HCI Prototyping

Chapters 26, 4 (p. 69-77), 6.6

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Why bother trying out your ideas?

- Check feasibility of ideas with users
- Allow users to contribute to the design
- Validate & negotiate requirements
- Check the usefulness of the application


Start with people, not specs

How to do it?

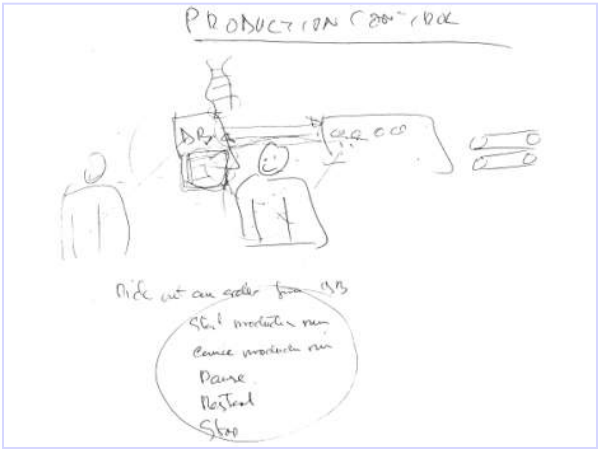
- **Step 1: creating mockups**
  - paper and digital low-fidelity prototypes
  - high-fidelity prototypes
- **Step 2: testing mockups**
  - Heuristic evaluation (refers to the entire system)
  - Cognitive walkthrough (refers to a specific task)
  - Thinking aloud (refers to entire systems & specific task)

Low-fidelity Prototypes

- very coarse-grained
- fuzzy layouts of general system requirements
- paper-based and digital
  - sketching
  - screen mockups
  - storyboards

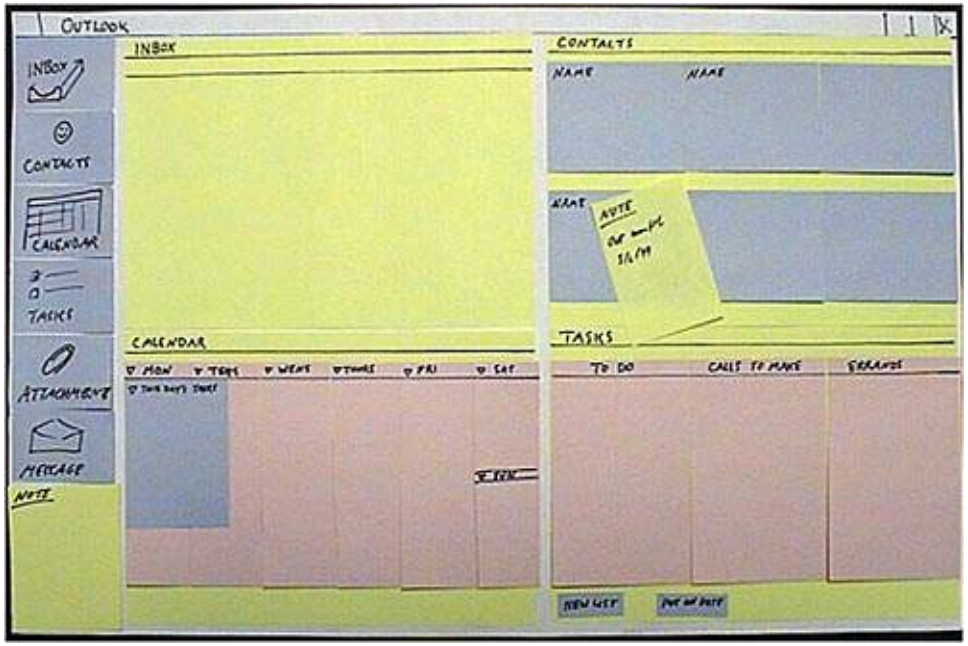
- used to gather feedback on the ***basic functionality*** or visual layout

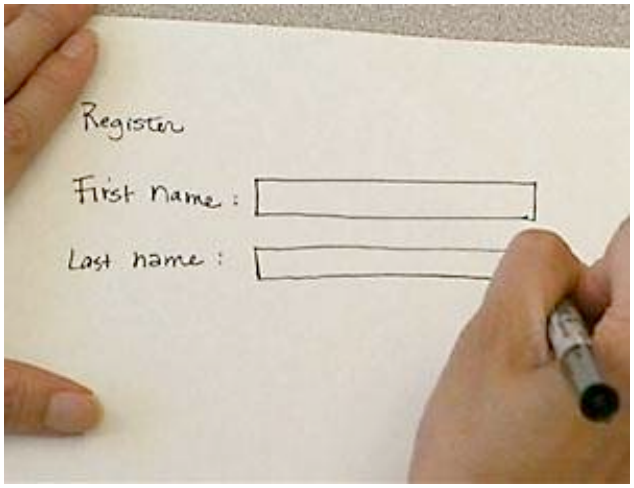
Paper Prototypes

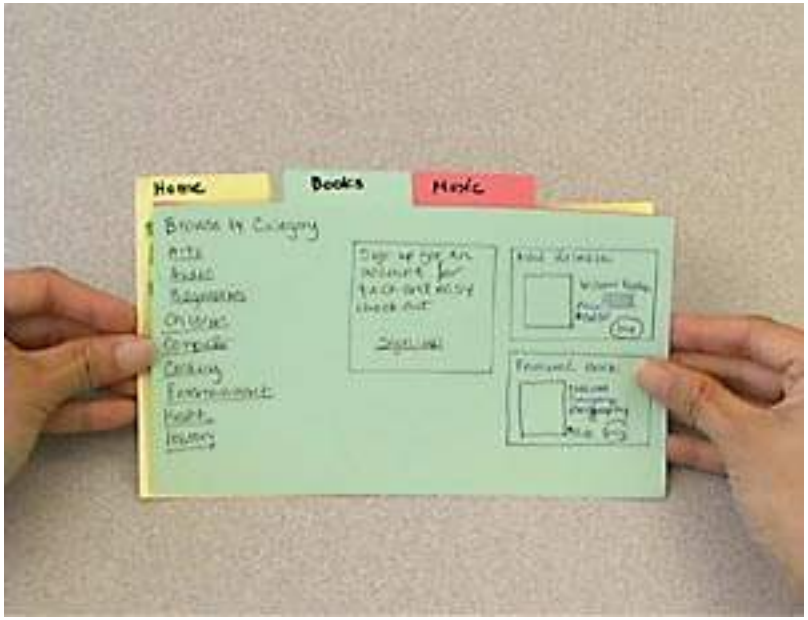


- Sketches and screen mock-ups
  - quick to build
  - easy to run
- Storyboards
  - sequence of screens focusing on a user action
  - don't capture every detail, just systems' major functionality
  - could be limited in scope, more rigidly linear
- Users love paper prototypes
  - opportunity to contribute to the new design

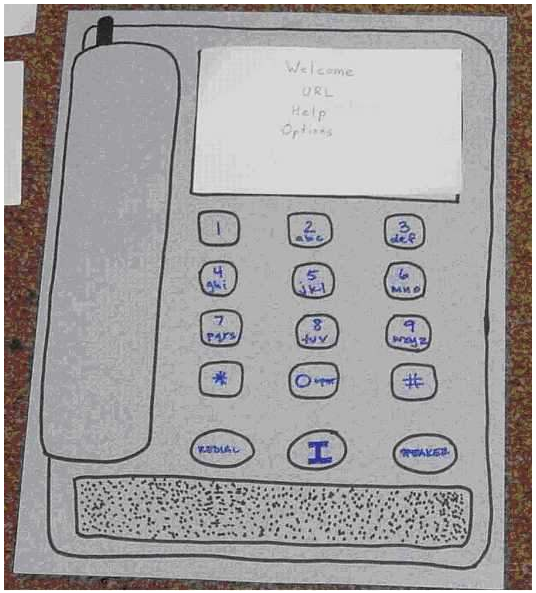
Paper Prototypes

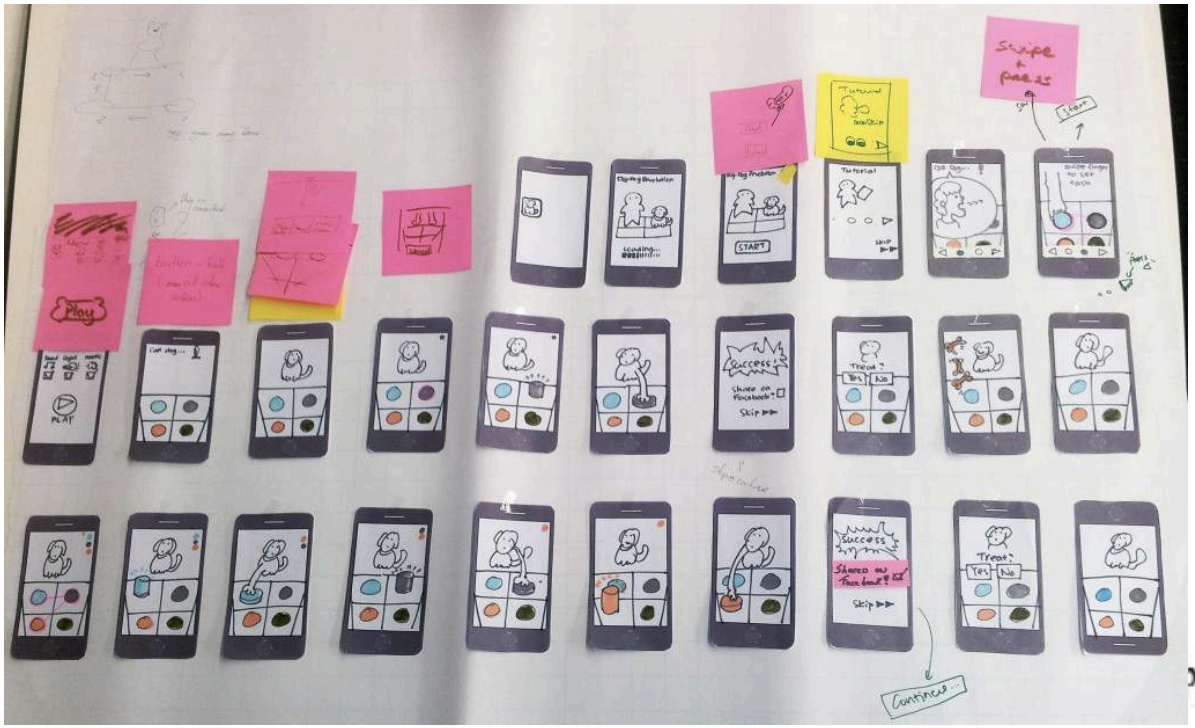




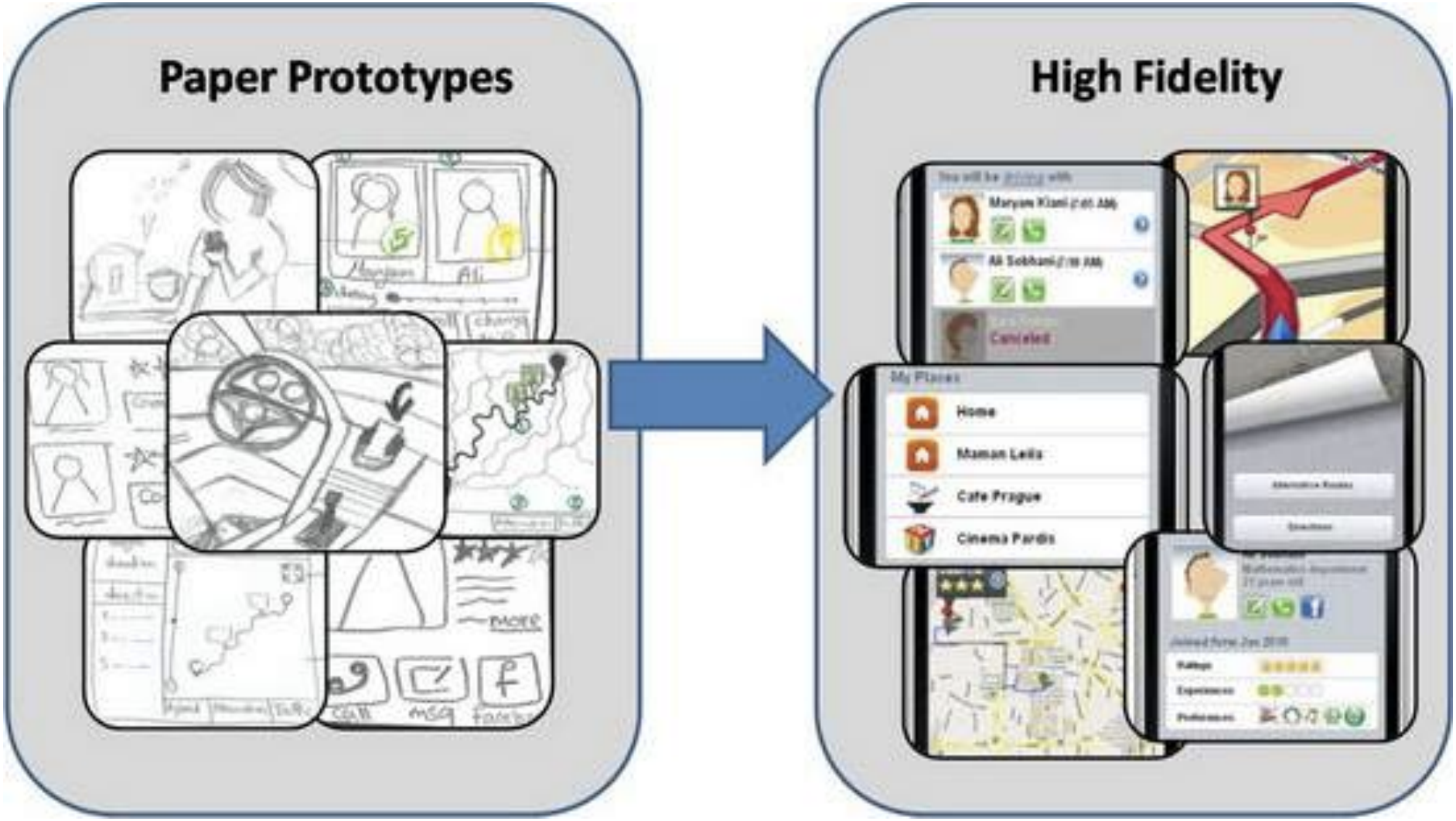


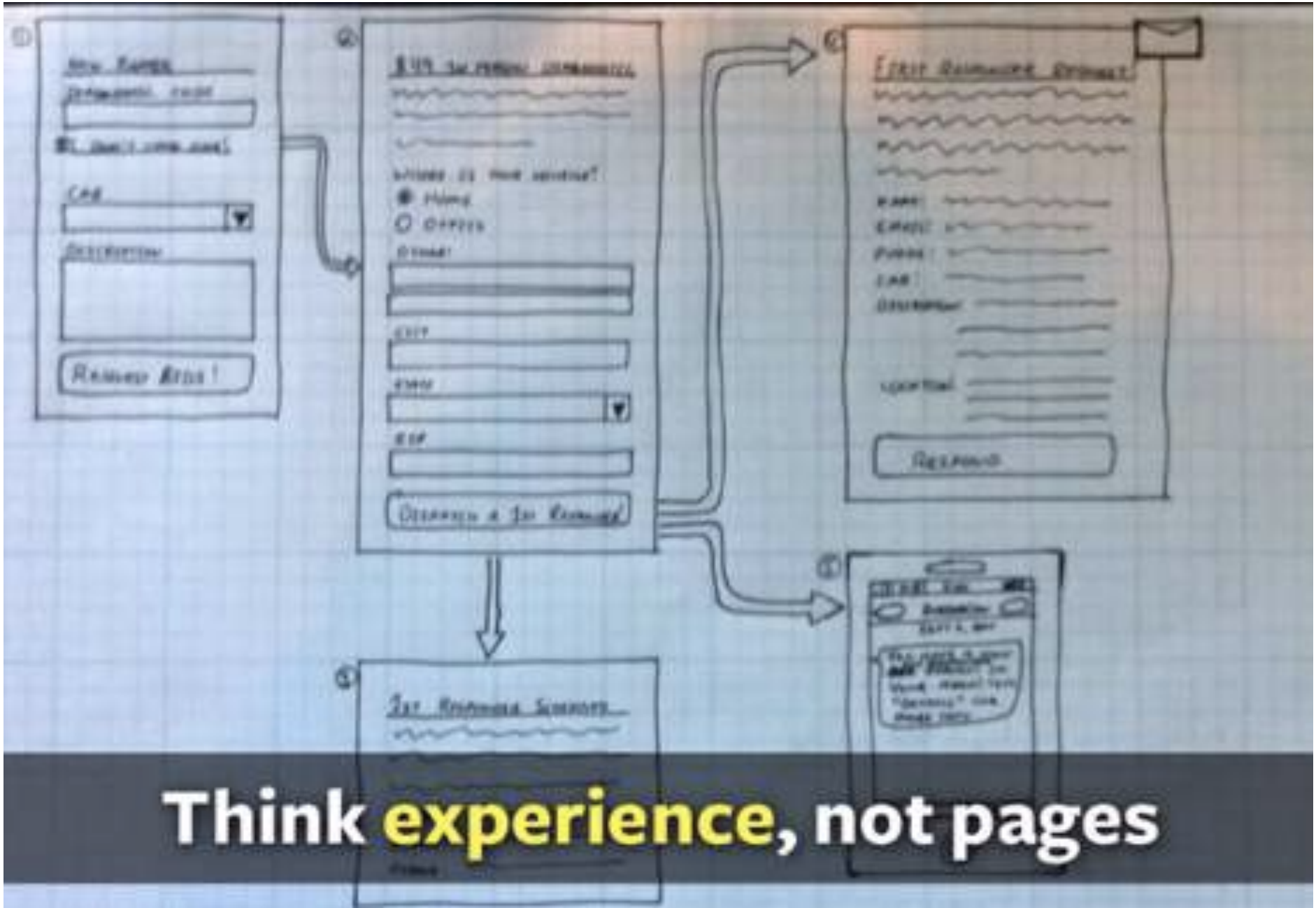

Directions
Timetable
Plan a Journey
current location
Victoria
now
Travel options
on
off
Plan Journey
Suggested routes
Earlier
Fastest
30 min
Later
Directions


Welcome
URL
Help
Options



...pe on Windows Mobile based Smartphones


Paper Prototypes
High Fidelity
Home
Maman Leila
Cafe Prague
Cinema Pardis


Think experience, not pages

Opportunities: THE TWITTER OF TEAM SPACES: "TEAM UP"

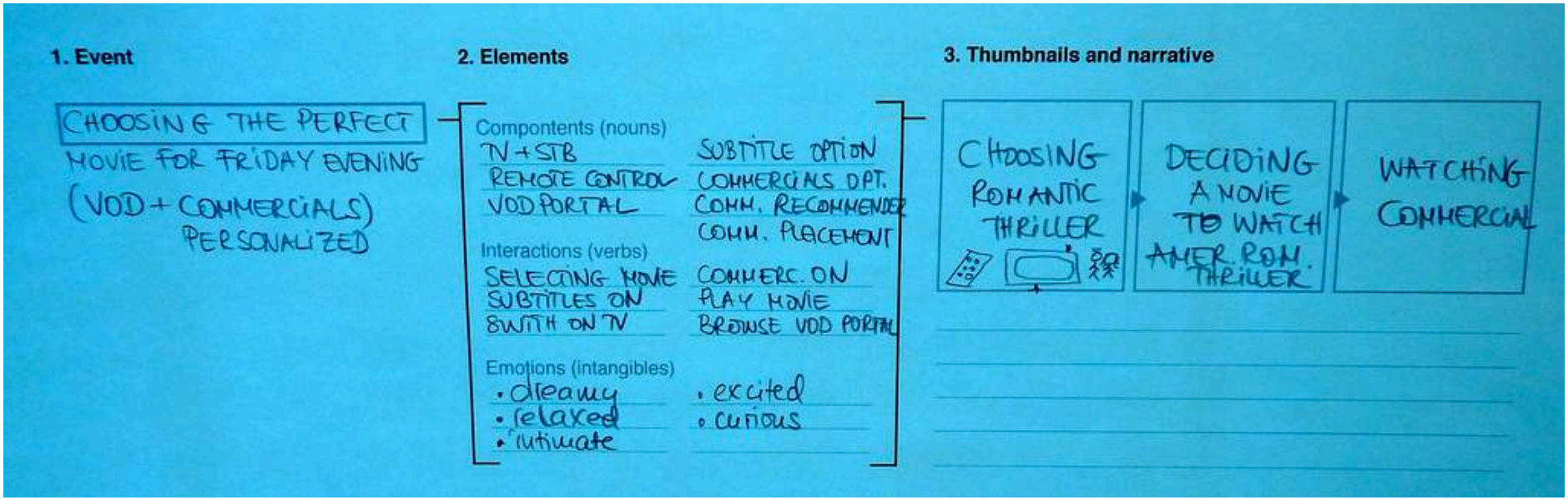
Event: SHARE A FILE

CAROL JUST UPLOADED A NEW REPORT — A REVISION. OTTO NOTICES, AND TAKES A QUICK PEEK TO SEE WHAT CHANGED.

A PREVIEW POPS UP, AND IT LOOKS LIKE CAROL MADE AN IMPORTANT CHANGE THAT MIGHT BE WORTH LOOKING AT — LATER.

BUT FOR NOW, OTTO NEEDS TO FINISH WHAT HE'S DOING. TEAM UP DOWNLOADS THE FULL FILE AND HOLDS ON TO IT FOR HIM TO CHECK OUT LATER.

Storyboard


1. Event
CHOOSING THE PERFECT MOVIE FOR FRIDAY EVENING (VOD + COMMERCIALS) PERSONALIZED
2. Elements
Compontents (nouns)
TV + STB
REMOTE CONTROL
VOD PORTAL
SUBTITLE OPTION
COMMERCIALS OPT.
COMM. RECOMMENDER
COMM. PLACEMENT
Interactions (verbs)
SELECTING MOVIE
SUBTITLES ON
SWITH ON TV
COMMERC. ON
PLAY MOVIE
BROWSE VOD PORTAL
Emotions (intangibles)
• dreamy
• relaxed
• intimate
• excited
• curious
3. Thumbnails and narrative
CHOOSING ROMANTIC THRILLER
DECIDING A MOVIE TO WATCH
AMER. ROM. THRILLER
WATCHING COMMERCIAL

Storyboards Should Convey

- Setting
  - People involved
  - Environment
  - Task being accomplished
- Sequence
  - What steps are involved?
  - What leads someone to use the app?
  - What task is being illustrated?
- Satisfaction
  - What's motivates people to use this system?
  - What does it enable people to accomplish?
  - What need does the system fill?

Use Case Title: Watching My News Agency with recommendations to friends

Description: It is afternoon. Gabrielle is at the doctor's waiting room. She uses her PDA to use"My News Agency" service and see what happens in the world. Some news are also interesting to Mauro so she recommends a couple of them to her husband.

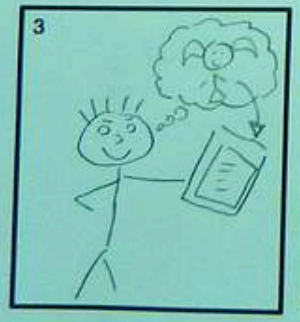
Gabriella Verdi lives in Turin with his husband Mauro, and his children Sabrino (16), Paola (6) and baby Marco.

He works in the Italian car industry and has to travel a lot.

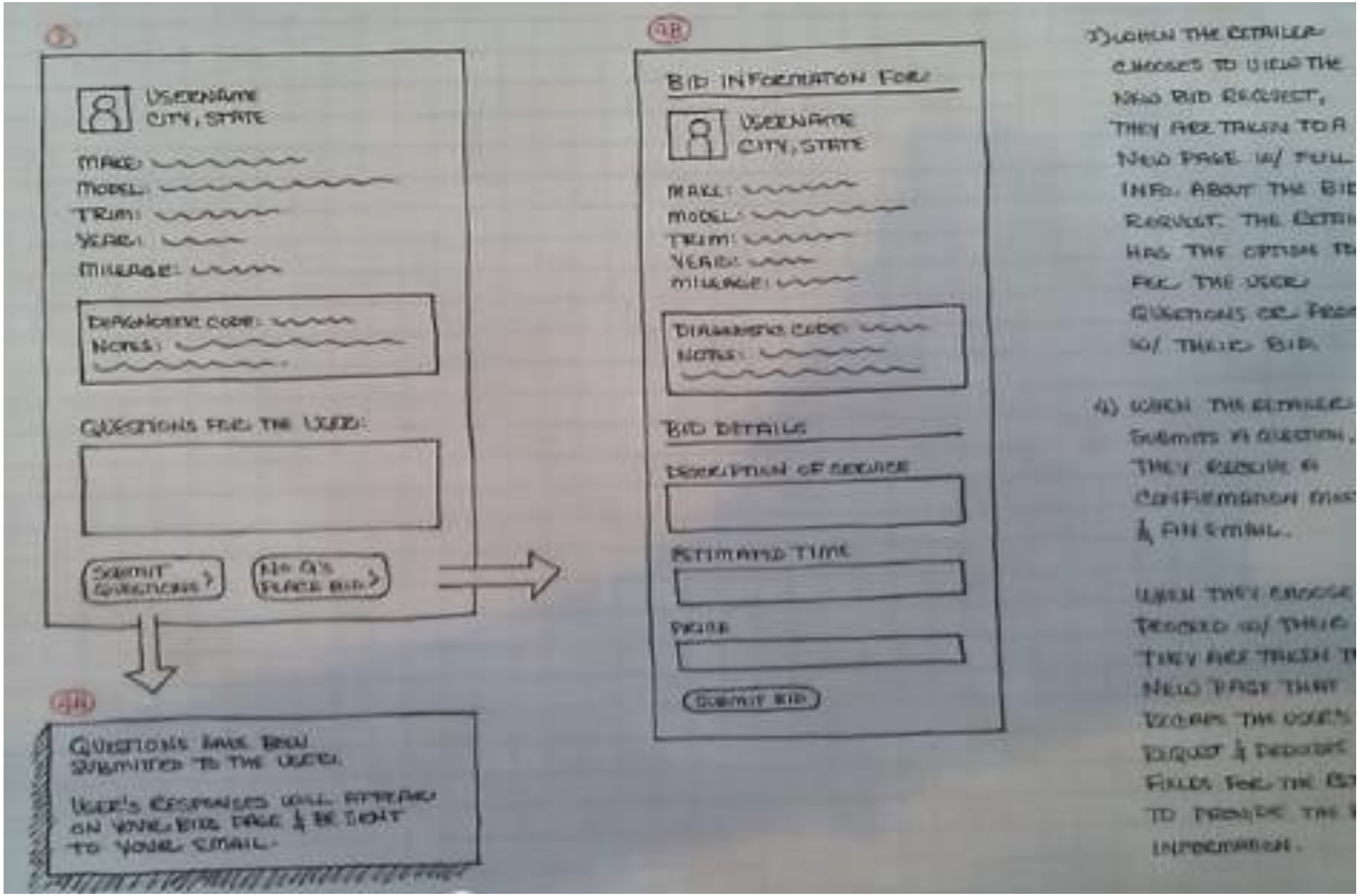
The Verdi household is NoTube compliant: it can tell who is in each room and what device they are using.

Mauro, Gabriella and Sabrino use integrated PDAs to communicate.

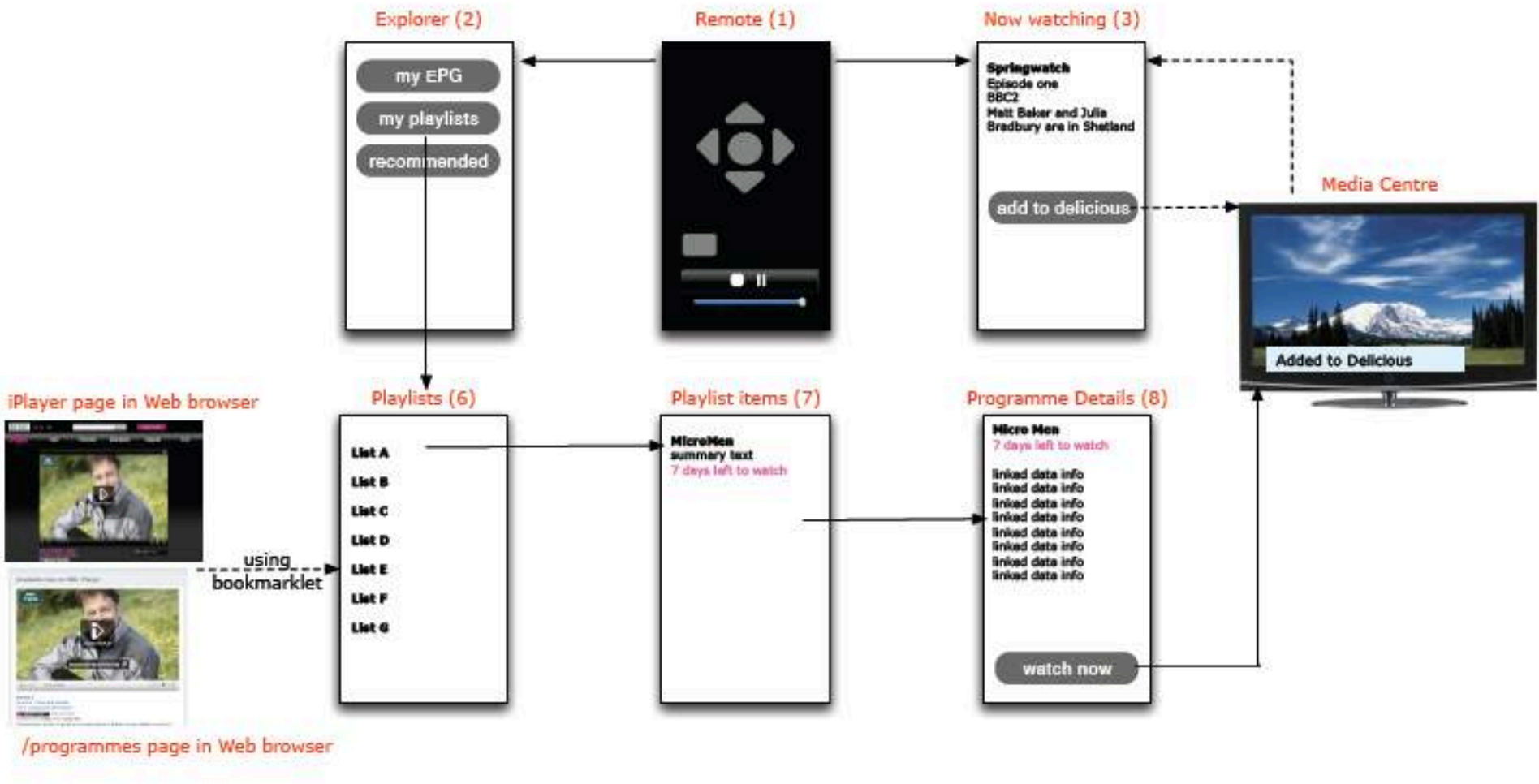
NoTube components (if applicable)

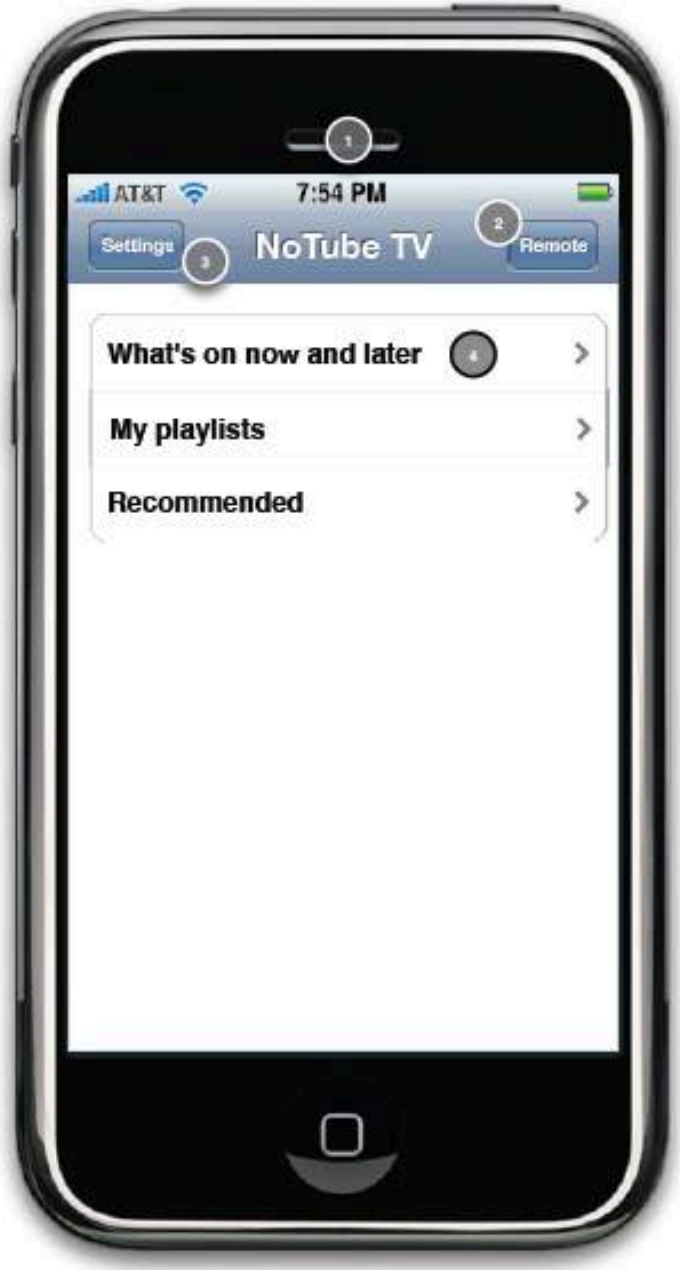
Thumbnail	UI e.g. remote, mobile, STB, web	recommender	profile store e.g. Beancounter	data enhancement	media asset store	content schemas	vocabularies	broker
1 	start here							
2 								
3 								

Note: the boxes you draw explain what the component does at that point


USERNAME
CITY, STATE
MAKE:
MODEL:
TRIM:
YEAR:
MILEAGE:
DIAGNOSTIC CODE:
NOTES:
QUESTIONS FOR THE USER:
SUBMIT QUESTIONS
NO Q'S PLACE BID
BID INFORMATION FOR:
USERNAME
CITY, STATE
MAKE:
MODEL:
TRIM:
YEAR:
MILEAGE:
DIAGNOSTIC CODE:
NOTES:
BID DETAILS
DESCRIPTION OF SERVICE
ESTIMATED TIME
PRICE
SUBMIT BID
QUESTIONS HAVE BEEN SUBMITTED TO THE USER.
USER'S RESPONSES WILL APPEAR ON YOUR BID PAGE & BE SENT TO YOUR EMAIL.

Wireframes


Explorer (2)
my EPG
my playlists
recommended
Remote (1)
Now watching (3)
Springwatch
Episode one
BBC2
Matt Baker and Julia Bradbury are in Shetland
add to delicious
Media Centre
Added to Delicious
iPlayer page in Web browser
using bookmarklet
Playlists (6)
List A
List B
List C
List D
List E
List F
List G
Playlist items (7)
MicroMen
summary text
7 days left to watch
Programme Details (8)
Micro Men
7 days left to watch
linked data info
watch now
/programmes page in Web browser



2. Explorer (same for Jana and Stephen)

1. This screen is reached via the 'Explorer' button on the remote screen
2. The Remote button is always available in the top right of these white 'Explorer' screens to toggle back to the remote at any point
3. The 'Settings' button links to configuration options (some of which will be shown in scene 4)
4. This is a local version of the user's personalised EPG for browsing on the iPhone instead of the set top box (not shown): the user can either browse as lists or in EPG view

Page version history

0.2	09/02/10	• "TV bookmarks" was merged with "My playlists" • "My recommendations" was added

Author: Vicky Buser
Version: v0.4 (15 Mar 10)

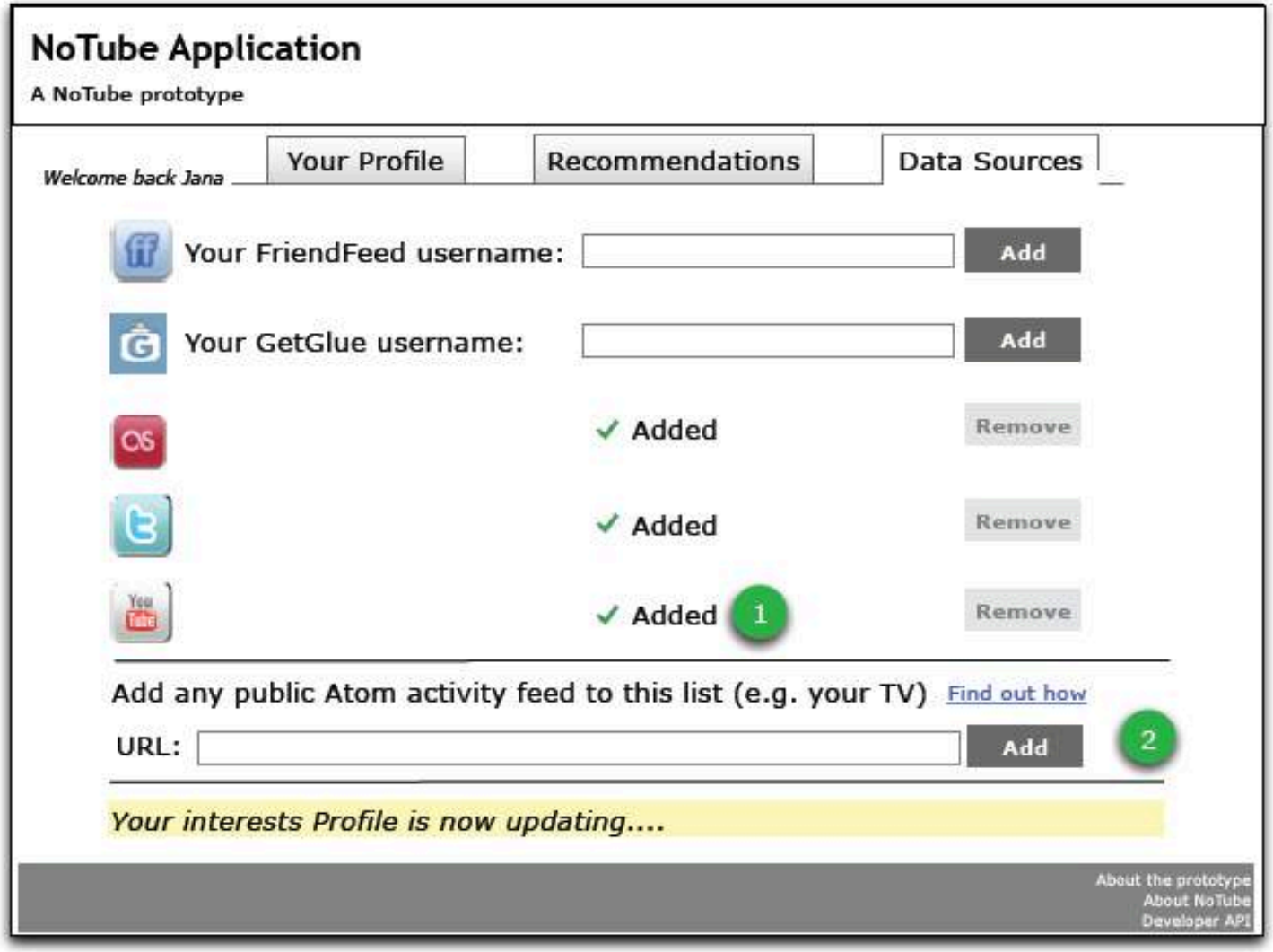
6c ACTION

Jana picks up her iPhone and taps the 'Now watching' control on the remote screen to see details about the programme.

DIALOGUE

Jana wants to find out more information about these birds. By using her iPhone to do this she won't interrupt the programme or disturb Stephen. Jana is now using her smart phone as a companion device for getting information from both her TV and the Web.

Scene 9b: Jana adds YouTube as an additional data source



DIALOGUE

...so she decides to add YouTube to her NoTube account as an additional source of activity data for her Profile. 1

[NOTE: she has signed in with her OpenID and clicked on the 'Data Sources' tab, but we don't necessarily need to show this happening]

[NOTE 2: she could also link to her NoTubeTV activity stream here?] 2

Filename: Website_Wireframes_WP7c_First_Demo
Version: 0.1

By Vicky Buser
Last changed on Tue Mar 09 2010

Mockup Review Form (1/2)

Mockup style to proceed with:

1 2 (3) (4) (5) (Other When Available):

Please review the following categories, and feel free to mix comments regarding multiple styles.

Color scheme

Do you want any color changes? ☐ No ☐ Yes If Yes, please explain:

Size

Do you have size constraints, limits, or specifications? ☐ No ☐ Yes

If Yes, please explain:

Navigation

Do you have navigation or button title changes (refers to wording on the buttons or links)? ☐ No ☐ Yes If Yes, please explain:

Is the navigation and button look acceptable? ☐ No ☐ Yes

If No, please explain:

Mockup Review Form (2/2)

Are the general positioning and layout of navigation acceptable?
☐ No ☐ Yes If No, please explain:

Graphics
Are there any specific photographs or images you would prefer to see on the final web site? ☐ No ☐ Yes If Yes, please explain:

Are company logos and other identifications included and correct?
☐ No ☐ Yes If No, please explain:

General layout/look and feel

Does the overall layout support your needs?
☐ No ☐ Yes If No, please explain:

Does the look and feel match the image desired by your company?
☐ No ☐ Yes If No, please explain:

Advantages and Disadvantages of Low-Fidelity Prototypes

Advantages	Disadvantages
They are cheap to produce. They can evaluate design ideas and design alternatives. They promote rapid, iterative development.	Their ability to check errors in design is limited. The specification is less detailed so it may be more difficult for programmers to code.
They are useful for facilitating communication between users and stakeholders and the UI designer.	A human facilitator is needed to simulate how the UI will work (e.g., by manipulating how different prototypes in response to users actions). Paper may seem less compelling.
They can show the look and feel and layout of screens.	They are useful for gathering requirements but are generally thrown away once the requirements have been established.

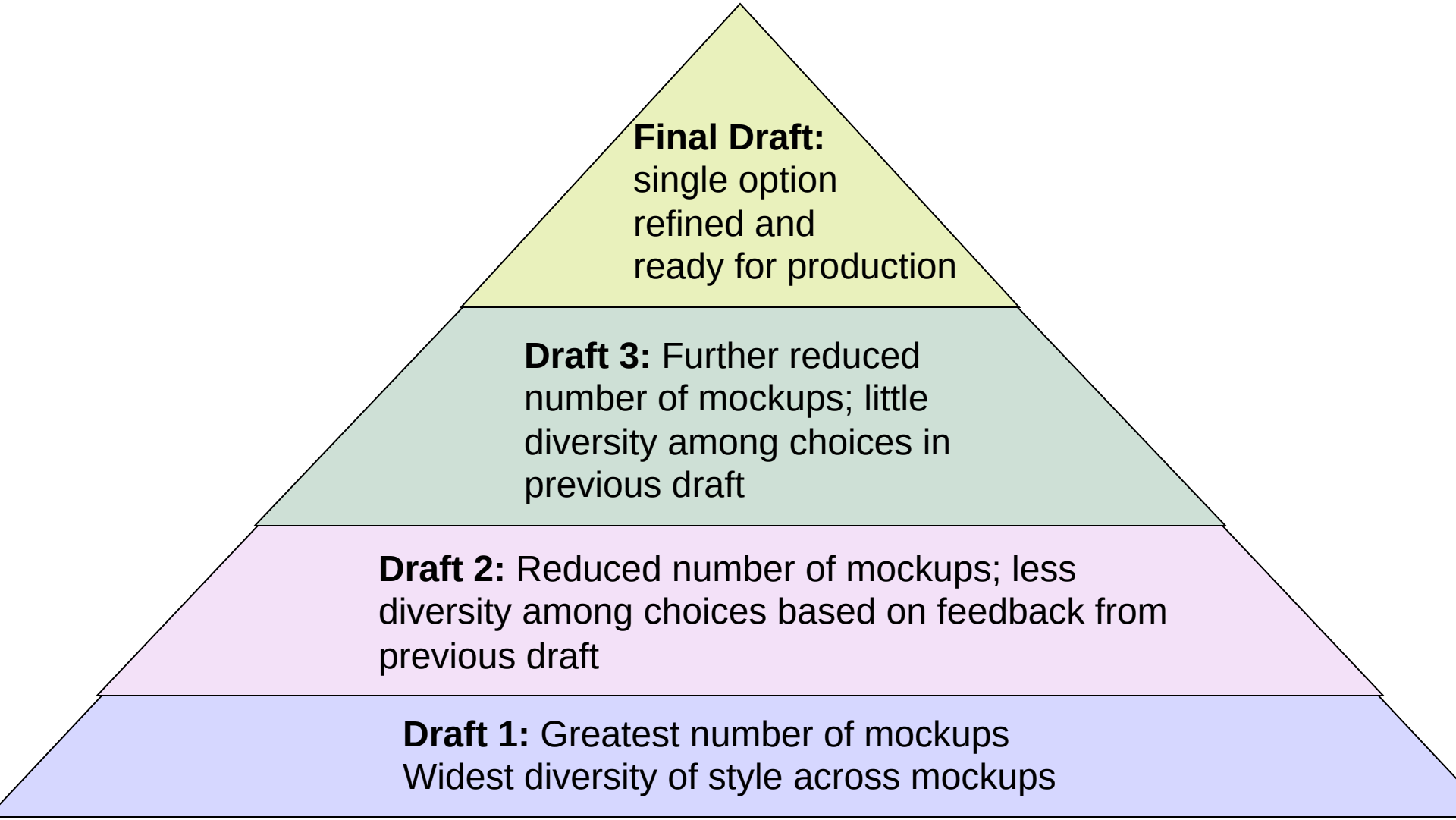
High-fidelity Prototypes

- fine-grained
- highly elaborate and polished digital versions of the system
- used to gather detailed information on the ***processes*** involved in traversing several ***parts of the system***, or a subset of tasks

Advantages and Disadvantages of High-Fidelity Prototypes

Advantages	Disadvantages
They can show complete functionality.	They are more time consuming to create than low-fidelity prototypes.
They can show the look and feel, layout, and behavior of the final product.	They are not as effective as low-fidelity prototypes for requirements gathering, because they cannot easily be changed during testing.
They are fully interactive, and can be useful as a marketing tool (demo).	They can look so professional and finished that users are less willing to comment. This may mean that the prototype gets built irrespective of its merits and loses its throw-away benefits.

Draft System Model



USABILITY INSPECTION METHODS

Usability Inspection Methods (1/2)

- **Heuristic evaluation (most informal method)**

- **Cognitive walkthrough**
  - simulates user's problem-solving process at each step through the dialogue
  - Pluralistic walkthrough (group meetings)
    - users, developers, and human factors people step through a scenario, discussing each dialogue element

Usability Inspection Methods (2/2)

- **Feature inspection**
  - steps not natural for users & require extensive knowledge/experience in order to assess a proposed feature set
- **Consistency inspection**
- **Standards inspection**
- **Formal usability inspection**
  - a six-step procedure with strictly defined roles
  - with elements of both heuristic evaluation and a simplified form of cognitive walkthroughs.

COGNITIVE WALKTHROUGH AND THINKING ALOUD WITH PROTOTYPES

What Is a Cognitive Walkthrough?

- step by step execution (evaluation) of selected typical tasks with a system
- **keep an eye out for certain problems** that often arise, especially with beginning users
- Discover mismatches between **HOW the user thinks about a task**, and **HOW the UI designer thinks about the same task**

https://www.youtube.com/watch?v=BNO5OkA0R44

Cognitive Walkthrough Procedure

- Step 0: Write down all the steps in the task
- For each action in the task do three steps:
  - **Step 1: Explore** object, prototype, or task scenario for the action that might enable him to perform the task
  - **Step 2: Select** the action that appears to match most closely with what he is doing
  - **Step 3: Interpret** the system's response and assess if any progress is made towards completing the task

For each action of the task in step 0

- evaluators try to answer the following questions:
  - During step 1:
    - *How does the user know what to do next?*
    - *Is the correct action sufficiently evident to the user (can the user recognize it?)*
    - *does the user have to recall what to do from memory?*
  - During step 2:
    - *Will the user connect the description of the correct action with what he is trying to do?*
  - During step 3:
    - *Choose an action based on the system's response – will the user know if he has made a right/wrong choice?*

What is Thinking Aloud?

- **Basic idea**
  - You ask your participant to **verbalize all of the thoughts** that come into their mind
  - But they are **not supposed to express any ideas** that would not spontaneously occur to them if they were not thinking aloud

- **Positive example**: "*Create* − Gee, I wonder what that means!“
- **Negative example**: "I don’t entirely understand the label *Create*; maybe it’s because the object of the verb is missing“

Preparation Exercise

- Conduct a cognitive walkthrough for one task in your target application
- You will observe how another student working on other target application tries to perform the task that you have analyzed
- The fellow student will think aloud in the process

Part 1: Select an Appropriate Task

- Hints
  - It can be quite a simple, limited task
  - It should be straightforward enough so that you can give the task to your fellow student who works on other target application
- Part of system
  - what part of your system will the following analysis refer to?
- Task
  - sketch here the task that you will analyse with the forms on the following sheets

Part 2: Conduct the Cognitive Walkthrough

- Make notes, answering the questions in turn
- Although it is possible and customary for a single person to conduct a cognitive walkthrough, you can decide whether each member of your group does it individually or if you do it together
- In either cases, try to learn from any differences in the assessments that the group members make with respect to individual questions

Form: Analysis of a Single User Action

- Action
  - what is the next action (or step) that the user has to perform?

- Checks
  - 1. **Will users be trying** to produce the result of this next action?
    - *i.e., regardless of whether they know how to achieve this result, will they at least know that they are supposed to achieve this result?*
  - 2. Will users **see the control** (button, menu, switch, etc.) for the action?
  - 3. Once users see the control, will they **recognize** that it produces the result they want?
  - 4. After the correct action is taken, will the users **understand the feedback** they get, so they can go on to the next action with confidence?

Part 3: Observe a User Thinking Aloud

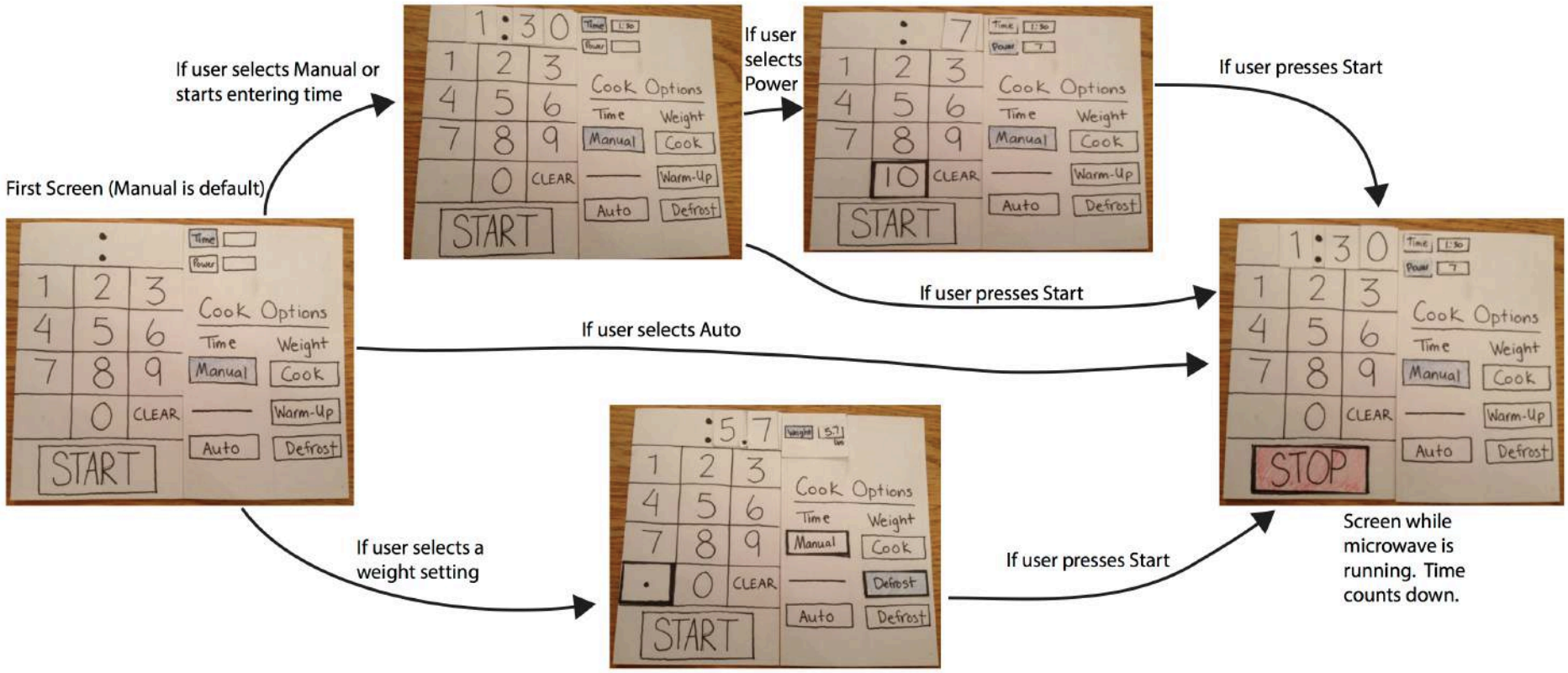
- Basic idea
  - invite a fellow student working on another target application to perform your task while thinking aloud

- Instructions
  - 1. Explain to him/her the task that are to be performed
    - Examples
    - "Find out what (possibly indirect) relationships exist between the artists Monet and Manet“
    - "In this page about Rembrandt, annotate the fact that he was born in the city of Delft“
  - 2. If necessary, give him/her any hints that they may need to get started, but don’t tell them exactly how to perform the task

Part 3: Observe a User Thinking Aloud

3. As the user performs the task and think aloud, make a note on anything, that he/she says or do, that seems interesting, problematic, or unexpected

4. When he/she is finished, go back to the forms that you filled in for the cognitive walkthrough
   - For each sheet that corresponds to an individual action, make a note at the end about anything that you learned from the thinking aloud observation about the problems that can arise with that action



HEURISTIC EVALUATION OF PROTOTYPES

Goal of Heuristic Evaluation

- to find ***usability problems*** early in the design
- ideally, each potential usability problem is assigned to one or more ***heuristics*** to help facilitate fixing the problem
- estimate the degree to which each usability issue potentially could impede user performance or acceptance.

Heuristic Evaluation

- Inspection of entire system - whether it complies with design principles (**heuristics**)
  - Nielsen's heuristics (1993)
  - conducted by a small set (one to four) of evaluators
  - evaluators independently examine user interface

- Choosing the '***inspectors***'
  - domain experts
  - non-experts
  - developers
  - usability experts

Nielsen's Heuristics (1993)

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather then recall
7. Flexibility and efficiency of use
8. Aesthetics and minimalist design
9. Help users recognize, diagnose and recover from errors
10. Help and documentation

- http://www.usability.gov/methods/heuristiceval.html

Examples

- **Problem**: “stop” function is not available in some screens
- **Solution**:
  1. Explain why, or
  2. Add function
  3. It was there, but named differently

- **Problem**: use of inconsistent typography in the form of upper/lower case formats and fonts
- **Solution**: pick a single typographical format for the entire interface

Conducting a Heuristic Evaluation

- Prepare a **task with the system**
- **Inspector follows task steps** with system - reviews task description and heuristics
  - in this way you could predict what users might do
  - it misses out on system parts not involved in this task
- You could **also check each screen or sequence** against the heuristics
  - it's useful to plan the sequence in advance and make sure that each inspector is looking at the same screen
- Prepare a **data collection form** for each inspector

Data Collection Form

Task scenario: 1 **Evaluator's Name: John** **Inspector's Name: George**		**Session Date: 15/09/07** **Session Start Time: 9:30** **Session End Time: 10:30**	
Location in the task description	**Heuristics violated**	**Usability defect description**	**Inspector's comments regarding the usability detect**
Search results presented	Help and documentation	The user is not guided through the organization of the search results	The user would like to know how are the results organized (to have their meaning explained)

Data Interpretation Form

Task scenario: 1 **Evaluator's Name: John** **Inspector's Name: George**		**Review Meeting Date: 20/09/2007**	
Usability defect	**Inspector's comments on the usability defect**	**Severity rating**	**Recommendations**
The user does not have explanation of the results clustering and ranking	The user would like to know how are the results clustered and ranked	Medium	Add a mouse-over indicator of the rank of each search result; Add an explanation to each cluster

Severity of a usability problem

- **frequency** with which the problem occurs:
  - Is it common or rare?
- **impact** of the problem if it occurs:
  - Will it be easy or difficult for the users to overcome?
- **persistence** of the problem:
  - Is it a one-time problem that users can overcome once they know about it or will users repeatedly be bothered by the problem?

Severity of a usability problem

- **0 = not a** usability problem at all
- **1 = cosmetic problem only:** fixed if extra time is available on project
- **2 = minor usability problem:** fix it, low priority
- **3 = major usability problem:** important to fix, high priority
- **4 = usability catastrophe**: imperative to fix this before product can be released

Assisted vs. not assisted evaluation

- If the system is intended for the general population, or if evaluators are domain experts
  - let evaluators use it without assistance

- If the system is domain-dependent & evaluators are fairly naive with respect to the domain
  - assist evaluators to enable them to use the interface
  - follow typical usage scenario with various steps a user performs a sample set of realistic tasks

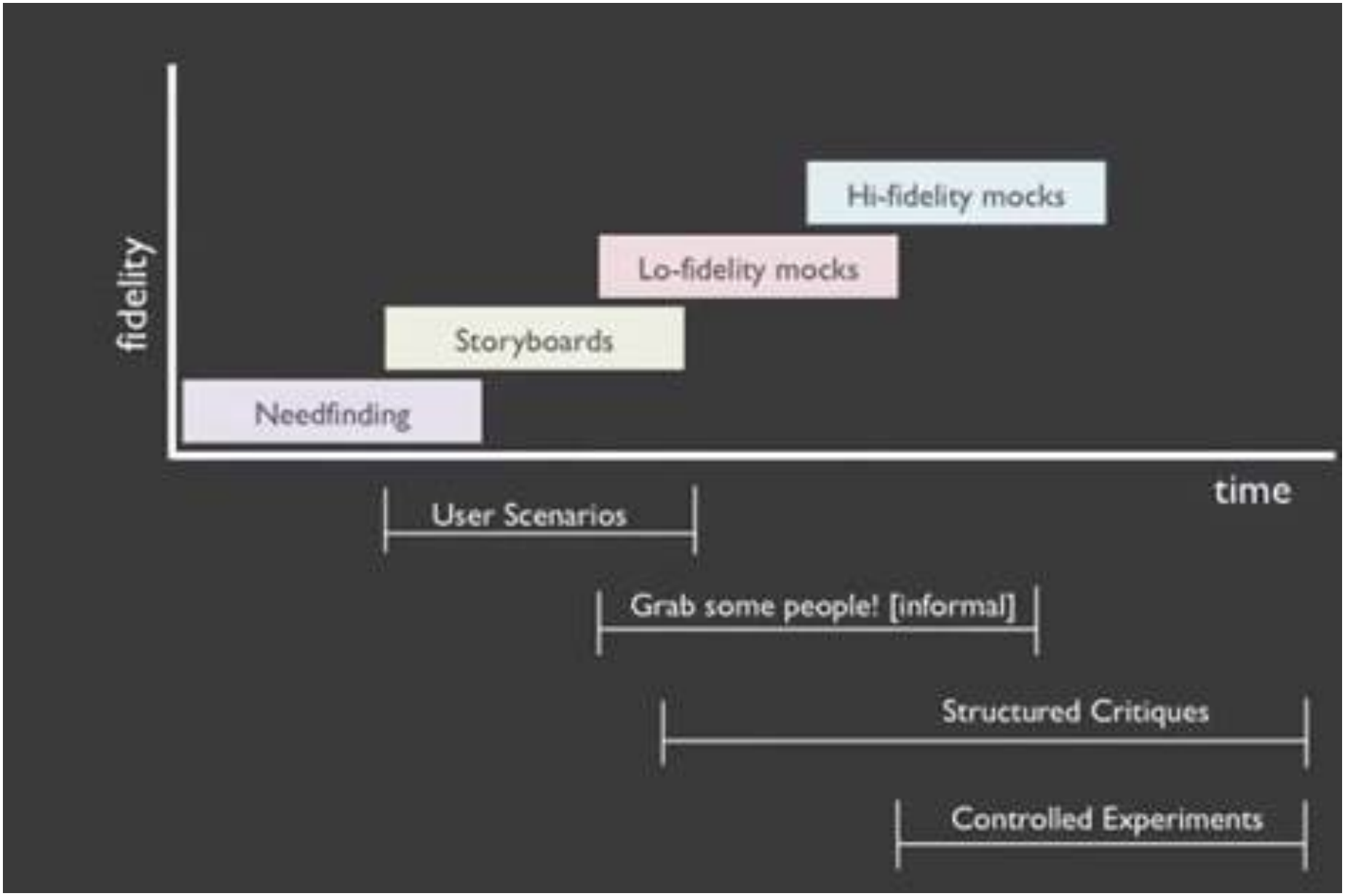
Heuristic Evaluation Benefits

- Inspection could be less expensive than user observation
- During inspection, inspectors recommend solutions
- It could be annoying to discover large numbers of obvious design problems during user observations

Heuristic Evaluation Limitations

- Do not involve real prospective users (real users find heuristics difficult to understand)
- Some defects are more important to the inspector than to the real users (**inspector's own biases**)
- If the inspectors have insufficient task and domain knowledge, it might affect the validity of the evaluation

IN SUMMARY


fidelity
time
Hi-fidelity mocks
Lo-fidelity mocks
Storyboards
Needfinding
User Scenarios
Grab some people! [informal]
Structured Critiques
Controlled Experiments

Keep Iterating and Re-designing!

Always keep the users in the loop!

Feedback Assignment 1

Style & Clarity

- Use *numbers (and captions) for tables & figures*; refer with those numbers to tables & figures in the text
- Use ALWAYS an *explanatory text for tables & figures*
- Include *TOC, Introduction and Conclusions* for your document. Conclusions should summarize what is the main result of your work, also mention if there were some problems.
- Include always *group #, group member names and document name* (e.g. assignment 1) in the title page of the document

Feedback Assignment 1

Data Collection

- Include the *setting description, activity diary*
- Include *conclusions of the results of the interview and questionnaires*, e.g. what were the most important points you got from them (and what are the things you didn't manage to collect but hoped to)
- *Raw data* in excel sheet (preferably online, e.g. Google document URL in a footnote)

Task Objects

- Include *Objects* in the container descriptions, e.g. programs, channels, users

Task Sequences

- Define clear *task sequences for each task*

Feedback Assignment 1

Non-functional HCI requirements

- Accessibility and privacy
- What happens when multiple people are trying to perform one of your tasks?
- How do you protect private devices?
- Is the device shared, or personal?
- Does your target group have accessibility problems?