Interaction Design

Chapter 2 (May 11, 2011, 9am-12pm):
Approaches to IxD
Approaches to Interaction Design

• The Purpose of Different Approaches

• Four Main Approaches
• User Centered Design (UCD)
• Activity Centered Design
• Systems Design
• Genius Design

• Case Study: Apple (Interaction-) Design and Business
Recap: Designing for Everyday Life

(1) Professional Tools
(2) Game Machines for Teenagers

(1) Larger user groups (e.g. Kids/Parents/Grandparents)
(2) Various Contexts of use (e.g. Work/School/Home/Leisure)

25 years ago  today
Approaches to Interaction Design and the Role of the Users
INTERACTION DESIGN

Know? FEEL? ...Do?
Expert Mindset
“users” seen as subjects
(reactive informers)

Design-Led

Participatory Mindset
“users” seen as partners
(active co-creators)

Research-Led

source: [6]
Approaches to Interaction Design

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User Centered Design (UCD)

Activity - centered Design

Genius Design

Systems Design

source: [5]
-can be used in many different situations to create vastly different products and services,
-e.g. Web sites, consumer electronics or non-digital services.

source: [5]
-move between approaches, applying the best approach to the right context
-sometimes applying multiple approaches even within a single project.

source: [5]
-problematic situations can be improved by developing at least one of these approaches

source: [5]
<table>
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<th>Approach</th>
<th>Overview</th>
<th>Users</th>
<th>Designer</th>
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<tr>
<td>User-Centered Design</td>
<td>Focuses on user needs and goals</td>
<td>Guide the design</td>
<td>Translates user needs and goals</td>
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<tr>
<td>Activity-Centered Design</td>
<td>Focuses on the tasks and activities that need to be accomplished</td>
<td>Perform the activities</td>
<td>Creates tools for actions</td>
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<tr>
<td>Systems Design</td>
<td>Focuses on the components of a system</td>
<td>Set the goals of the system</td>
<td>Makes sure all the parts of the system are in place</td>
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<td>Relies on the skill and wisdom of designers used to make products</td>
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source: [5]
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Case Study:

Paul Bradly

- designed the “Microsoft Mouse”
- followed an established “User-Centered Design Process” (UCD)
- helps Interaction Designers at IDEO developing their prototypes

http://www.designinginteractions.com/interviews/PaulBradly

source: [3]
User Centered Design (UCD)

Philosophy: Users know best

- People who will be using a product or service know what their needs, goals and preferences are

- Designers aren’t the users.

- Participation from users at every stage of the design process.

- Roots in industrial design and ergonomics: Industrial designer Henry Dreyfuss (Bell) popularized the method with his 1955 book “Designing for People”.

- Software designers were long time unaware of the method

source: [5]
With increased memory and processor powers and color monitors different forms of interfaces were now possible.

In the early 1980’s a movement began focusing on the users not on computers.

source: [5]
What is a user-centered approach?

- User-centered approach is based on:
  - **Early focus** on users and tasks: directly studying cognitive, behavioral, anthropomorphic & attitudinal characteristics

source: [4]
What is a user-centered approach?

• User-centered approach is based on:
  – **Early focus** on users and tasks: directly studying cognitive, behavioral, anthropomorphic & attitudinal characteristics
  – **Empirical measurement**: users’ reactions and performance to scenarios, manuals, simulations & prototypes are observed, recorded and analyzed

source: [4]
What is a user-centered approach?

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  – **Early focus** on users and tasks: directly studying cognitive, behavioral, anthropomorphic & attitudinal characteristics
  – **Empirical measurement**: users’ reactions and performance to scenarios, manuals, simulations & prototypes are observed, recorded and analyzed
  – **Iterative design**: when problems are found in user testing, fix them and carry out more tests

source: [4]
Four basic activities

• Identifying needs and establishing requirements

source: [4]
Four basic activities

- Identifying needs and establishing requirements
- Developing alternative designs

source: [4]
Four basic activities

- Identifying needs and establishing requirements
- Developing alternative designs
- Building interactive versions of the designs

source: [4]
Four basic activities

• Identifying needs and establishing requirements
• Developing alternative designs
• Building interactive versions of the designs
• Evaluating designs

source: [4]
Summary:

- **Goals** are important in UCD -> interaction designer focus on what the user ultimately wants to accomplish.

- Interaction designer determines the user’s task and means necessary to achieve those goals -> always with the users needs and preferences in mind
- Interaction designers involve users at every stage of the process
- Users are consulted of the very beginning of a new project
- Interaction designers conduct extensive research (Chapter 4) up front to determine what the users goals are in the current situation
- Interaction Designers test and try prototypes of a system with users

- **User data is a determining factor throughout the project when making decisions**

source: [5]
Designing for Interaction: Creating Innovative Applications and Devices (Voices That Matter) [Taschenbuch]

Dan Saffer (Autor)

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Case Study:

Jeff Hawkins

-worked with the team that developed the first laptop, the Compass by GRID
-developed the first tablet PC, the GRIDpad
-started PALM computing
-is also a neurologist that focuses on the colleration be

http://www.designinginteractions.com/interviews/JeffHawkins

source: [3]
Activity Centered Design

Philosophy: Activities as the main design focus
- Activities are a **cluster of actions and decisions** that are done for a purpose (tasks)
- The purpose of an activity is not necessarily a goal
- Purposes are more focused and tangible than goals

source: [5]
Example: Activity of buying a new computer game:

> Decide to buy a new game
> Decide what game to buy
> Decide where to buy it
> Get directions to store if necessary
> Go to store
> Enter store
> Find a game in store
> Buy game
> Leave store
> Go home

source: [5]
Summary:

-The difference between a task and an activity can be fairly minor

-Some tasks have enough parts to them to be considered sub activities themselves

-Like UCD, activity centered design relies on research as the basis for its insights, albeit not as heavily

-Interaction designers catalog users’ activities and tasks which leads to a specific design solution to help users accomplish the task, not achieve a goal per se

-The activity, not the people doing the activity guides the design process

source: [5]
A danger in *activity-centered design* is that designers might not look for solutions for the problem as a “whole” (Not see the forrest for the trees)
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Systems Design

- Analytical method of approaching design problems

- A set of entities that act upon each other is center of the design process

- Systems can range from simple (heating system in a house) to the enormously complex (power-plant)

- Systems design is a structured, rigorous design methodology

- Excellent for tackling complex problems

- Holistic design approach (focus on the context of use)

- Systems design outlines the components that systems should have: A goal, a sensor, a comparator and an actuator (these parts are shaped by the interaction designer)

- Compared to other approaches systems design provides a clear roadmap for designers to follow

source: [5]
GOAL
Goal -> not the users´goal but the goal of a system as a whole
-> can be drawn for users´ goals

The Goal states the **ideal relationship** between the system and the environment it lives in
ENVIRONMENT

photo credits © wikimedia
A diagram illustrates the components of a feedback loop system. The system is divided into input and output sections. Input is processed by a sensor, which alerts a comparator to detect errors. The comparator drives an actuator. The actuator affects the environment, which in turn affects the sensor. The feedback loop is indicated by arrows that connect these components, showing the flow of information and control. The source of the diagram is [5].
Environment -> Where does the system “live”?
Thermistor

SENSORS

photo credits © wikimedia
source: [5]
Sensors -> How does the system detect changes in the environment?
DISTURBANCES
Disturbances -> Changes in the environment are called disturbances
COMPERATOR

source: [5]
Comparator

- The comparator embodies the goal within the system
- It compares the current state (the environment) to the desired state (the goal)
- Any difference between the two is seen by the system as an error
ACTUATOR
THE SYSTEM

Sensor -> Comparator -> Actuator

Goal

INPUT

Sensor measured by

Comparator detects errors

OUTPUT

Actuator drives

Feedback Loop

Environment affects

Disturbances affect

source: [5]
**Actuator**

-> Actuators are means of making changes to the environment
-> It compares the current state (the environment) to the desired state (the goal)
-> Any difference between the two is seen by the system as an error

source: [5]
FEEDBACK

http://www.flickr.com/photos/luxproducts/4500156630/sizes/m/in/photostream/
The system consists of a sensor, a comparator, and an actuator. The sensor measures feedback, the comparator detects errors, and the actuator is driven by these errors. The system is closed by a feedback loop, affecting the sensor and the actuator. The environment affects the system, and disturbances are detected by the sensor. The goal of the system is set internally and affects the comparator, which in turn affects the actuator.
Feedback

-> Feedback can consist of a message whether a goal was achieved or maintained—whether or not an error was detected

source: [5]
CONTROLS
Goal

is set in

Sensor → Comparator → Actuator
alerts  detects errors  drives

Feedback Loop
measured by

Environment
affects

Disturbances
affect

INPUT

OUTPUT

THE SYSTEM

source: [5]
Controls

-> Controls are means of manually manipulating parts of the system (except the environment)

source: [5]
Unexpected disturbances

-> things that fall outside of the expected range of input

->to make unexpected disturbances expected (and thus make the system more stable), systems need what’s called *requisite variety*

->the system needs an assortment of responses to deal with a range of situations to prevent the system from failing
->systems without requisite variety can crash

source: [5]
Summary:

-> By focusing on the broad context of use and the interplay of the components, interaction designers gain a better understanding of a product or a service
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Genius Design

Philosophy: Design relies almost solely on the wisdom and experience of the interaction designer making the design decisions.

- User involvement (if any) comes at the end of the process

- Probably best practiced by experienced designers who have encountered several types of problems and can draw solutions from previous design issues

source: [5]
"Great design is as much about prospecting in the past as it is about inventing the future.”

Bill Buxton
Beau Brownie Camera 1930

iPod Shuffle 2004

source: [8]

http://www.apple.com
http://www.businessweek.com/innovate/next/archives/kodak_ipod.jpg
"A mobile device with a touch interface and only one physical button?"
IBM Simon 1993

Apple iPhone 2007

source:[8]
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• Case Study: Apple (Interaction-) Design and Business
On December 20, 1996 Apple announced their intention to purchase **NeXT Computer**...
NeXT Computer GUI

Steve Jobs
Product

Software Engineering

Industrial Design
iMac (1st Generation)

http://www.mac-history.de/wp-content/uploads/2008/05/apple_imac_g3.jpg
Buxton’s eight points that are particularly relevant in the story of the iMac:

1.) Design saved Apple

(source: [1])
Buxton’s eight points that are particularly relevant in the story of the iMac:

2.) The design innovation was done with the existing team

One of the prime talents (Ive) that helped save the company was in its employ through the full period of its slide to near oblivion!


source: [1]
Buxton’s eight points that are particularly relevant in the story of the iMac:

3.) **Executive vision was critical to success**

If you do not have the vision (Industrial design as a key factor), will and power at the highest level, then talent is almost certain to remain wasted as it is frustrated.

[source: [1]](http://www.spd.org/images/blog/Wired%20Feb%201996.jpg)
Buxton’s eight points that are particularly relevant in the story of the iMac:

4.) **Momentum was sustained and rapid**

The innovation was constant and rapid, and the design language of the products kept changing and developing. It ranged from the candy colored translucency of the original iMac to the minimalist form of the Power Mac Cube.

[source: [1]]
Buxton’s eight points that are particularly relevant in the story of the iMac:

5.) **There were failures**

The key problem with the mouse was its uniform circular shape. It looked beautiful, and was in keeping the rest of the computer. However the regularity of its circular shape provided no **affordances**, or tactile cues, that let you know its orientation when you grabbed it.
Buxton’s eight points that are particularly relevant in the story of the iMac:

6.) The failures were key to success

If Jobs had played it save, and not risked periodic failure, he never would have succeeded in the way he did. Things will not always go right, and Jobs factored that into his plan - not as an error but as a valuable (and expensive) “learning experience”. Jobs and Apple had to fail (but not always) in order to succeed.
Buxton’s eight points that are particularly relevant in the story of the iMac:

7.) The design that led to success was largely in the realm of styling, bordering on the superficial

The style of these machines gave them character that clearly resonated with people, and helped reshape their perception of what a computer might be for. But underlying these systems was the old familiar graphical user interface (GUI), with perhaps a bit of updating in graphical style.

source: [1]
Buxton’s eight points that are particularly relevant in the story of the iMac:

8.) **There was almost no interaction between industrial designers and user interface design**

The industrial designers knew that if there was a mouse, a keyboard, and display, then the user interface (UI) could be supported. Likewise the UI designers knew that their systems could, and must, run equally well on any of the company’s platforms, regardless of industrial design.

Not only could the industrial design and interface teams work independently, Jobs actively discouraged communication of collaboration between them.
Looking back...

- role of industrial design
- role of a visionary management

challenges:
- it’s going to be harder ever to separate the software aspects of the user interface from the physical aspects

conclusion:
- holistic design, which truly integrates both of these aspects of the design, must be there in fact.
Paul Mercer

-joined Apple in 1987
-developed the next generation from “Finder”
-founded a company called “Pixo”, focused on developing mobile devices

http://www.designinginteractions.com/interviews/PaulMercer

source: [3]
Buxton’s Key-points to note about the life of the iPod

source: [1]
Key-points to note about the life of the iPod:

1.) *It took three years for the iPod to become an “overnight success”*

In fact it took even longer, since the time starts when the product was launched, not when the project began.

source: [1]
Key-points to note about the life of the iPod:

2.) The iPod was not the first product in this space.

The first portable MP3 player, the *Eiger Labs MPMan F10* was introduced in the US in the summer of 1998, and was soon followed by the better-known *Diamond Rio PMP300*. Other hard-disk based devices also preceded the iPod, including the *Nomad*, released by *Creative Labs in 2000*.

source: [1]
Key-points to note about the life of the iPod:

3.) **Apple was its own strongest competitor.**

Even though they were not first to offer a disk-based MP-3 player, once they entered the market, their pace of introducing new products and services left little space for competitors to grab market share.

[source: [1]]
Key-points to note about the life of the iPod:

4.) Apple arguably had the best-designed product, but that is a relative thing.

The iPod gets a lot of press due to its design and especially its usability. It is important to recognize that this is a relative thing. Despite the positive press, even the current model has serious usability problems. It is just the competition does too. There has always been, and likely always will be, significant room for improvement.

http://www.apple.com/de/ipodclassic/gallery/

source: [1]
Key-points to note about the life of the iPod:

5.) **Style and fashion are really important.**

This is obvious to people from consumer products or haute couture. But it is not so well appreciated in the high-tech sector. What is especially worth noting is how the appeal of styling can be used to overshadow a product’s weaknesses. For example, each generation of the iPod had it’s design problems, but these were more than compensated for by the iPod’s strengths as a fashion item. The designer Jonas Löwgren calls this the iPod’s "jewelry aspect.” The thing to bear in mind in learning too hard on this aspect of design is that fashion can be very fickle, and can cut both ways.

source: [1]
Key-points to note about the life of the iPod:

6.) It took four generations of the basic iPod before it “tipped”.

1st Generation  2nd Generation  3rd Generation  4th Generation

source: [1]
Key-points to note about the life of the iPod:

6.) **It took four generations of the basic iPod before it “tipped”**.

Apple itself made repeated and significant improvements to their product. Their changes affected most iconic aspects of the iPod´s design, namely the user interface and the scroll wheel. The first and fourth generation are clearly from the same family, but by comparison to today´s model, the first one feels almost clunky and coarse - a very different sensation than what it provoked when it first came out

source: [1]
Key-points to note about the life of the iPod:

7.) **The success of the iPod depended on a much larger ecosystem.**

The saturation ad campaign featuring black silhouettes on pastel backgrounds was just one example on how creativity of the marketing has to match the product. Likewise, a critical part of Apple´s success was in their parallel initiative with iTunes and the associated music store.
Key-points to note about the life of the iPod:

8.) Jobs turned the Gillette model on its head

Gillette sells razors at loss on order to make money on the blades. Xerox made a major part of its income from the paper and toner consumed by their copiers. Apple has managed to do the opposite. They built their business around making their margin on the “razor” (The player) and accessories, and then selling the “blades” (The music) at the minimum that they could.

source: [1]
Key-points to note about the life of the iPod:

9.) Growth in revenue does not keep pace with growth in sales.

source: [1]
Key-points to note about the life of the iPod:

10.) **There was some luck involved in Apple’s success**

It was not until the second-generation iPod had been released that Napster was finally forced to close its doors. Apple might have hoped, or even guessed, that this would happen. But they could not be sure. They were lucky.

source: [1]
Key-points to note about the life of the iPod:

11.) Even Steve Jobs had no idea how successful the iPod would be.

Steve Jobs hopes that every product that he brings out, including the Power Mac G4 Cube, will have this kind of success. And in planning, he anticipates what will need to be done in the event that it does. But by the same token, he knows that batting 100% is really unlikely. He hopes for it. He anticipates it. But he doesn't expect it or take it for granted.

source: [1]
Key-points to note about the life of the iPod:

12.) God is in the details.
(Ludwig Mies van der Rohe)

One detail of the iPod design that illustrates the power and importance of simple details....
Key-points to note about the life of the iPod:

13.) **Holistic design not only requires an ecosystem, it also feeds one.**

Apple made as close as much money (or even more selling) iPods accessories as it does selling iPods themselves. The investment in the design sells the design. Marketing can leverage great design.

Key-points to note about the life of the iPod:

14.) From the design and management perspective, the iPod is a different class of product than the iMac.

The previously mentioned development strategy (separation between the software and hardware design teams) does not apply here anymore. There should not be a separation between the software aspects done by the user interface design, and the hardware aspects done by the industrial design.
What can we learn here?

Summary of one story on successful interaction design:

The company had to fire on all cylinders, with all parts going more or less in the same direction. There are always some superstars among the protagonists but...

...everyone is essential, but no person or group is sufficient on his or her own!

source: [1]
References (Books):


References (Papers):


Articles: