Programming of Interactive Systems

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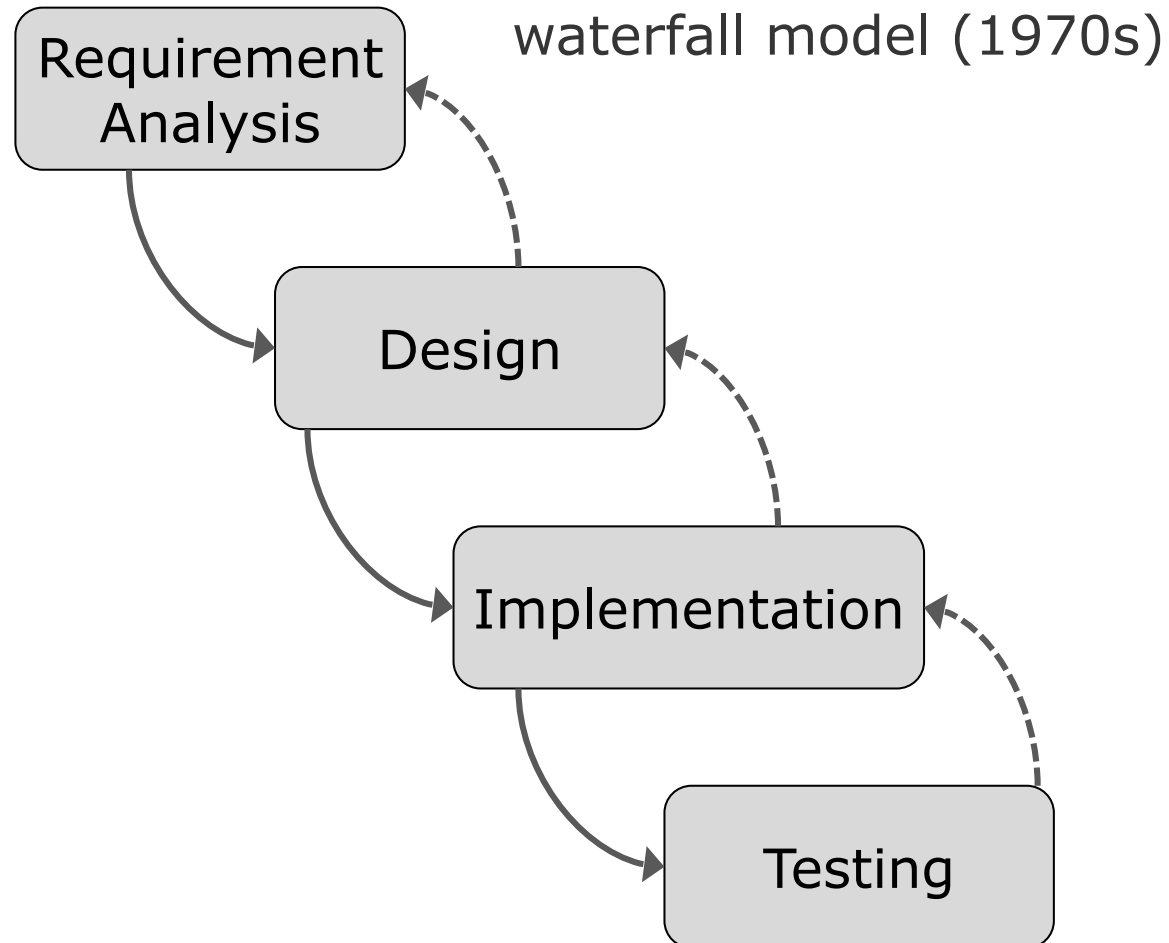
Week 1 :
b. Design Cycle of Interactive System
    developing & prototyping
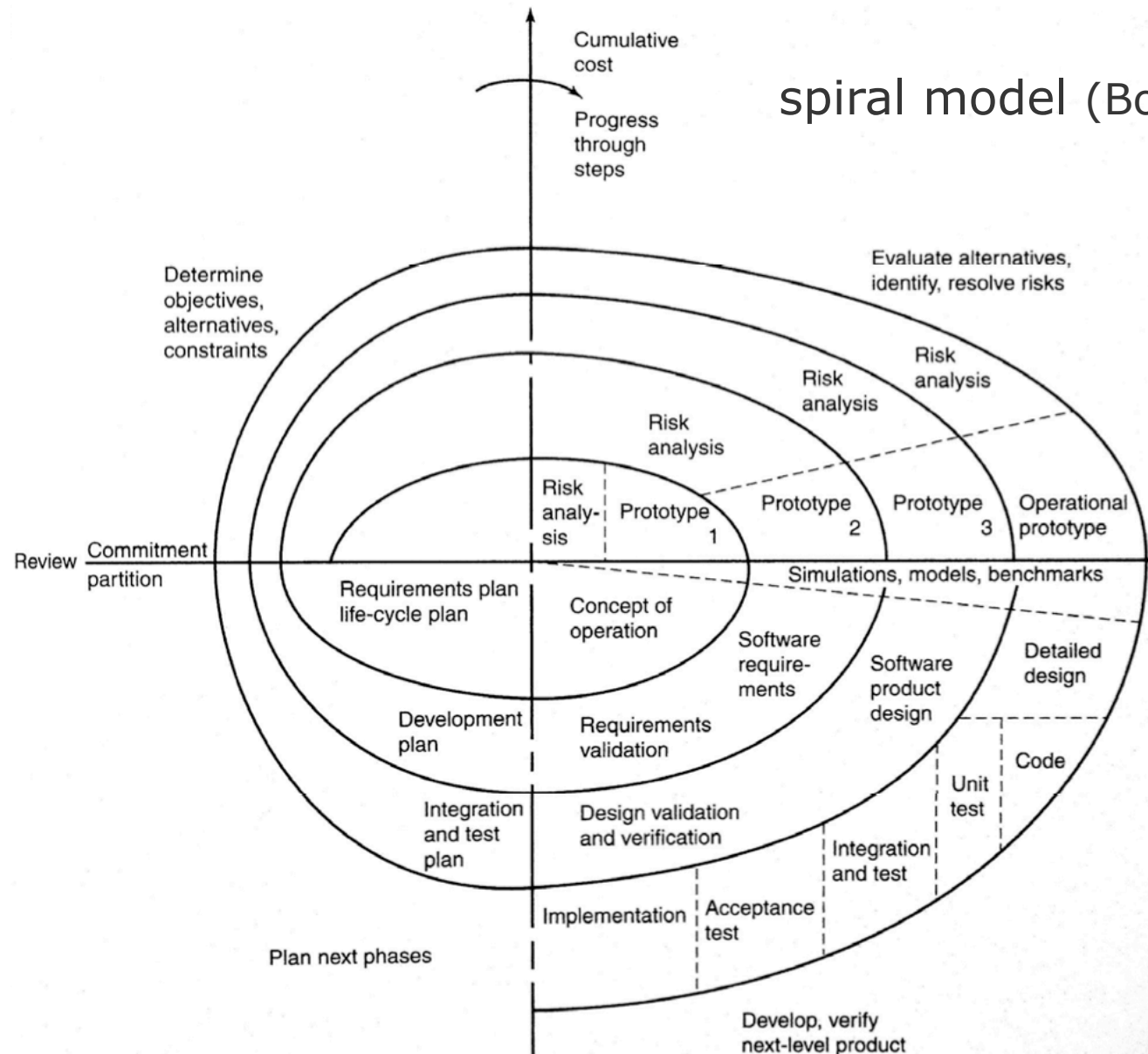
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(part of this class is based on previous classes from Anastasia,
and of T. Tsandilas, S. Huot, M. Beaudouin-Lafon, N.Roussel, O.Chapuis)
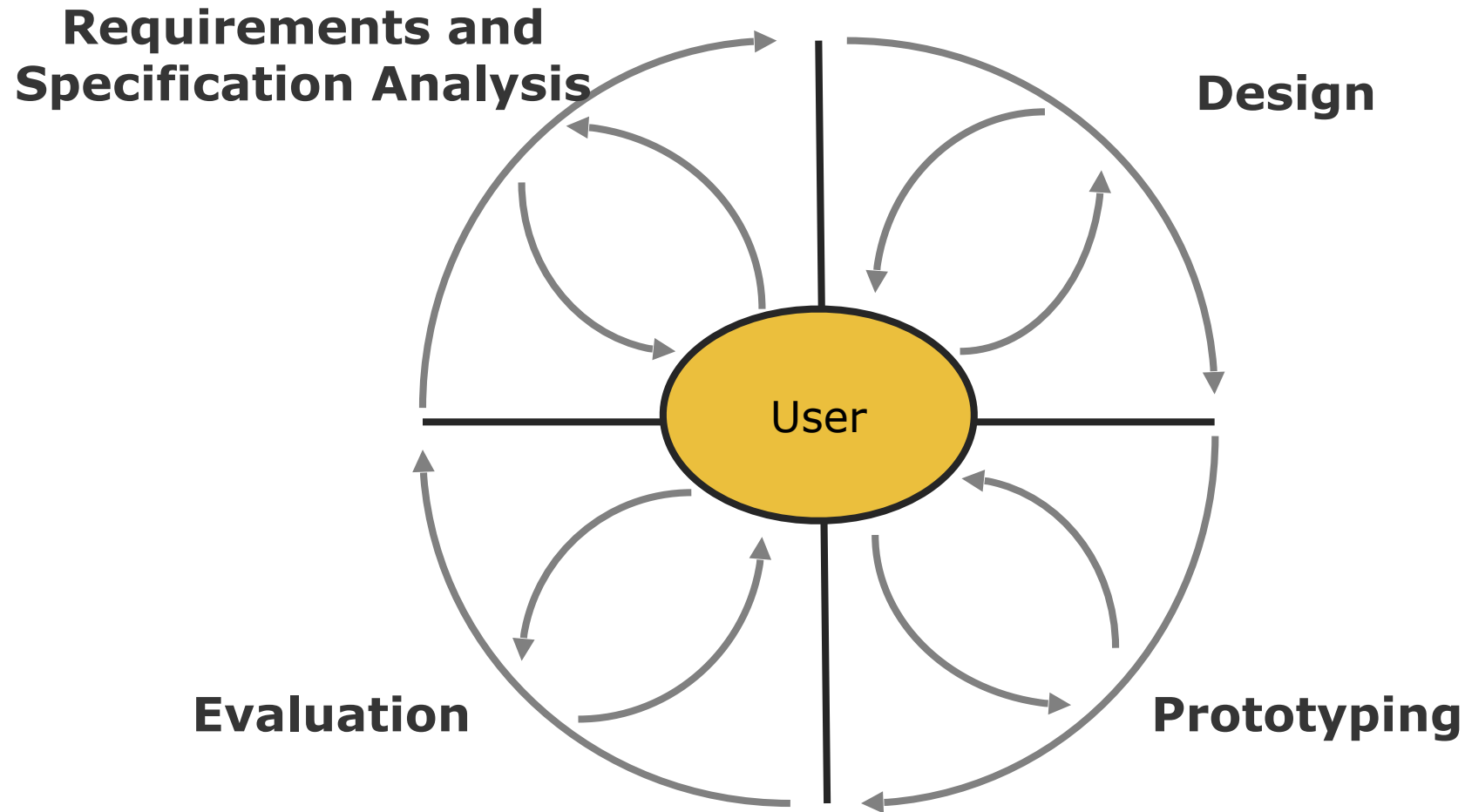
software engineering

Requirement Analysis

waterfall model (1970s)

Design

Implementation

Testing

software engineering

spiral model (Boehm, 1998)

user-centered design

Requirements and Specification Analysis
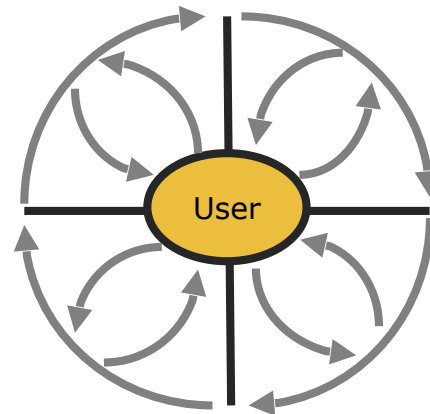
Design

Evaluation

Prototyping

User

user-centered design

Requirements and Specification Analysis

personas
scenarios
field studies
task analysis
requirement
specification

Design

brainstorming
participatory design
conceptual models
metaphors
interaction styles
scenarios
storyboards
interaction models

Evaluation

usability tests
heuristic evaluation
focus groups
lab experiments
observational studies

Prototyping

paper prototypes
low/high fidelity prototyping
physical models
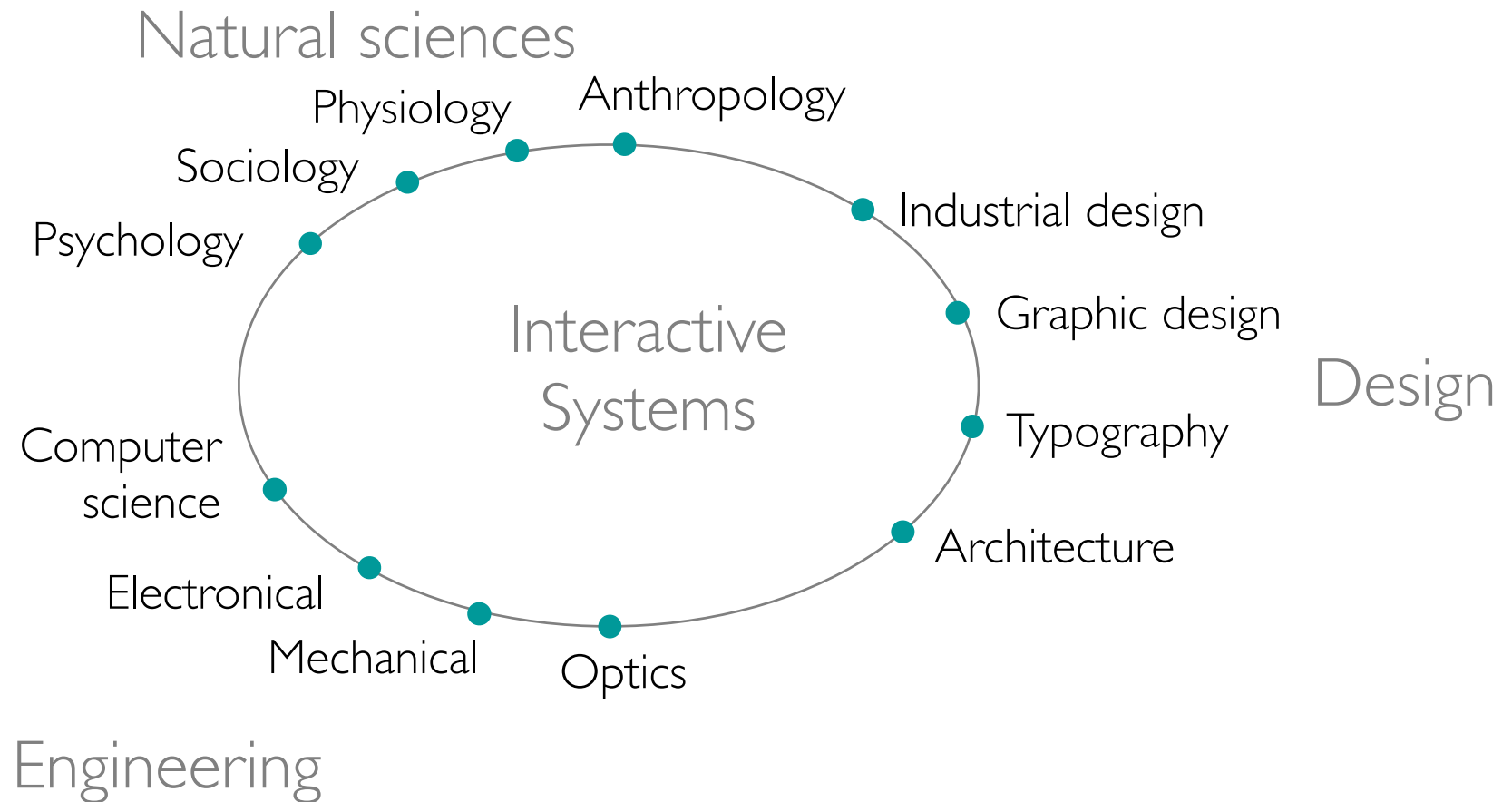alpha/beta releases

User

methods: multidisciplinary origin

Image by W. Mackay & M. Beaudouin-Lafon

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importance of user-centered design

Development Cost

Cost of user interfaces : ~50% of total cost

Maintenance Cost

20% : « bugs »
80% : unexpected user needs

Problem correction Cost

= $1 during design
= $10 during development
= $100 after delivery

importance of user-centered design

In this class we focus on IS programming,

... but we still need other parts of the cycle to help us in the development, such as ...

Design + Prototyping

system design + prototyping

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how to start?

Understand your user needs
　　Through interviews, observations, etc.

Invent ideas
　　Brainstorm, generate as many solutions as possible
　　Focus on the consistent interaction between user and system

Prototype
　　Envision how your ideas would work in practice

Code !!!

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brainstorming

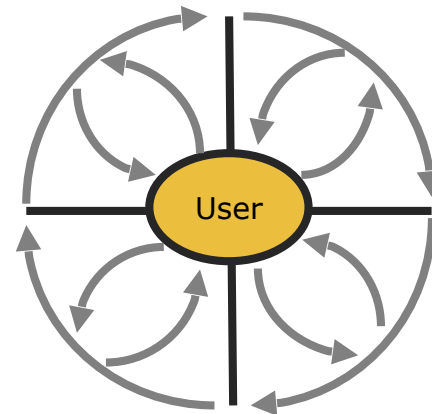Generate creative ideas

later for your project !!

prototyping

user-centered design

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personas
scenarios
field studies
task analysis
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specification

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brainstorming
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design activities

We start already with:
- an understanding of the users' needs
- a problem to solve and decide what we will develop (concept)

We explore possibilities and show interactions:
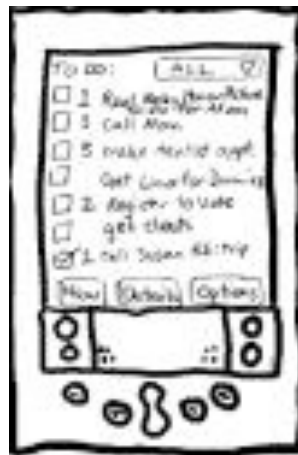   Storyboards

interaction in context
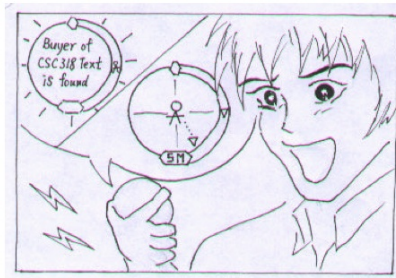
Design scenarios and storyboards

capture and communicate an interaction story with the <u>new</u> system

Rapid Prototyping

physical models, sketches, paper prototypes, …
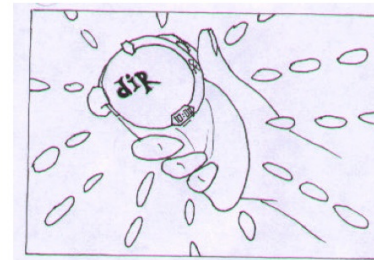receive user feedback early in the design cycle
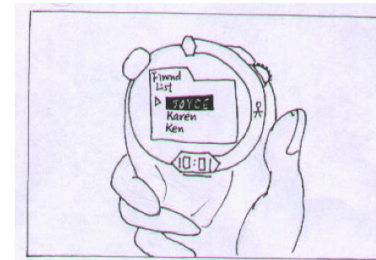
a storyboard

Whenever the DIR beeps, it indicates that a match is identified. In this case, a buyer is found. It also shows the buyer's location and their actual relative distance.
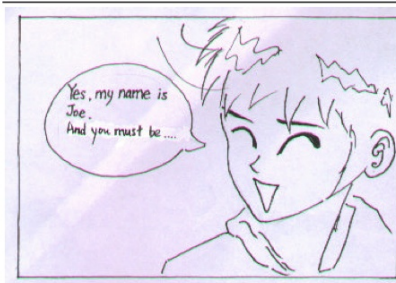
At the same time, the buyer's DIR is behaving the same way. They can then easily locate each other.

Joe introduces himself.

Joe does not believe his eyes, because Joyce is exactly the same type of girl he always dreams of!!

Joyce asks Joe about the price for the book.

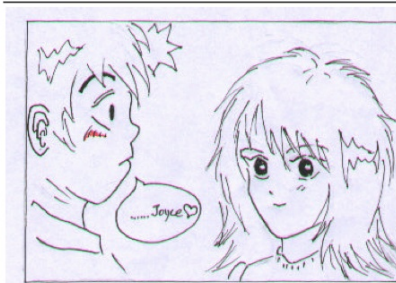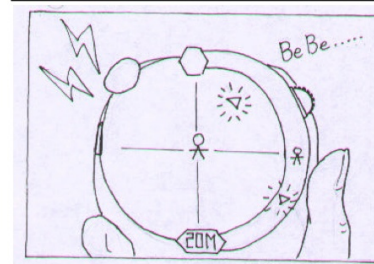Joe is totally defeated under Joyce's beauty.

He takes out the DIR from his pocket.

On the friends list, Joyce's name is highlighted indicating that she is near him. Joe selects her name to view her location.
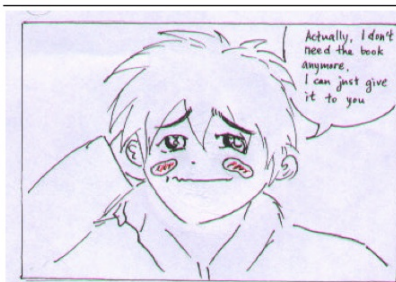
The DIR shows a sparking indicator on the screen. This shows Joyce's location at this moment.

Joe decides to follow the map of the DIR to meet Joyce.
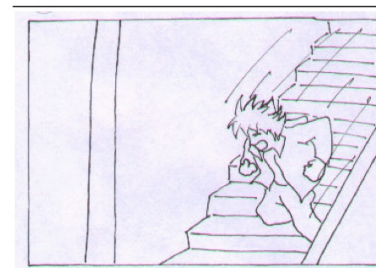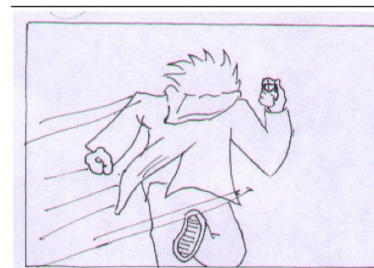
He goes downstairs.

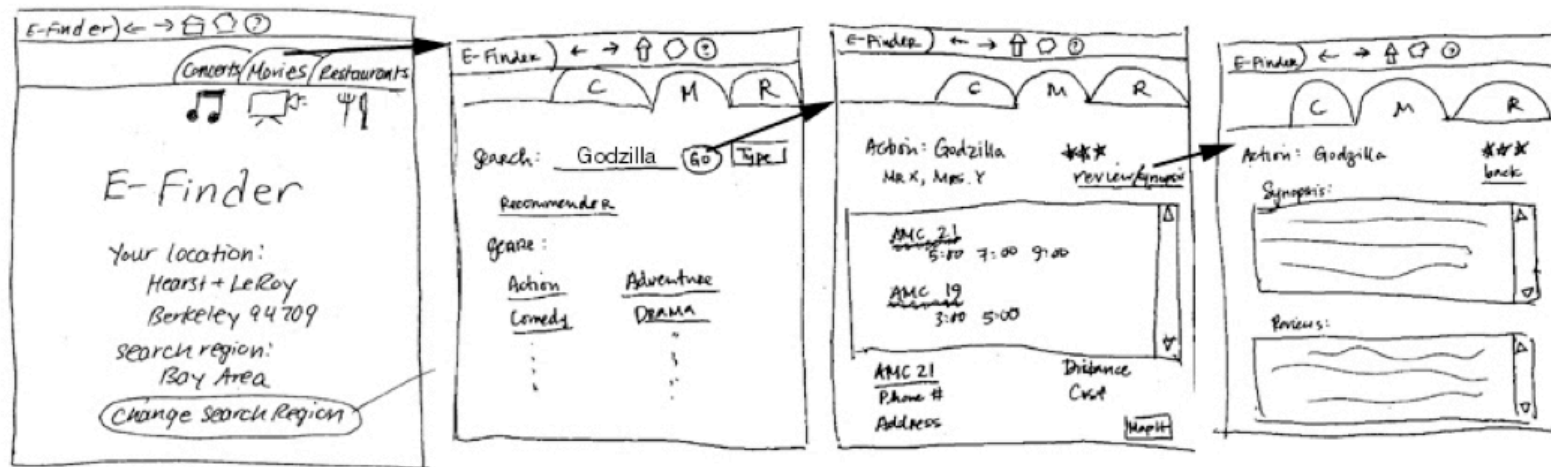student design scenario of the use of communcation device

storyboards

a series of key frames as sketches

originally from film
used to get the idea of a scene sequence
snapshots of the interface at particular points in the interaction

portrays key scenes in the interface and the transitions that caused the changes

Ex. http://webzone.k3.mah.se/k3jolo/Sketching/sk31.htm,
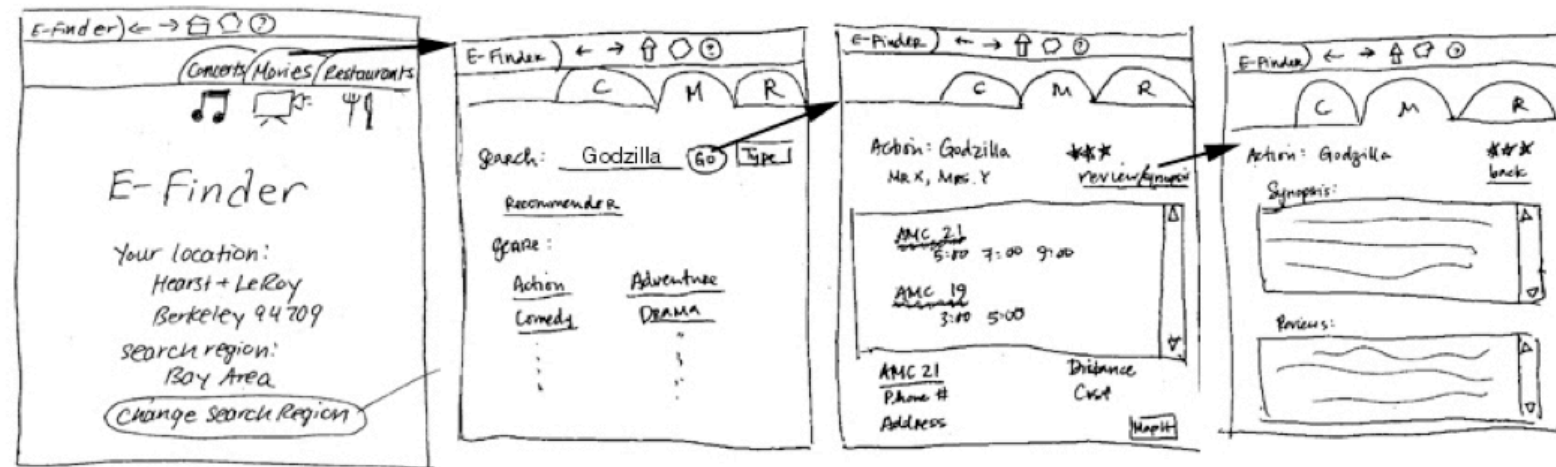http://stavchansky.net/work.php?wID=42&cat=3

storyboards

Illustrate a design scenario (in Fond HCI)

Describe the interaction in easy to read segments

Define the key elements and a coherent order

Decide what details to show

Ex. http://webzone.k3.mah.se/k3jolo/Sketching/sk31.htm,
http://stavchansky.net/work.php?wID=42&cat=3

storyboards: possible shots

A Vocabulary of Camera Shots and Filmmaking

Filmmakers use specific terminology to describe the composition of a certain scene within a storyboard. We use some of their terms to describe the scenes in our sketched storyboards, and you can use those terms to think about how you want to compose and vary your own narrative images. A partial list of popular *camera shots* is provided below; a more complete description of these and other terms is found in Katz [2] and Block [3].

▶ *Extreme long shot (wide shot).* A view showing details of the setting, location, etc.

▶ *Long shot.* Showing the full height of a person.

▶ *Medium shot.* Shows a person's head and shoulders.

▶ *Over-the-shoulder shot.* Looking over the shoulder of a person.

▶ *Point-of-view shot.* Seeing everything a person sees.

▶ *Close-up,* such as showing details of a user interface on a device the person is holding.

Bill Buxton Sketching User Experiences, Morgan Kaufman Figure 4

storyboards: possible shots

A Vocabulary of Camera Shots and Filmmaking

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▸ *Extreme long shot (wide shot).* A view showing details of the setting, location, etc.

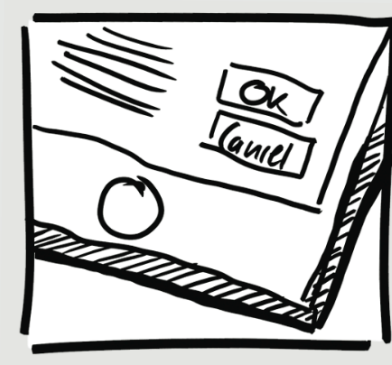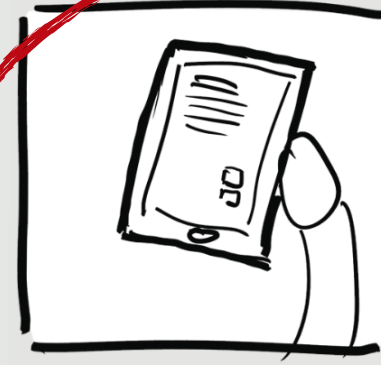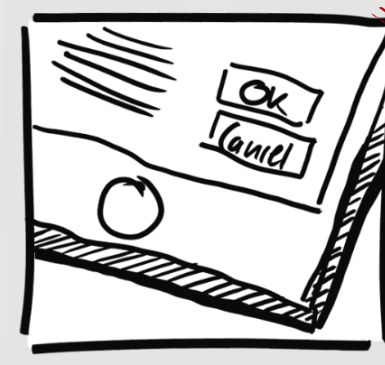▸ *Long shot.* Showing the full height of a person.

▸ *Medium shot.* Shows a person's head and shoulders.

▸ *Over-the-shoulder shot.* Looking over the shoulder of a person.

▸ *Point-of-view shot.* Seeing everything a person sees.

▸ *Close-up*, such as showing details of a user interface on a device the person is holding.

our focus

Bill Buxton Sketching User Experiences, Morgan Kaufman Figure 4

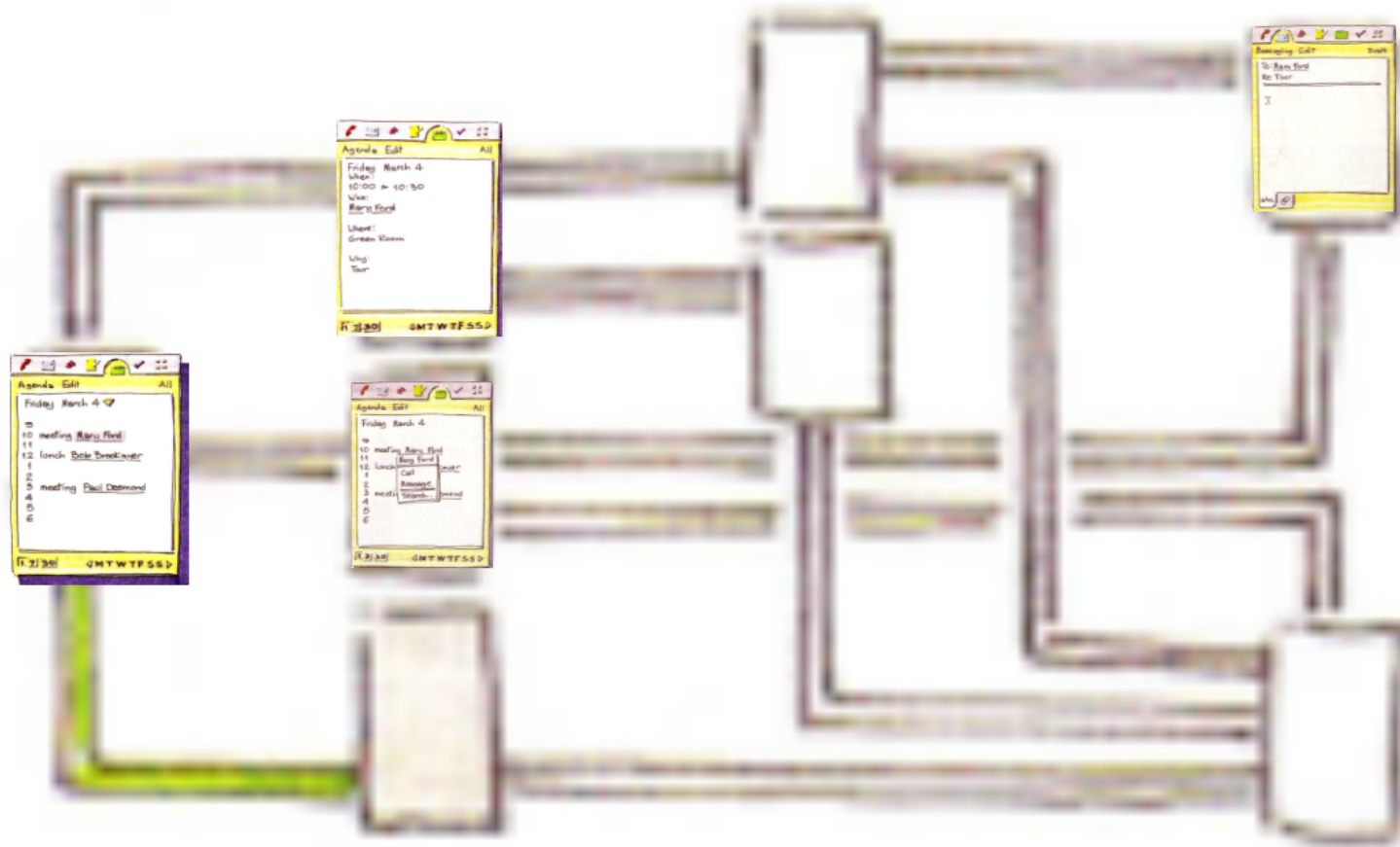# storyboard techniques

State Transition Diagrams

Scenario Sequences

Make storyboards come alive

storyboard techniques

State Transition Diagrams

Scenario Sequences

Make storyboards come alive

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storyboard: State Transition Diagrams

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storyboard: State Transition Diagrams

Create transition diagram
    key interaction steps
    branch points when multiple interactions exist

For each transition
    sketch the screen
    include the transition diagram (a navigational map) when we
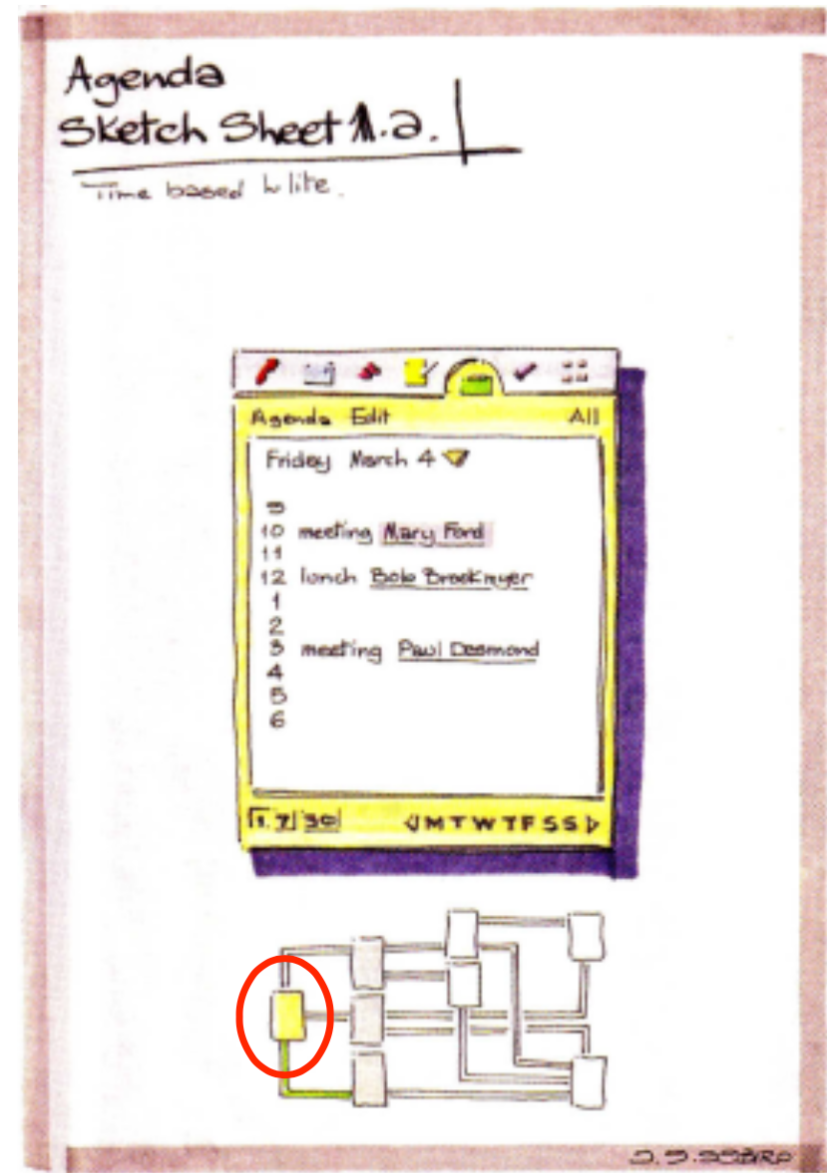   have a large number of transitions

Label the transition with what triggered it
    typically user input or set of system responses

storyboard: State Transition Diagrams

Interacting with a mobile agenda:

Looking at the agenda and seeing that there is a 10am meeting with someone named Mary Ford.
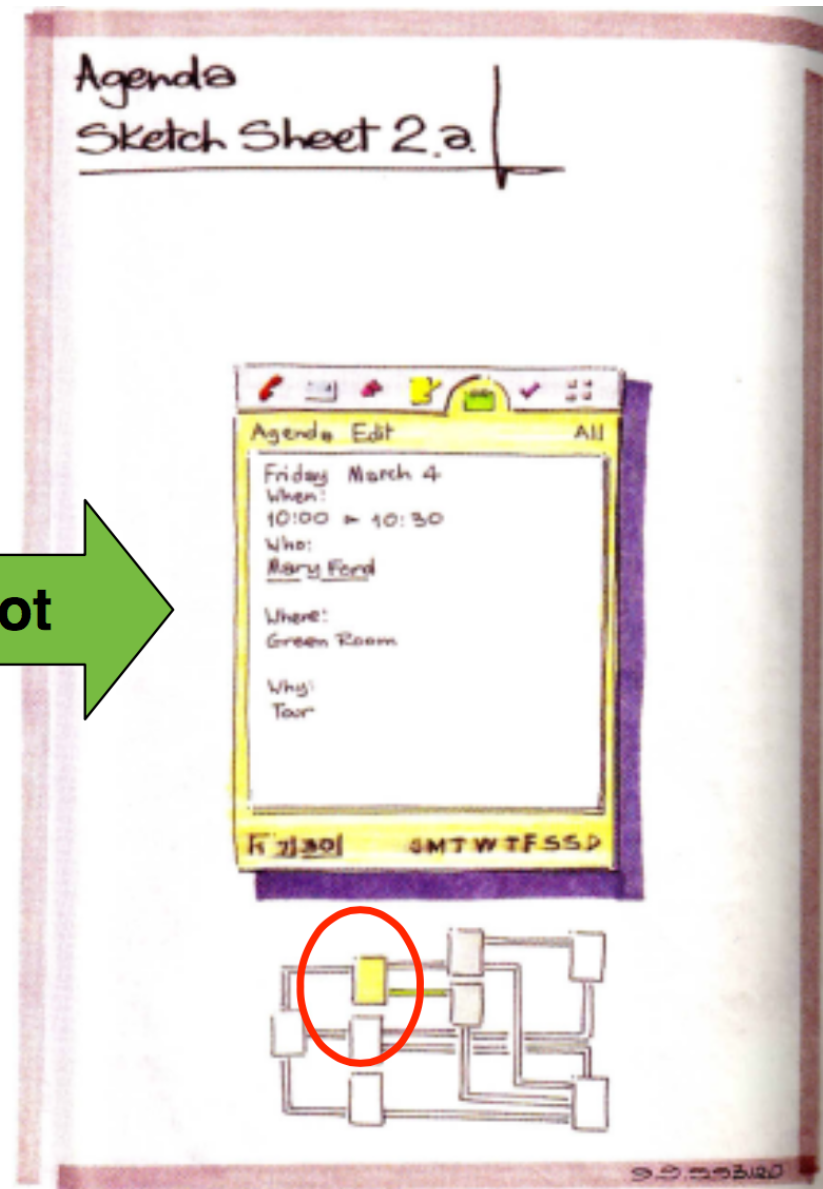
storyboard: State Transition Diagrams

Check to see what the meeting is about.

Click on that time slot

etc ...

storyboard: State Transition Diagrams

Click on that time slot

Click on Mary's name

Select Message
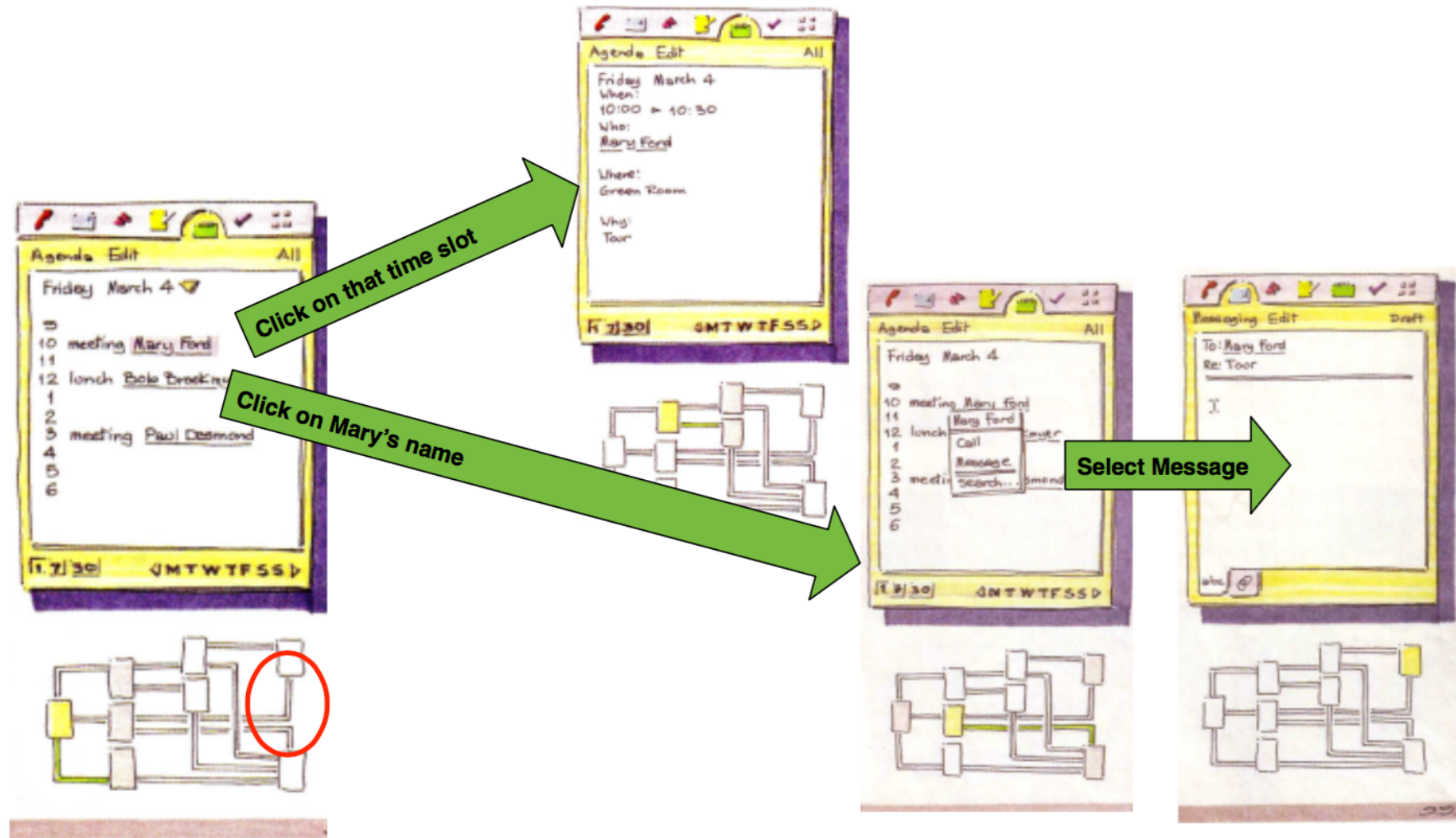
storyboard: State Transition Diagrams
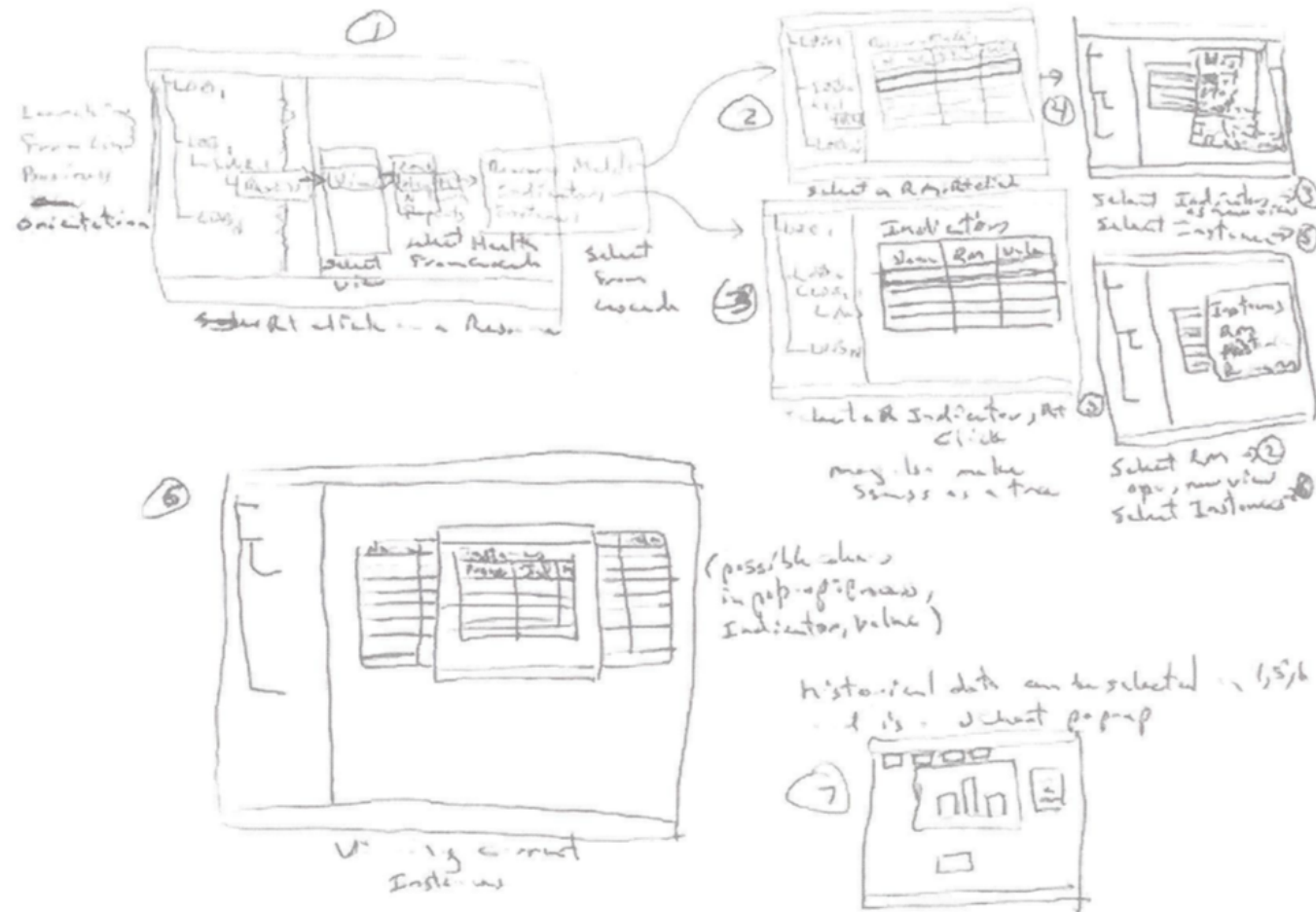
storyboard: State Transition Diagrams
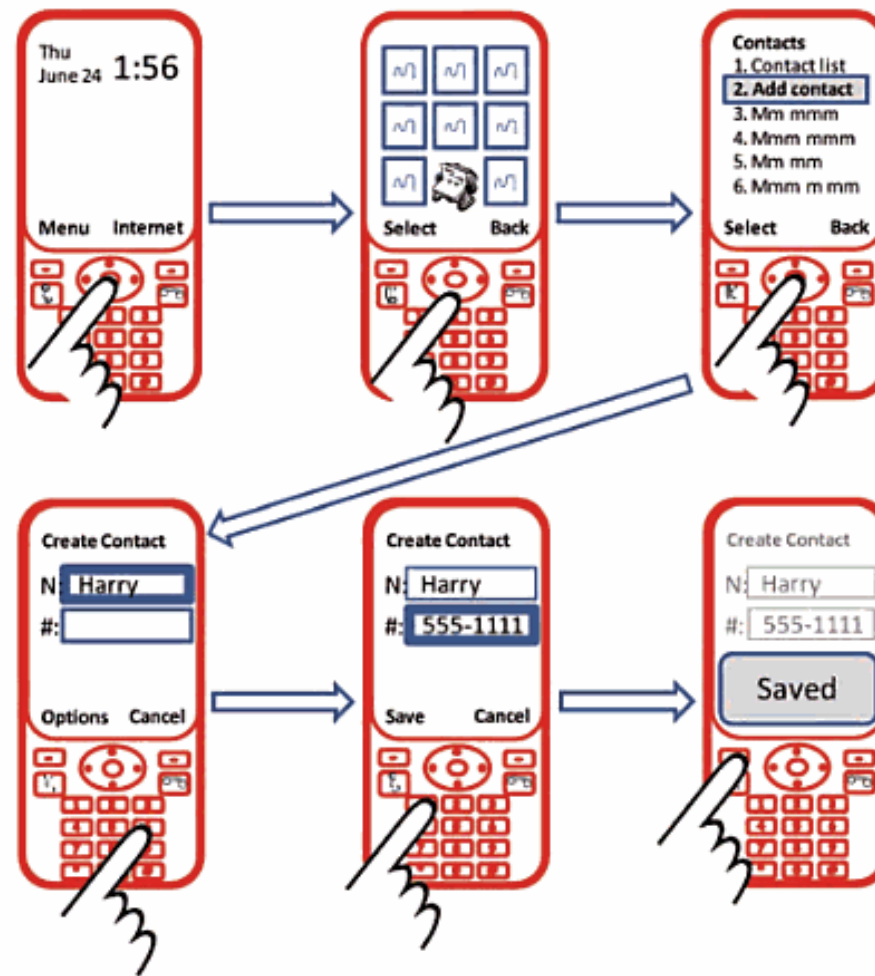
this shows a linear interaction (no branches)

from the book "Sketching User Experiences: The Workbook"

storyboard: State Transition Diagrams

This is the detail we need before programming

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storyboard techniques

State Transition Diagrams

Scenario Sequences

Make storyboards come alive

storyboard: Scenario Sequence

Describes a **person** doing a particular task

e.g., checking announcement with mobile

http://grouplab.cpsc.ucalgary.ca/grouplab/uploads/Publications/Publications/2012-NarrativeStoryboard.Interactions.pdf

storyboard: Scenario Sequence

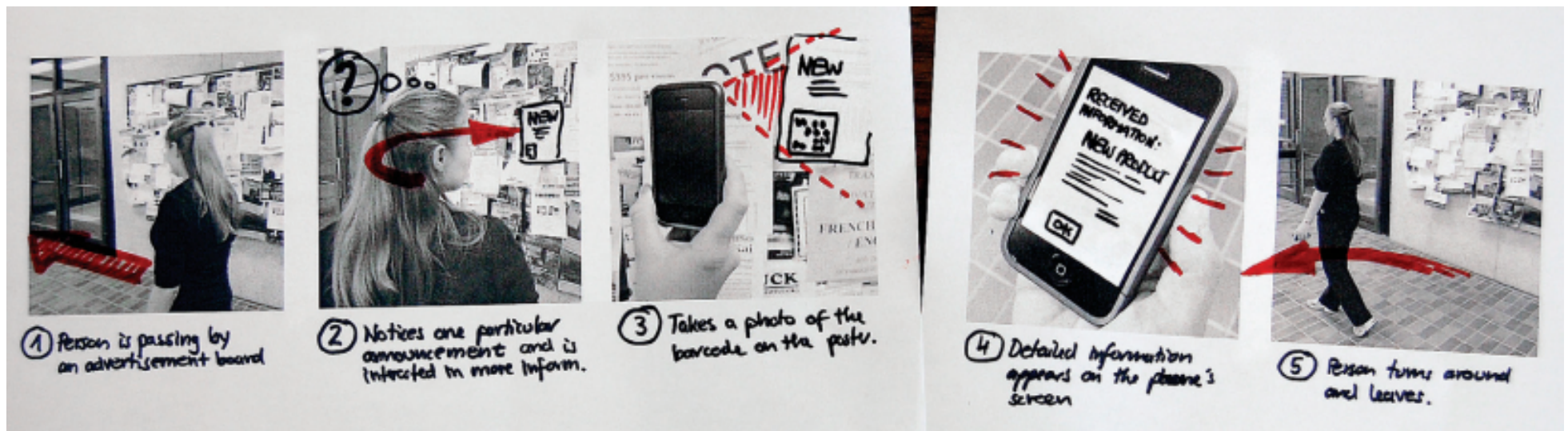Describes a **person** doing a particular task

e.g., checking announcement with mobile

① Person is passing by an advertisement board

② Notices one particular announcement and is interested in more inform.

③ Takes a photo of the barcode on the poster.

④ Detailed information appears on the phone's screen

⑤ Person turns around and leaves.

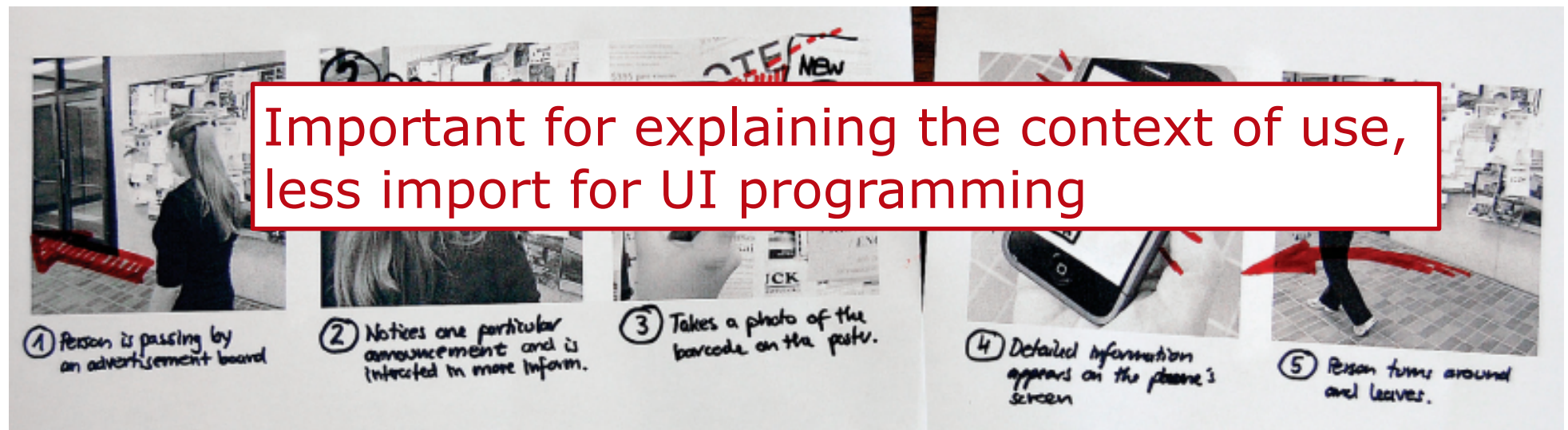Important for explaining the context of use, less import for UI programming

http://grouplab.cpsc.ucalgary.ca/grouplab/uploads/Publications/Publications/2012-NarrativeStoryboard.Interactions.pdf

Storyboard techniques

State Transition Diagrams
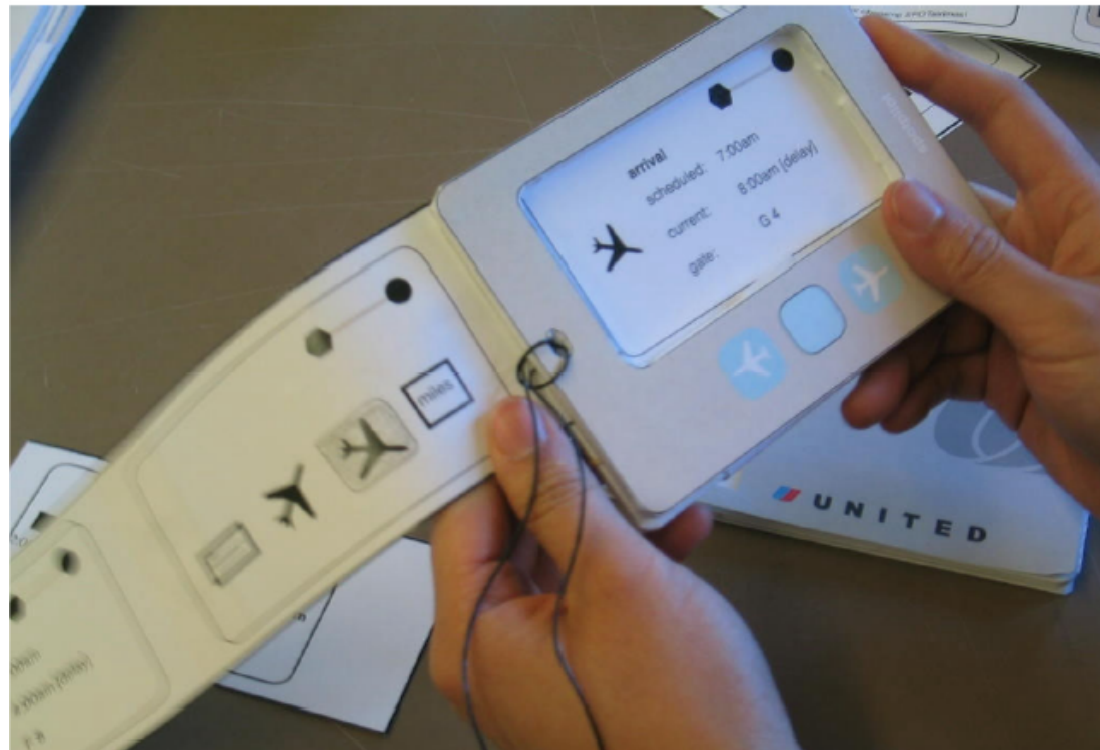
Scenario Sequences

Make storyboards come alive

making storyboards come to life: prototypes

An interactive storyboard
Concrete representation of an IS (that does not exist)

Spotlight system, From Design for the Wild, Bill Buxton

paper prototypes

Designing with office supplies

    multiple layers of sticky notes and plastic overlays

   different sized post-it's represent icons, menus, windows etc.

interaction demonstrated by manipulating notes

    new interfaces built on the fly

sessions videotaped for later analysis

    usually end up with mess of paper and plastic!

prototypes

concrete representation of an IS (that does not exist)

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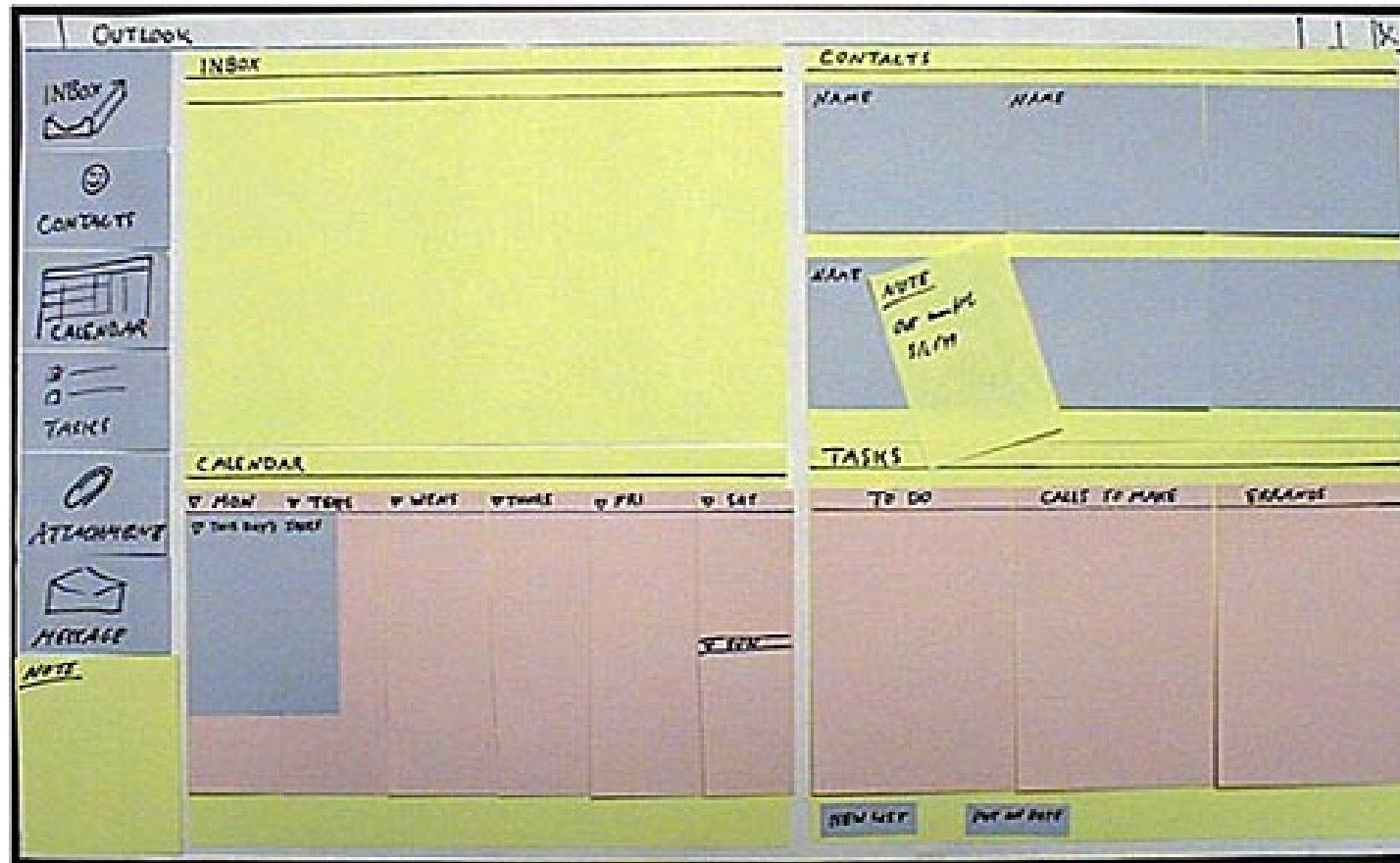
prototypes

Prototype is used to …
- Explore different design alternatives
- Ensure its <u>usability</u> under different conditions
- Aid users to imagine the interface
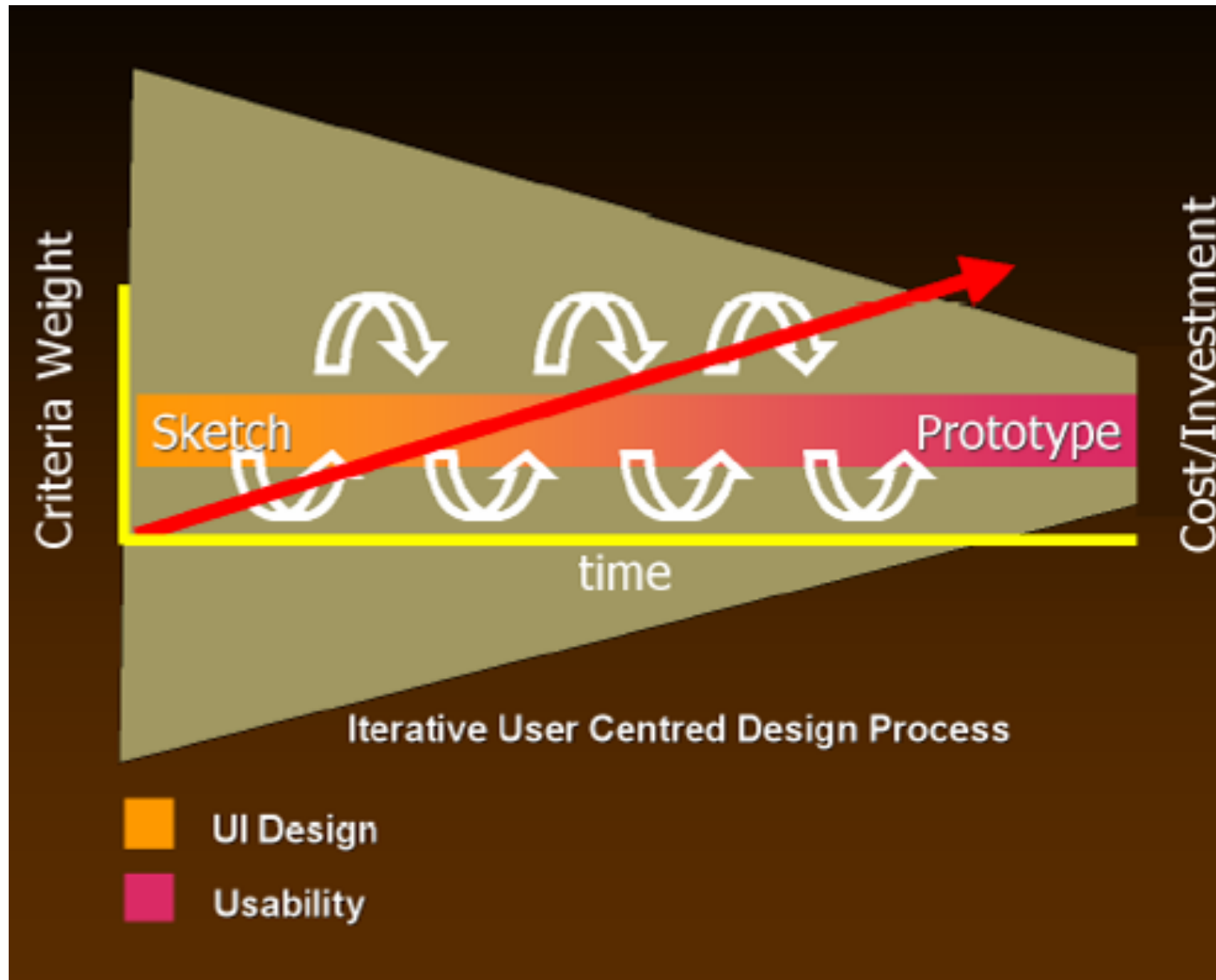- Focus on problematic aspects of the interface

Why prototype?
- If you start implementing code too early, you risk spending too much time to create a system that does not work for your users

Prototyping is a fast way to …
- Explore details of your concept before implementation
- Communicate the concept to users, your managers, etc
- Justify your design choices

prototype evolution

From Sketching the User Experience, Bill Buxton

sketches

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mid-fidelity prototype

What to do
Touch a different color, or scan another item.

What you selected

JPG Stroller
For children between 1-3 years old ...**$98.**

[X] Green

[ ] Blue

[ ] Red (out of stock)

Item	Style	Cost	
JPG Stroller	Green	98.00	Delete

tax: 6.98

Total: $104.98

All done?

Place your order	Print this list	Throw this list away

Story – board

Initial screen

What to do
Find the item you want in the catalog and scan the bar code next to it.

What you selected

Item	Style	Cost

tax:

Total: $ 0.00

All done?

| Place your order | Print this list | Throw this list away |

Scan the stroller ->

What to do
Touch a different color, or scan another item.

What you selected
JPG Stroller
For children between 1-3 years old ...**$98.**

X Green

☐ Blue

☐ Red (out of stock)

Item	Style	Cost	
JPG Stroller	Green	98.00	Delete

tax: 6.98

Total: $104.98

All done?

| Place your order | Print this list | Throw this list away |

Change the color ->

What to do
Touch a different color, or scan another item.

What you selected
JPG Stroller
For children between 1-3 years old ...**$98.**

☐ Green

X Blue

☐ Red (out of stock)

Item	Style	Cost	
JPG Stroller	Blue	98.00	Delete

tax: 6.98

Total: $104.98

All done?

| Place your order | Print this list | Throw this list away |

Place the order ->

What to do
To get your items, bring your printout to the front counter.

What you selected

Item	Style	Cost
JPG Stroller	Blue	98.00

tax: 6.98

Total: $104.98

All done?

| Place your order | Print this list | Throw this list away |

Alternate path…

What to do
Touch a different color, or scan another item.

What you selected

JPG Stroller
For children between 1-3 years old **...$98.**

- [ ] Green
- [X] Blue
- [ ] Red (out of stock)

Item	Style	Cost	
JPG Stroller	Blue	98.00	Delete

tax: 6.98

Total: $104.98

All done?

| Place your order | Print this list | Throw this list away |

Scan the shirt ->

What to do
Touch a different size, or scan another item.

What you selected

JPG Stroller
For children between 1-3 years old **...$98**

- [ ] Green
- [X] Blue
- [ ] Red (out of stock)

Item	Style	Cost	
JPG Stroller	Blue	98.00	
Rad Shirt	Large	45.99	Delete

tax: 10.08

Total: $154.07

All done?

| Place your order | Print this list | Throw this list away |

Touch previous item ->

What to do
Touch a different size, or scan another item.

What you selected

JPG Stroller
For children between 1-3 years old **...$98**

- [ ] Green
- [X] Blue
- [ ] Red (out of stock)

Item	Style	Cost	
JPG Stroller	Blue	98.00	Delete
Rad Shirt	Large	45.99	

tax: 10.08

Total: $154.07

All done?

| Place your order | Print this list | Throw this list away |

Delete that item->

What to do
Touch a different size, or scan another item.

What you selected

Rad Shirt
Casual adult wear **$45.99**

- [X] Large
- [ ] Medium
- [ ] Small

Item	Style	Cost	
Rad Shirt	Large	45.99	Delete

tax: 3.22

Total: $ 49.21

All done?

| Place your order | Print this list | Throw this list away |

Video Prototype

What to do

Find the item you want in the catalog and scan the bar code next to it.

What you selected

Item	Style	Cost

tax: _____

Total: $ 0.00

All done?

Place your order	Print this list	Throw this list away

What to do

Touch a different color, or scan another item.

What you selected

JPG Stroller
For children between 1-3 years old ...**$98.**

[X] Green

[ ] Blue

[ ] Red (out of stock)

Item	Style	Cost	
JPG Stroller	Green	98.00	Delete

tax: 6.98

Total: $104.98

All done?

Place your order	Print this list	Throw this list away

What to do

To get your items, bring your printout to the front counter.

What you selected

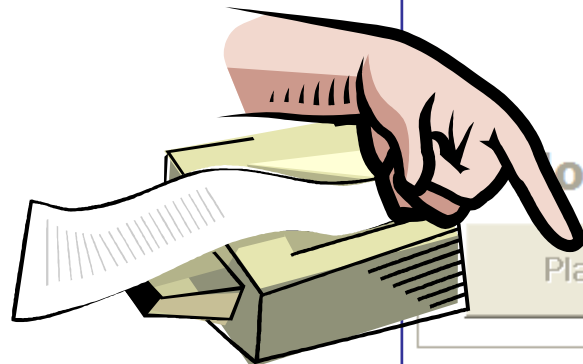| Item	Style	Cost
JPG Stroller	Green	98.00

tax: 6.98

Total: $104.98

one?

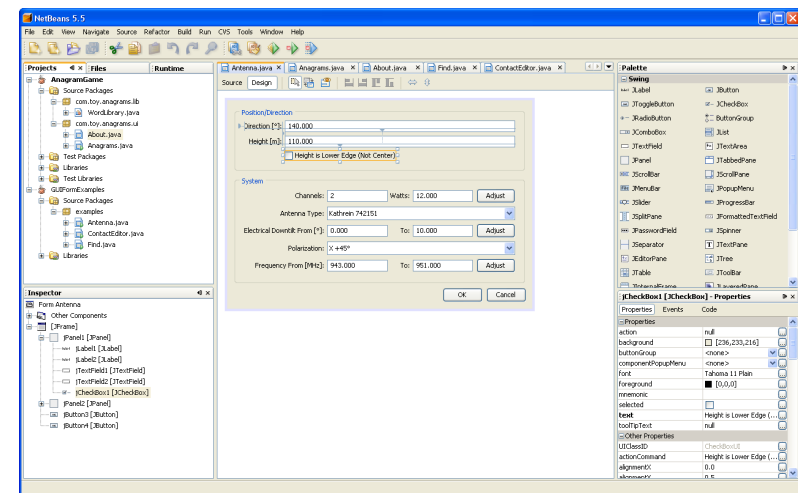| Place your order | Print this list | Throw this list away |

high fidelity prototype

High-fidelity (very detailed) prototypes
 Can be build by interface builders (e.g. SceneBuilder)
  or your Toolkit
 … but (some) functionality is missing

Good for communicating a specific aspect
e.g.: detailed dialog box with the size and text of buttons

Sketching and Prototyping

Early design

Brainstorm different representations

Choose a representation

Rough out interface style

Sketches & low fidelity paper prototypes

Task centered walkthrough and redesign

Medium fidelity prototypes in computer (wireframes, animations)

Fine tune interface, screen design

Heuristic evaluation and redesign

High fidelity prototypes (interface builders)

Usability testing and redesign

Limited field testing

Working systems

Alpha/Beta tests

Late design

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