do as they go along.
 - Increases ease of use of the product and reduces chance for user error.
- Risks
 - Repeat user may not require progressive disclosure (depends on the task).
 - Assumes the designer understands the most popular, common or important task for the user.



IXD BEST PRACTICES

It is easy for a user to get the sense that an icon of a trashcan has to do with deleting/removing something.



▪ UI Metaphors

- UI Metaphors are product oriented conceptual models that map over to user oriented mental models. They embed common semantics that we can leverage.
- Examples of Metaphors:
 - Inbox
 - Typewriter
 - Canvas, brushes, and pallet
 - Desktop
 - Shopping cart
 - Etc.



IXD BEST PRACTICES: MODELING INTERACTION STYLES

This table is from
your textbook –
you should already
be familiar with it.

Interaction style	Main advantages	Main disadvantages	Application examples
Direct manipulation	Fast and intuitive interaction Easy to learn	May be hard to implement. Only suitable where there is a visual metaphor for tasks and objects.	Video games CAD systems
Menu selection	Avoids user error Little typing required	Slow for experienced users. Can become complex if many menu options.	Most general-purpose systems
Form fill-in	Simple data entry Easy to learn Checkable	Takes up a lot of screen space. Causes problems where user options do not match the form fields.	Stock control, Personal loan processing
Command language	Powerful and flexible	Hard to learn. Poor error management.	Operating systems, Command and control systems
Natural language	Accessible to casual users Easily extended	Requires more typing. Natural language understanding systems are unreliable.	Information retrieval systems

IXD BEST PRACTICES

▪ Modalities – modes of interaction.

- A View mode = no changes to stored data.
- Edit mode = changes to stored data.

BlackBoard has two basic modes: a view mode for students, and a edit mode for teachers. Based on the mode different functionality is available (e.g., editing the name of a folder).

The image displays two side-by-side screenshots of the BlackBoard Learn interface, showing the 'Modules' section of a course.

Left Screenshot (View Mode): The 'Edit Mode' button in the top right corner is set to 'OFF'. The 'User-Centered Design' module is selected. The interface shows a list of modules with their names, descriptions, and weeks.

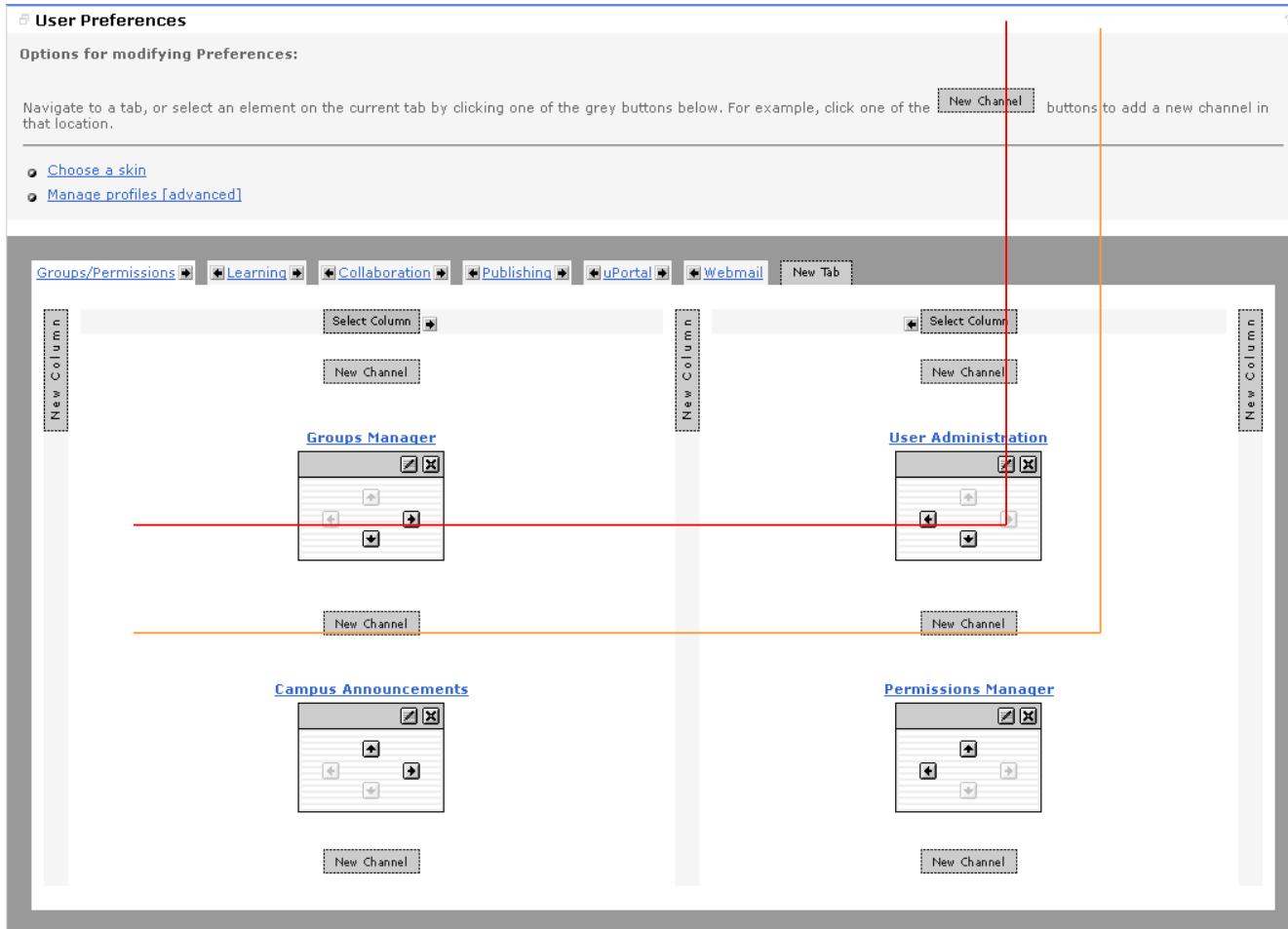
Module	Description	Week
Starting Out	Week of 8/23.	
User-Centered Design	Module 1, week of 8/30.	
User Modeling	Module 2, week of 9/13.	
Interaction Design	Module 3, week of 9/20.	
Principles of UI Design	Module 4, week of 9/27.	

Right Screenshot (Edit Mode): The 'Edit Mode' button in the top right corner is set to 'ON'. The 'User-Centered Design' module is selected. A context menu is open over the module, listing options like 'Edit', 'Adaptive Release', 'Metadata', 'Copy', 'Move', and 'Delete'.

Module	Description	Week
Starting Out	Week of 8/23.	
User-Centered Design	Module 1, week of 8/30.	
User Modeling	Module 2, week of 9/13.	
Interaction Design	Module 3, week of 9/20.	
Principles of UI Design	Module 4, week of 9/27.	
UML Interaction Model	Availability: Item is not available. Module 5, week of 10/18.	
UML Behavior Modeling	Availability: Item is not available. Module 6, week of 10/25.	

IxD BAD PRACTICES

800 x 600 1024 x 768



- No progressive disclosure
- Poor system feedback
- No task flow pattern
- Overly literal translation
- Unconventional and ambiguous buttons
- Inconsistent controls & operations (ambiguous modes)
- Overly redundant controls
- Ineffective use of white space, awkward dimensions
- Relies on recall, rather than recognition
- Poor / no access to help



IXD BEST PRACTICES

▪ Example of Preferences

User Preferences

> Manage Channels & Layout Change Colors & Styles

Choose from the options below:

- 1 [Manage My Tabs](#)
Setup tabs to help organize content into manageable groups.
- 2 [Add/Remove Content](#)
Choose from a wide range of the content channels that best suit your interests.
- 3 [Customize My Layout](#)
Change where channels are placed on each tab and adjust page columns.

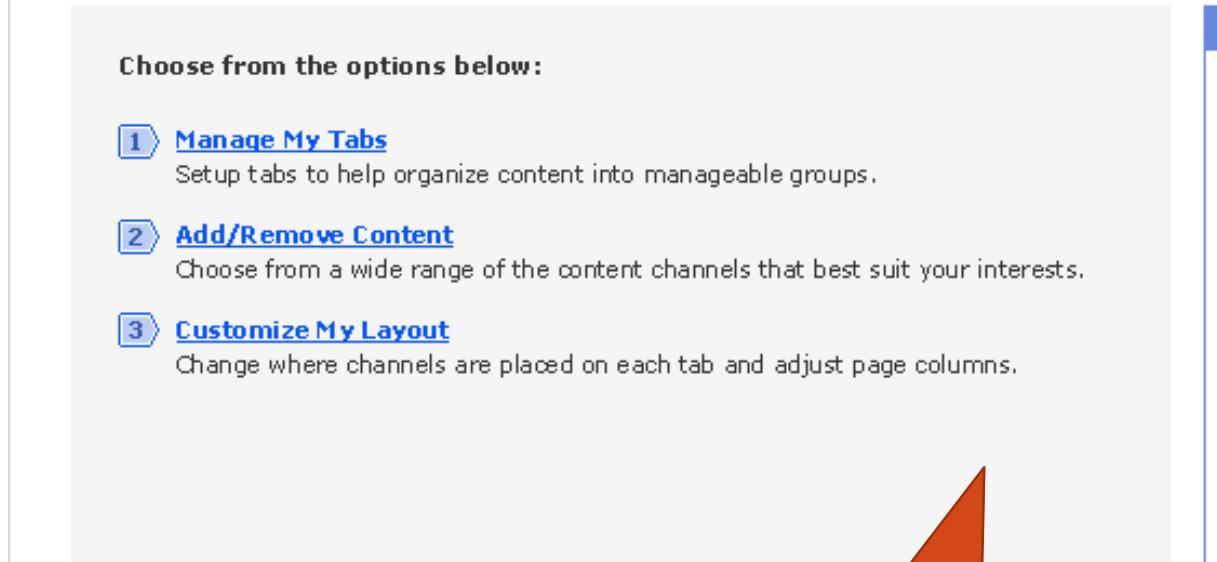
Related Links

Task Shortcuts

[Add a new tab to my portal](#)
[Use an ADA compliant theme](#)
[Add a new channel to this tab](#)
[Rename this tab](#)
[Select a different color scheme](#)

Help Station

[How can I delete a tab?](#)
[Can I email technical support?](#)
[How many columns can I use?](#)
[Is there away to change fonts?](#)
[How can I remove a channel?](#)



Goal and Task oriented

Notice that all of
the links align
with a potential
user task.



IxD BEST PRACTICES

■ Example of Preferences

User Preferences

> Manage Channels & Layout Change Colors & Styles

Add/Remove Content

Create a new tab

My Tabs New Tab

Personal
Collaboration (Default)
News & Info
Webmail
Course Management
uPortal Admin

Collaboration Tab

Select a channel to add or deselect to remove:

Collaboration Channels	Campus Channels	External Websites
<input type="checkbox"/> Address Book	<input type="checkbox"/> Campus Announcements	<input type="checkbox"/> IBS News
<input type="checkbox"/> Briefcase	<input type="checkbox"/> Campus News	<input type="checkbox"/> Salon.com
<input type="checkbox"/> Calendar	<input type="checkbox"/> Campus Resources	<input type="checkbox"/> uPortal Homepage
<input checked="" type="checkbox"/> Discussion Forums	<input type="checkbox"/> Classifieds	<input type="checkbox"/> uPortal - Powered Sites
<input checked="" type="checkbox"/> Group Chat	<input type="checkbox"/> Notifications	
<input checked="" type="checkbox"/> Poll		
<input checked="" type="checkbox"/> Survey		
<input type="checkbox"/> Webmail		

Productivity Channels

<input type="checkbox"/> Bookmarks	<input type="checkbox"/> Channels Admin
<input type="checkbox"/> My Notes	<input type="checkbox"/> Discussion Forums Admin
	<input type="checkbox"/> User Admin

Campus Channels

<input type="checkbox"/> Academus CMS

Entertainment Channels

<input type="checkbox"/> Minesweep
<input type="checkbox"/> Number Guessing Game
<input type="checkbox"/> Word of the Day

Cancel Changes Save Changes



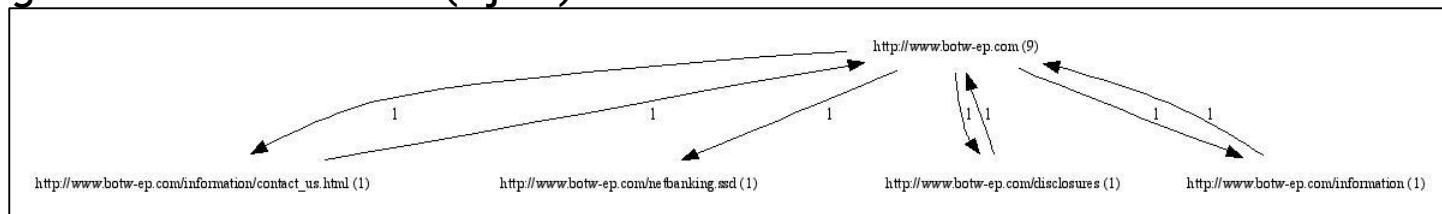
Use workflow patterns like a guide.

IxD IN THE CONTEXT OF UCD

- Some aspects of IxD blend in with UCD:

Storyboarding

- Our storyboards should provide a *flow* to our application
- Any interaction that “changes screens” must be planned carefully
- This is changing somewhat with web (AJAX) & mobile

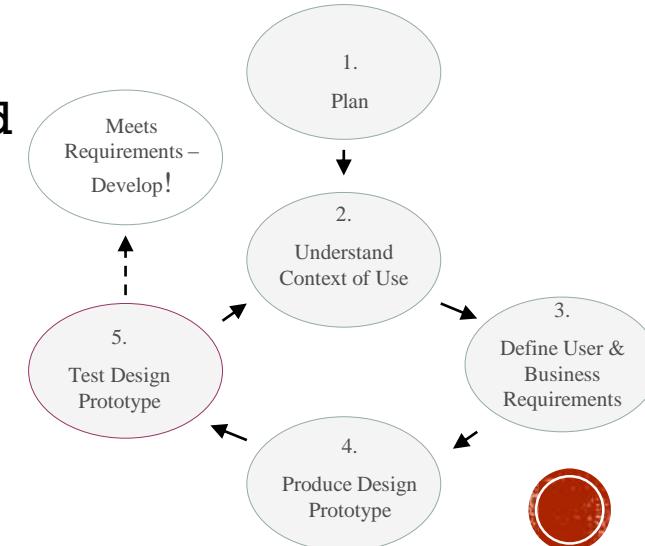


Clickstream Analysis

- The analyzing of user interactions (“clicks”) to see if s/he is using the system/app in the manner designed
 - What path is the user taking? Is it the intended path?
 - How many false/exploratory actions? Is the user frustrated?
- This is also changing (“swipestream analysis”?)

Refinement

- We discussed how UCD has iterations as much for refinement as for exploration of alternatives
- Interaction models certainly require refinement.



NEW TRENDS

- Much of traditional IxD was driven by systems
 - Think data entry
- Then along came the PC
 - The mouse was a revolution! Hello event handling and “widgets”
- Then the Web
 - Hypertext and “screen-by-screen” flows
- Now, Mobile & Games
 - *Mobile*: ubiquitous, touch-screens, “gesture-oriented”
 - The iPad: *so easy the naïve user can work it the 1st time*
 - *Games*: “physical UI”, immersion, perception
 - No longer a level playing field – the nature of the HCI is a fundamental differentiator
 - These 2 technologies also are changing the landscape in other aspects of UI development
 - Visual/graphics engines, sprites, etc. (next time)
 - Interaction modeling – multi-agent modeling, storyboards, etc.



IxD SUMMARY

- IxD is a subset of overall UI Design and UX
 - Defines a *planned set of interactions* to help the end user accomplish a *goal*
 - A significant UCD aspect is the *validation* that the end user uses the design in the manner intended
 - If s/he does not, is there frustration?
 - The nature of IxD is changing
 - our computing devices are changing in both physical interaction and form factor
 - And they are ubiquitous and used in “bursts”
 - Count how many times you take out your phone per day
- IxD comes before UI Graphical Design Modeling
 - That is, you map out interactions to achieve goals before you worry about the bells and whistles
 - IxD generally concerns itself with *macro-interactions*, not *micro* (which widget will I use to accomplish low-level task T?)

