

Design & Prototyping

UXD- User Centred Design

Lecture 5

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What is design anyway?

Design is:

The activity of marking out, of conceiving a plan in one's mind, of devising means for a specific function. It has the connotation of creating and calculating for a predetermined end.

(Nadin, 1998)

How do you design something?

Let's start with some guidelines
& principles....

Design Principles

Intended to help designers explain and improve design (Thimbleby, 1990)

1. Visibility
2. Feedback
3. Constraints
4. Consistency
5. Affordance

Visibility

Visibility is an important cue to identify what can be used, and how.



Good Visibility



Bad Visibility

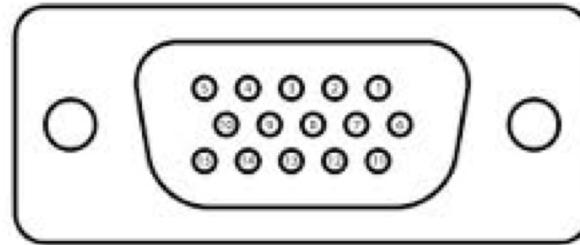
Feedback

Confirmation of action and state of system

Can be auditory, verbal, visual or combination

Constraints

Forced Function (Norman, 1998)



Consistency

Similar operations within & across interactions

Consistent function is easier to learn and use

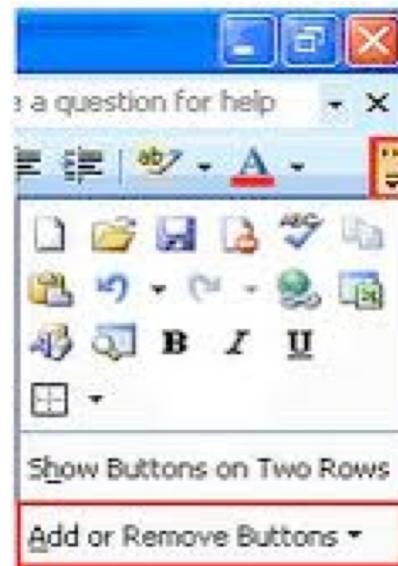
Difficult with interfaces with 100's operations

Affordance

Functional inference through attributes
Physical (a) or Perceived (b)



(a)



(b)



Accessibility

Degree to which product is accessible by as many as possible

Disability focus

- Physical, mental impairment
- Impacts on day to day activities
- Substantial and long term

[Game \(M\)](#)[Input \(I\)](#)[Output \(O\)](#)[View \(V\)](#)[Players \(P\)](#)

- 3. Pawn G4 x F5
- 3... Pawn D7 - D6
- 4. Pawn F5 - F6
- 4... Pawn C7 - C6
- 5. Bishop F1 - H3
- 5... Bishop C8 x H3
- 6. Knight G1 x H3
- 6... Pawn H7 - H5
- 7. Pawn D2 - D4
- 7... Pawn B5 - B4
- 8. Pawn C2 - C3
- 8... Pawn A7 - A5
- 9. Pawn A2 - A4
- 9... Queen D8 - C7
- 10. Bishop C1 - F4
- 10... Queen C7 - D6

[Go back](#)Player: **White (User1)**Speech command: **to Echo 5**Text command: **F4E5**

Standards

Set by national or international bodies

Hardware standards more common
than software

ISO 9241 defines usability as:
*effectiveness, efficiency and satisfaction
with which specified users can achieve
specified goals in a particular
environment.*

Golden rules and heuristics

“Broad brush” design rules

Useful check list for good design

Different collections e.g.

- Nielsen’s 10 Heuristics (more for evaluation)
- Shneiderman’s 8 Golden Rules
- Norman’s 7 Principles

Shneiderman's 8 Golden Rules

1. *Strive for consistency*
2. *Enable frequent users to use shortcuts*
3. *Offer informative feedback*
4. *Design dialogs to yield closure*
5. *Offer error prevention and simple error handling*
6. *Permit easy reversal of actions*
7. *Support internal locus of control*
8. *Reduce short-term memory load*

Norman's 7 Principles

1. Use both knowledge *in the world* and knowledge *in the head*
2. Simplify the structure of tasks
3. Make things visible: bridge the gulf of Execution and Evaluation
4. Get the mappings right (*user intentions mapping onto controls*)
5. Exploit the power of constraints, both natural and artificial
6. Design for error
7. When all else fails, standardize (*if no natural mapping then make all things standard so only learn once*)

Universal Design

equitable use

flexibility in use

simple and intuitive to use

perceptible information

tolerance for error

low physical effort

size and space for approach and use

It's also important to think about the conceptual

Conceptual Design

Transform **user requirements** into a conceptual model

“a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended”

Preece et. al, 2002

Conceptual Design- Advice

Immerse yourself in your data

Empathise

Don't move to a solution too quickly

Iterate, iterate, iterate

Consider alternatives: prototyping helps

Interface Metaphors

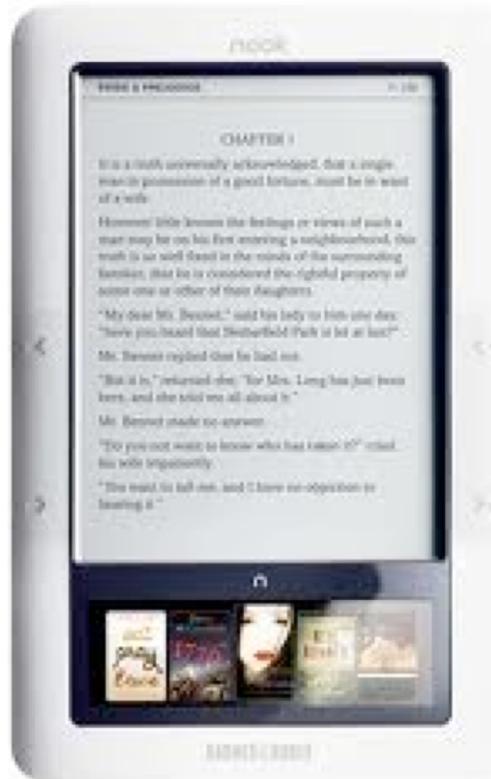
They combine:

- familiar knowledge
- new knowledge

To help the user understand the product

Three steps

1. Understand what the system will do (functionality)
2. identify potential problem areas
3. generate metaphors



What's the metaphor?

Evaluate the Metaphor

What structure does it provide?

- A good one should give familiar model

Relevant to the problem?

Easy to represent?

- Audio, visuals and words

How extensible is it?

- Useful for later in the interaction?

Will the audience understand it?



<http://google-latlong.blogspot.ie/2011/02/street-view-takes-you-inside-museums.html>

Conceptual Models

Which interaction type?

- Instructing (get this info)
- conversing (here are some choices)
- manipulating (interface actors)
- exploring (browsing info)

Most models have combination of these

Interaction Types

Do different *interface* types provide insight?

- WIMP, shareable, augmented reality, etc

Considering effects of different interface types can prompt alternative ideas

Decisions dependent of requirements

Expanding the model

What functions will the product perform?

- What will the product do and what will the human do (task allocation)?
- E.g. should a tickets website just show ticket options? Or automatically reserve a ticket too?

Expanding the model

How are the functions related?

- Sequential/temporal or parallel
- Categorisations, e.g. all actions related to telephone memory storage

Expanding the model

What information needs to be available?

- What data is required to perform the task?
- How is this data to be transformed by the system?
- E.g. travel site- need data from venues on access, availability etc.

Conceptual to Physical Design

Conceptual design should develop freely

Tying physical design too early might inhibit creativity

Design is about making choices

- Must balance usability with environmental, data, user experience with functional requirements

Trade offs are necessary

Need to identify the trade offs.....
which are acceptable to the user

More constrained interface= less visibility

Use your knowledge of the user

Prototyping

What's a Prototype?

Paper based outlines

Series of screen sketches

A storyboard

Video simulation

Piece of software with limited
functionality

Cardboard/3D mock up



Tablet Device

Why Prototype?

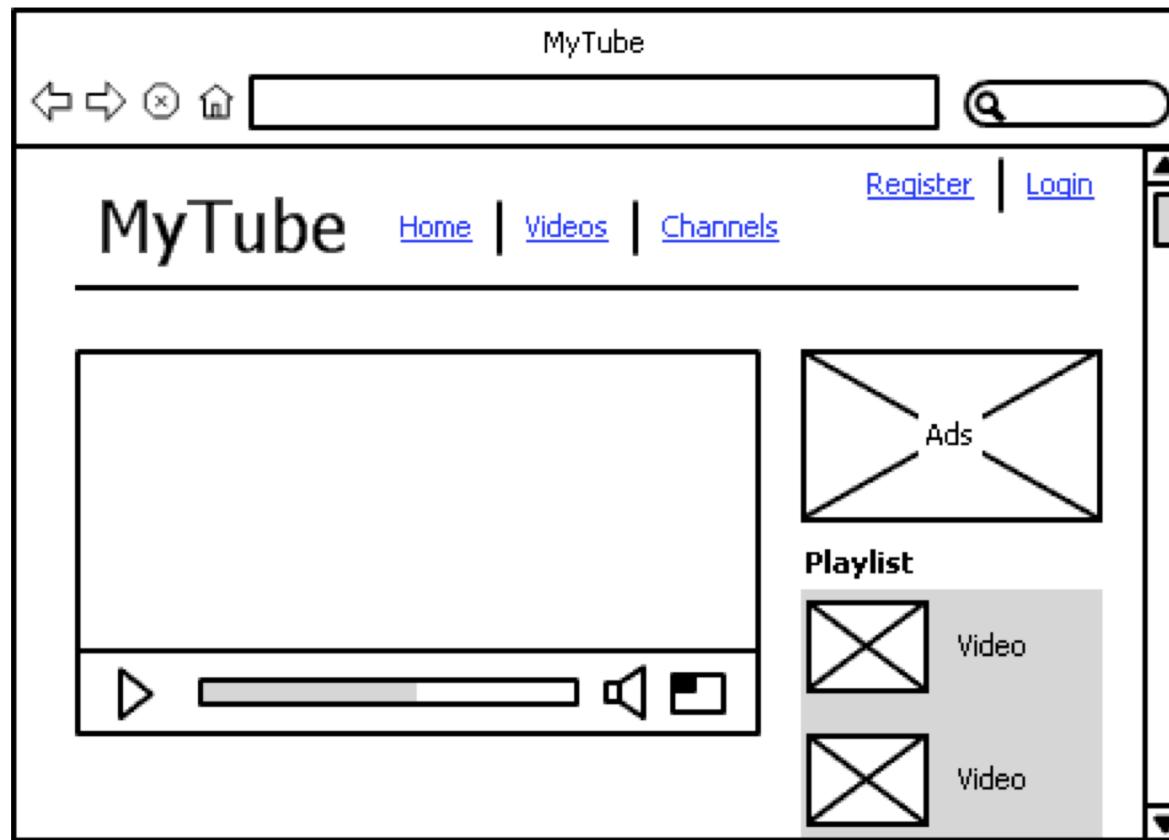
Evaluation & feedback

Helps with cross team communication

You can test out ideas for yourself

Encourages reflection

Helps choose between alternatives





Favor Link-

[http://www.servicedesigntools.org/sites/default/files/res_images/EXPERIE
ENCE%20PROTOTYPW.jpg](http://www.servicedesigntools.org/sites/default/files/res_images/EXPERIENCE%20PROTOTYPW.jpg)

Experience Prototyping

“any kind of representation, in any medium, that is designed to understand, explore, or communicate what it might be like to engage with product, space or system we are designing”

Buchenau & Suri, 2000

Experience Prototyping

Understand existing UX

Use proxies

e.g. development of
chest implanted
defibrillator



Buchenau & Suri, 2000

Experience Prototyping

Understand existing UX

Role playing

e.g. train experiences



Buchenau & Suri, 2000

Experience Prototyping

Exploring design ideas



Playing with props



Bodystorming

What to Prototype?

- Technical issues
- Physical features
- Work flow, task design
- Environment/experience
- Screen layouts & information display
- Difficult, controversial, critical areas

Lo-Fi Prototyping

Uses a medium which is unlike the final medium
e.g. paper, cardboard

Quick, cheap & easy to modify

Should be flexible & encourage exploration

sketches of screens, task sequences, 'Post-it' notes, storyboards

Used more to explore than evaluate with users

Why Use Lo-Fi Prototypes

Traditional methods take too long

- Sketches → prototype → evaluate → iterate

Can simulate the prototype

- Designer “plays computer”
- Other design team members observe & record

Sounds silly but is surprisingly effective

Storyboards

Series of sketches

- shows how user progresses through task/experience using the device
- No need to focus on things like screen etc

Used early in design

Often used with scenarios

- bringing more detail
- chance to role play

Storyboards- Example



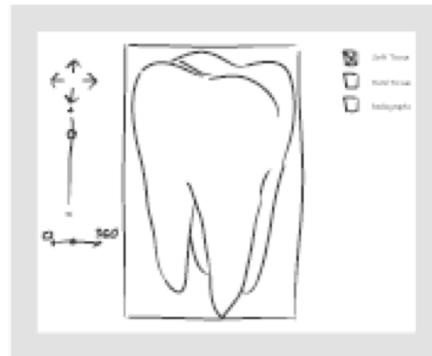
The dentist examines the patient.



The radiograph shows decay extending into the pulp, so he decides on a root canal.



Later that day, he returns to his computer to plan the procedure.



The 3D single tooth view shows him all he needs to know.



He plans the treatment.

Using Scenarios

As a basis for the overall design ideas

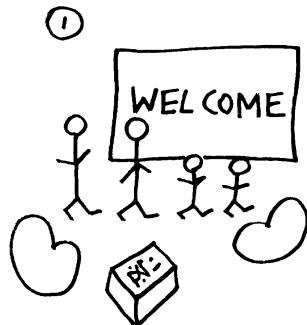
Scripts for user evaluation of prototypes

Concrete examples of tasks

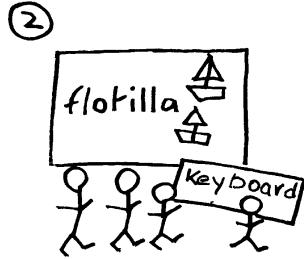
Co-operation across prof. boundaries

Plus and minus scenarios to explore extreme cases (Mancini et al., 2010)

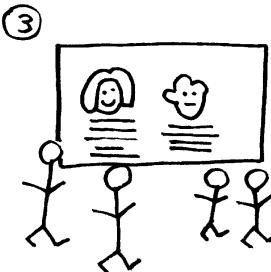
Generating Storyboards from Scenarios



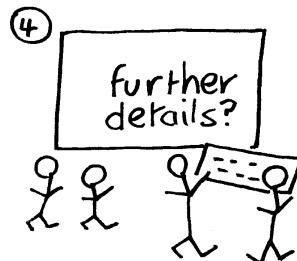
Thomson family
gather around



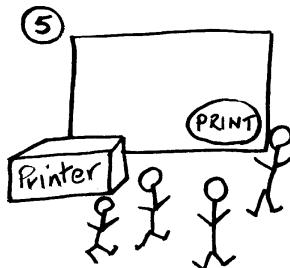
System suggests
flotilla



System shows
descriptions

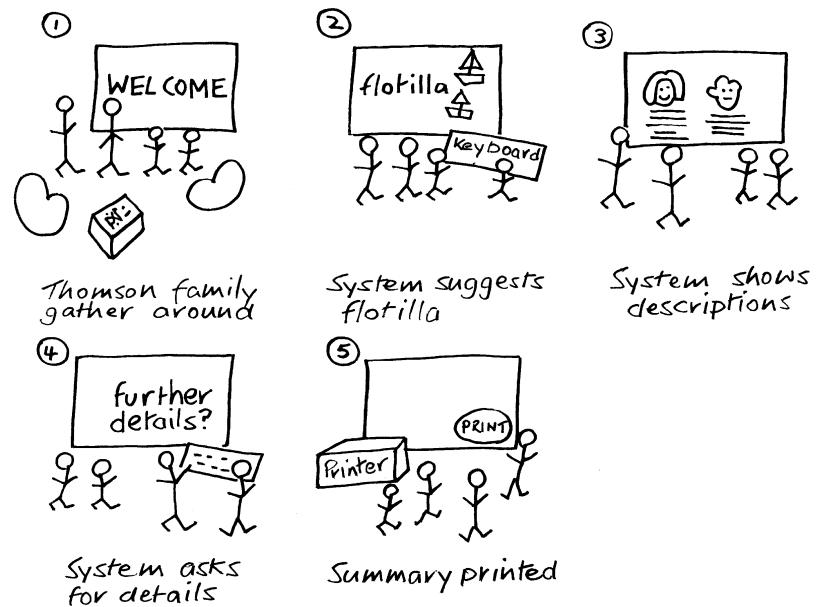


System asks
for details



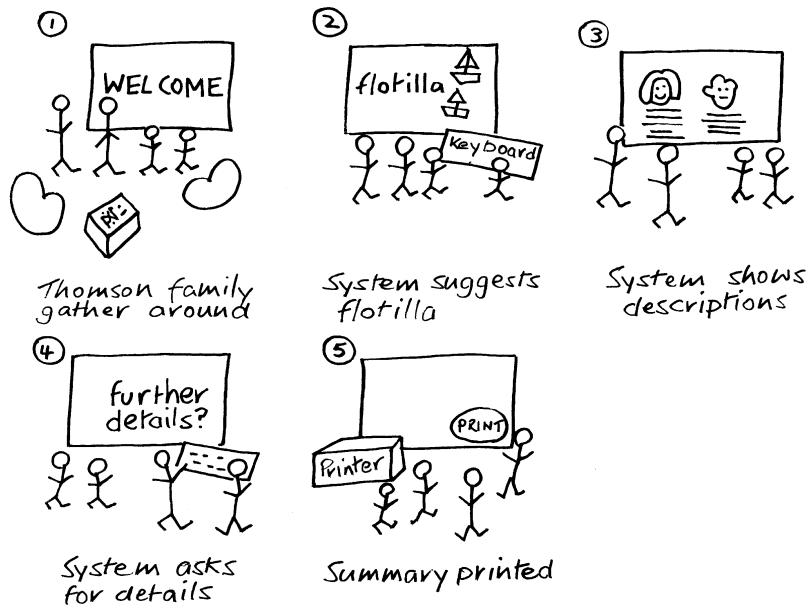
Summary printed

Drawing aspects of the interface and interaction act as tools to make you think about details.



From this activity questions arise:

- How can the whole family interact?
- Will people sit or stand?
- How will the user interact with the tech?

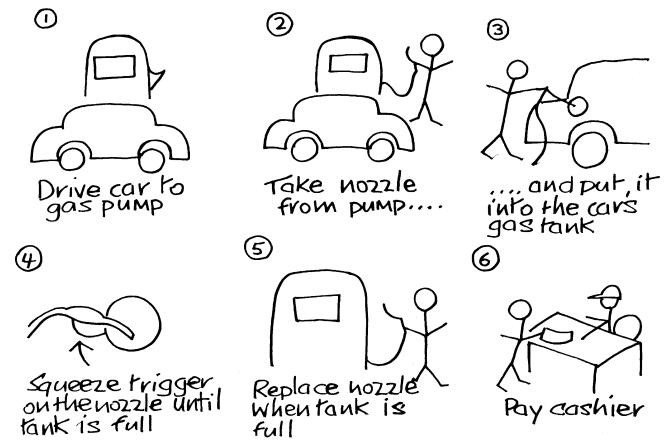


Sketching

Sketching is important
to low-fidelity
prototyping

No need to be
Da Vinci!

Stick men, rough
sketches



Card-based prototypes

Index cards (3 X 5 inches)

Each card represents screen/task element

Often used in web dev

User can go through cards doing a task

Travel
Organiser

23 August 2006

Train timetable from Milton Keynes Central
to York
on 16.09.06

Depart 09:09 10:09 same 22:09
Arrive 12:30 13:30 past hour

Accommodation Hotel B&B
£40 to £150 £20 to £60

Travel
Organiser

23 August 2006

WELCOME HELEN

Where do you want to go?

What date do you want to travel?

Which form of transport do you want? TRAIN

Do you need accommodation? YES

Generating Cards...

- Travel Information
- Visa requirements
- Vaccination Recommendations
- What to pack before you go

VISA REQUIREMENTS FOR (COUNTRY)

VISA REQUIREMENTS	
Destination Country	<input type="text"/> <input checked="" type="checkbox"/>
Traveller's Nationality	<input type="text"/> <input checked="" type="checkbox"/>
Find Requirements	

Use Cases

Focus on user (actor), system & process of actor goal execution

Normal course (commonly performed action) & alternative courses

Step by step deconstruction of interaction

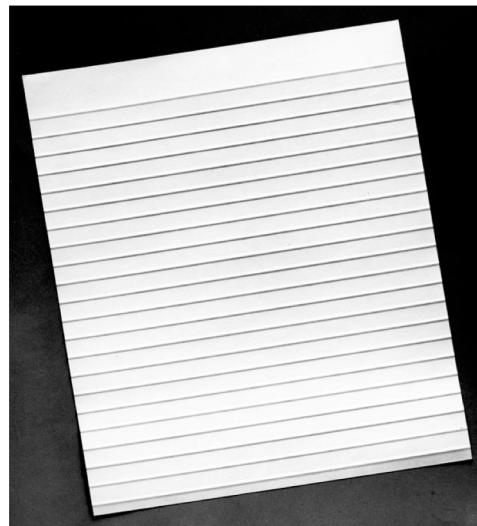
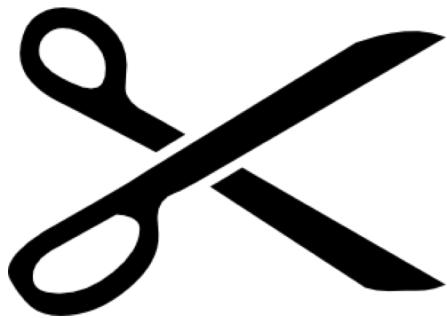
card-based prototype from use cases

TRAVEL INFORMATION
Visa requirements
Vaccination Recommendations
What to pack before you go

VISA REQUIREMENTS
Destination Country <input type="checkbox"/>
Traveller's Nationality <input type="checkbox"/>
Final Requirements

VISA REQUIREMENTS FOR (COUNTRY)
Print

Prototyping Physical Design



Prototyping Physical Design

Explores issues like interface layout, error messages, icons, display of info

Separate sheets per interaction “page”

Experimenter places next sheet in front of user when option selected

Observer takes notes

Hi-Fi Prototyping

Uses materials similar to final product

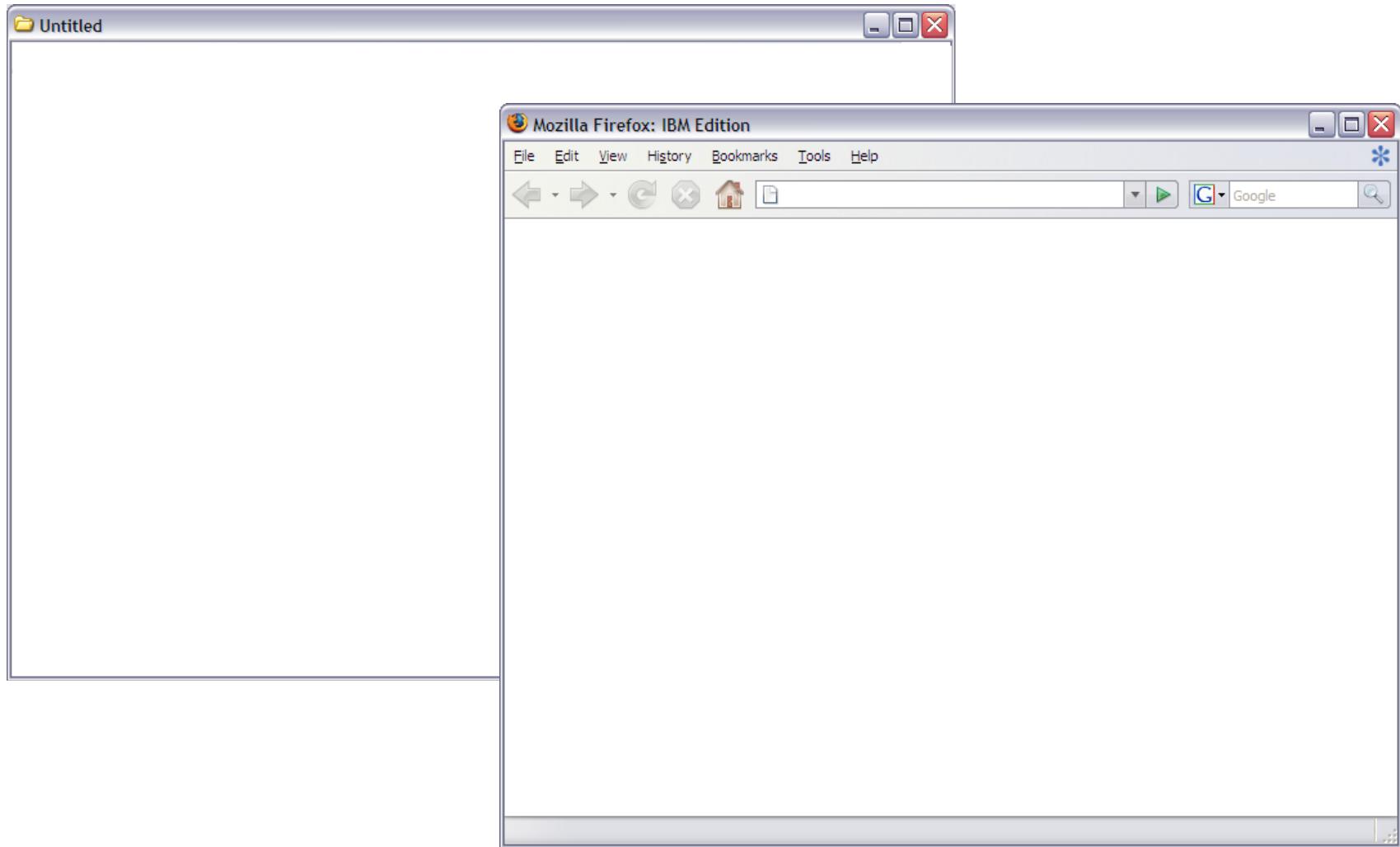
Has interactivity

Looks more like final system

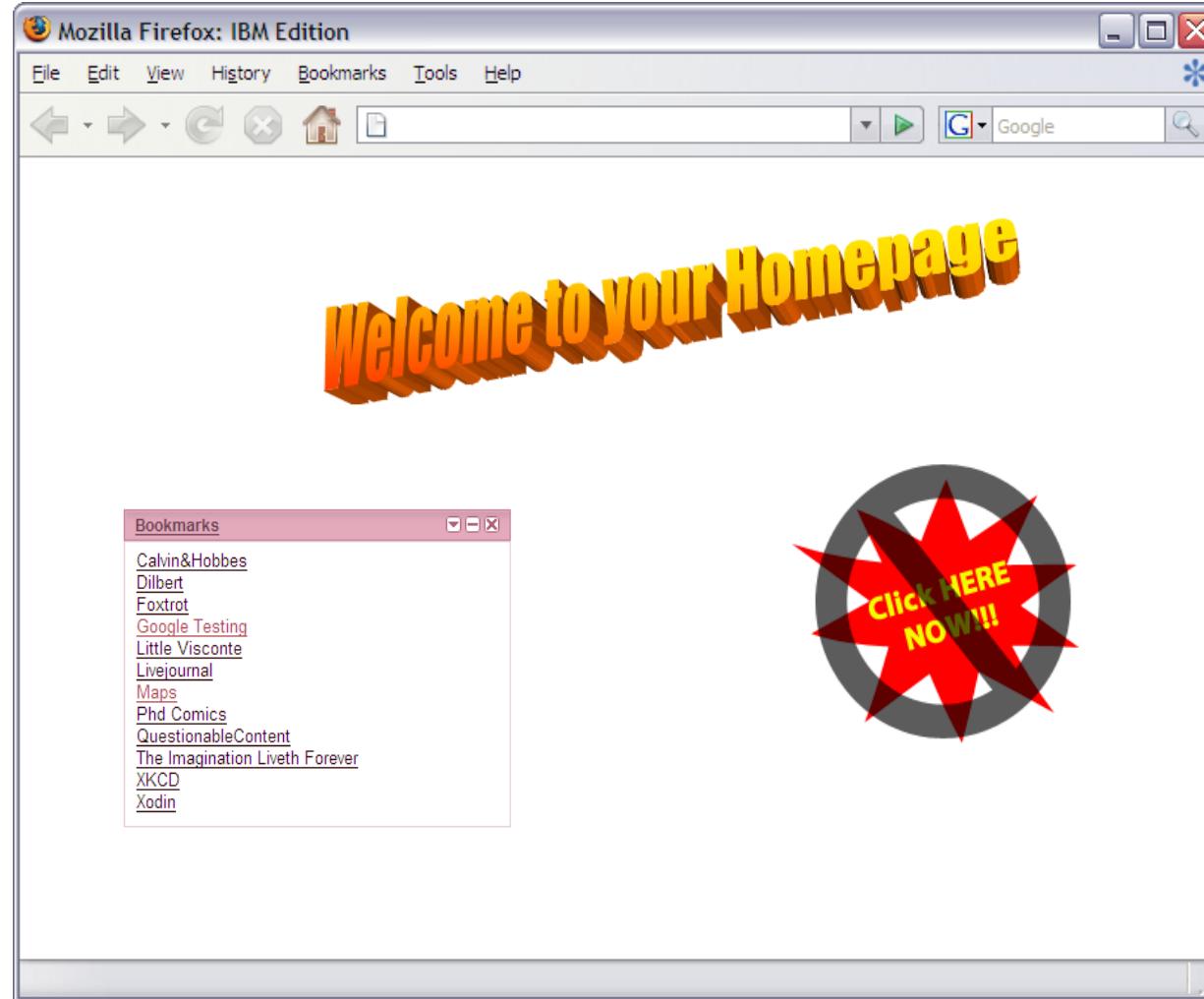
- Macromedia Director, Visual Basic but can also use PPT or HTML
- Can use screenshotting & videos
- Hack existing tech

Screenshotting

Start with a Blank Page



Use a drawing program to insert items you want



Useful Tricks

Print Screen and then cut out elements you like

- Windows: Alt-PrtScn captures the active window into the clipboard
- Mac: Cmd-Shift-4 captures the “grabbed” area into the clipboard
- Mac OSX Grab Utility
 - Open Grab (located in Applications/Utility).



Simple graphics editor like Paint to stitch images together

Web-Based

Provides the illusion of interactivity

“click-through” of screenshots

Good if you are considering adding
features to an existing site

Compromises

All prototypes involve compromises

- hi-fi perhaps a slow response? sketchy icons? limited functionality?
- lo-fi basic nature and concentration on concept/look

Common types of compromise

- ‘horizontal’: wide range of functions, little detail
- ‘vertical’: lot of detail for only few functions

Compromises

Hi-Fi Philosophies

- Evolutionary prototyping- evolves into final with rigorous testing
- ‘Throw-away’ prototyping- used as stepping stones to final design

The Final Product Stage

Learning from prototypes & creating a whole

Quality must be attended to

- usability (of course), accessibility, reliability, robustness, maintainability, integrity, portability, efficiency etc.

Supporting the Design Process

Interaction Design patterns (Tidwell, 2006; Crumlish & Malone, 2009)

- Tried & tested solutions to common design problems

Development and design resource sites

- iPhone app development support sites, web design support etc.
- Use the web!

Resources

<http://www.krisjordan.com/2008/09/07/10-minute-mock-prototyping-tips-for-powerpoint/>

<http://www.istartedsomething.com/20071018/powerpoint-prototype-toolkit-01/>