

Week 02

Foundation of HCI: Understanding and Conceptualizing Interaction

HCI 연구방법론 2019 Fall

Human-Computer Interaction+Design Lab _ Joonhwan Lee

오늘 다룰 내용

- Good and Poor Design
- What is Interaction Design?
- The Process of Interaction Design
- Understanding the Problem Space
- Conceptual Model
- Interaction Types
- Paradigm, Theories, Models and Frameworks

Good and Poor Design

Bad Designs



Bad Designs



Bad Designs



Bad Designs



Cable

Bad Designs



Cable

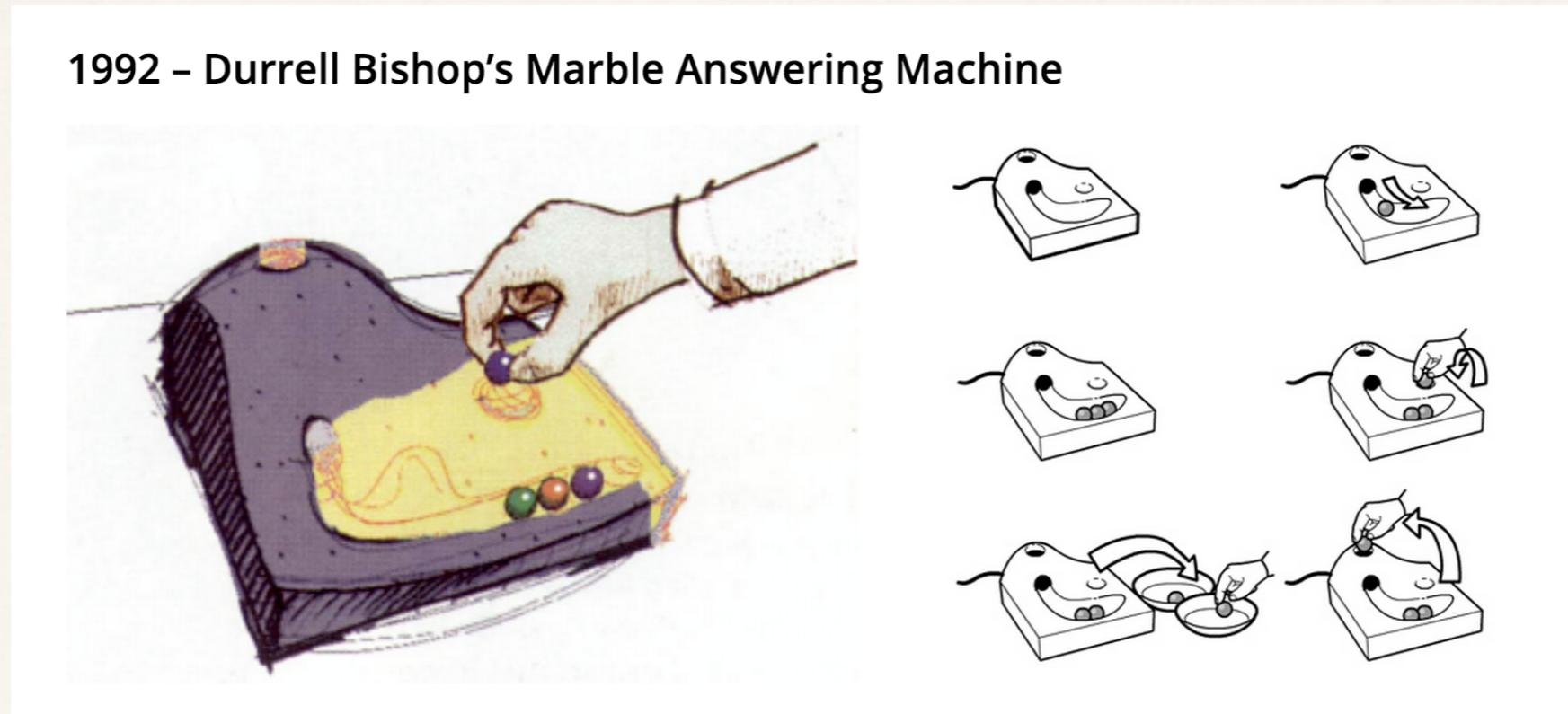
Bad Designs

Cable



Good Designs

1992 – Durrell Bishop's Marble Answering Machine



- ◆ Marble answering machine (Bishop, 1992)
- ◆ Based on how everyday objects behave
- ◆ Easy, intuitive and a pleasure to use
- ◆ Only requires one-step actions to perform core tasks
- ◆ Tangible User Interfaces (TUIs)

SIMON & IMOGEN'S HOUSE

Good and Bad Design

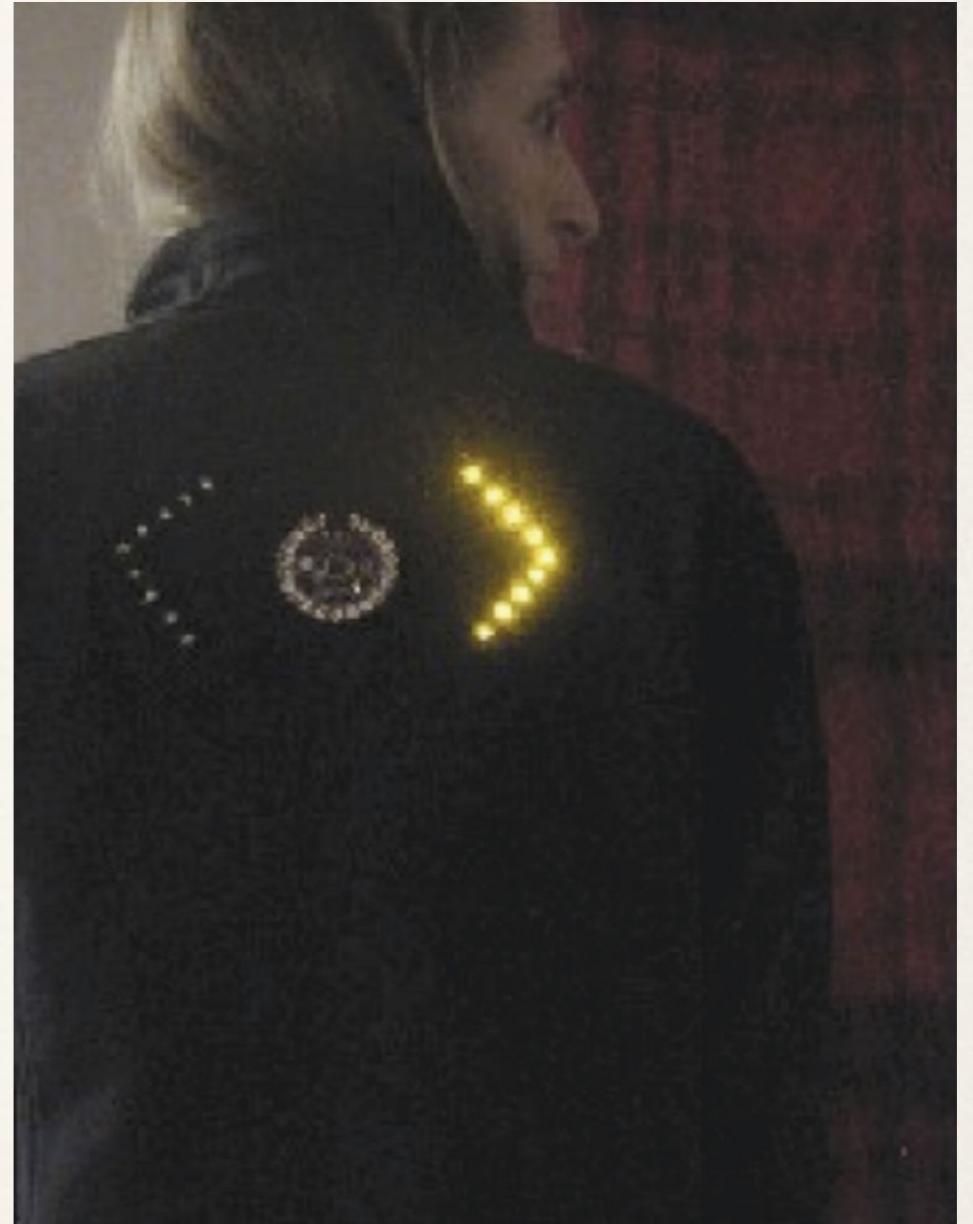


- ❖ What is wrong with the remote on the right?
- ❖ Why is the TiVo remote (left) so much better designed?
 - ❖ Peanut shaped to fit in hand
 - ❖ Logical layout and color-coded, distinctive buttons
 - ❖ Easy to locate buttons

What to Design

- ❖ Need to take into account:
 - ❖ Who the **users** are
 - ❖ What **activities** are being carried out
 - ❖ Where the **interaction** is taking place
- ❖ Need to **optimize the interactions** users have with a product
 - ❖ So that they **match the users' activities and needs**

Novel Interface



Biking jacket using e-textiles (Lean Beuchley)

Understanding User's Needs

- ♦ Need to take into account **what people are good and bad at**
- ♦ Consider **what might help** people in the way they currently do things
- ♦ Think through what might **provide quality user experiences**
- ♦ **Listen** to what people want and **get them involved**
- ♦ Use tried and tested **user-centered methods**

Understanding User's Needs

- ❖ How does making a call differ when using a:
 - ❖ Cell phone
 - ❖ Public phone box?
- ❖ Consider the **kinds of user, type of activity and context of use**



What is Interaction Design?

What is Interaction Design?

- ❖ Designing interactive products to support the way people communicate and interact in their everyday and working lives
 - Sharp, Rogers and Preece (2011)
- ❖ The design of spaces for human communication and interaction
 - Winograd (1997)

Goals of Interaction Design

- ❖ Develop usable products
 - ❖ Usability means easy to learn, effective to use and provide an enjoyable experience
- ❖ Involve users in the design process

Goals of Interaction Design

wget - UNIX 명령어

```
wget -P/tmp -l2 ftp://wuarchive.wustl.edu/
```

```
wget -r -l1 --no-parent -A.gif http://host/dir/
```

```
wget -nc -r http://www.gnu.ai.mit.edu/
```

```
wget ftp://hniksic:mypassword@jagor.srce.hr/.emacs
```

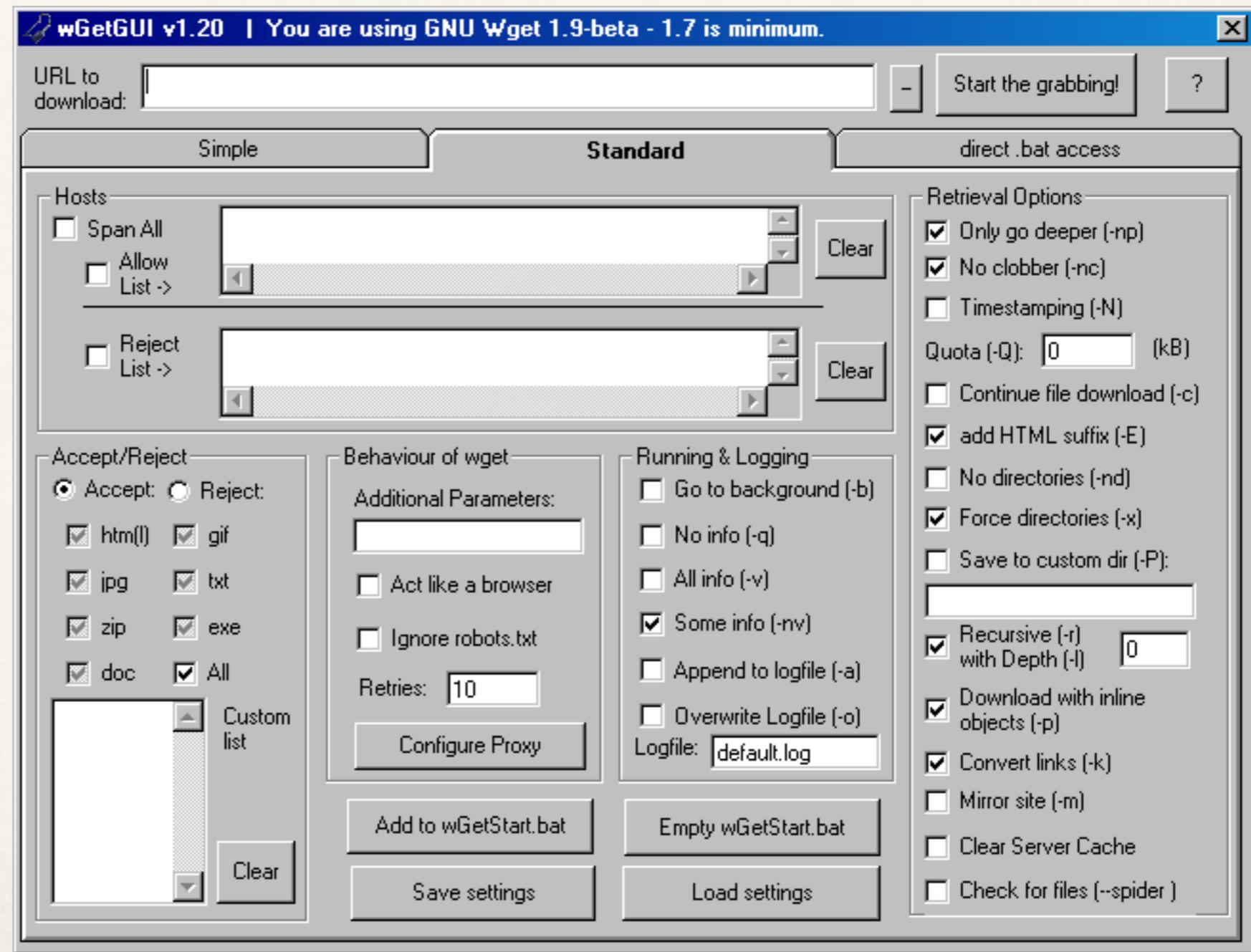
```
wget --dot-style=binary ftp://prep.ai.mit.edu/pub/  
gnu/README
```

Goals of Interaction Design

- ❖ Without user involvement,

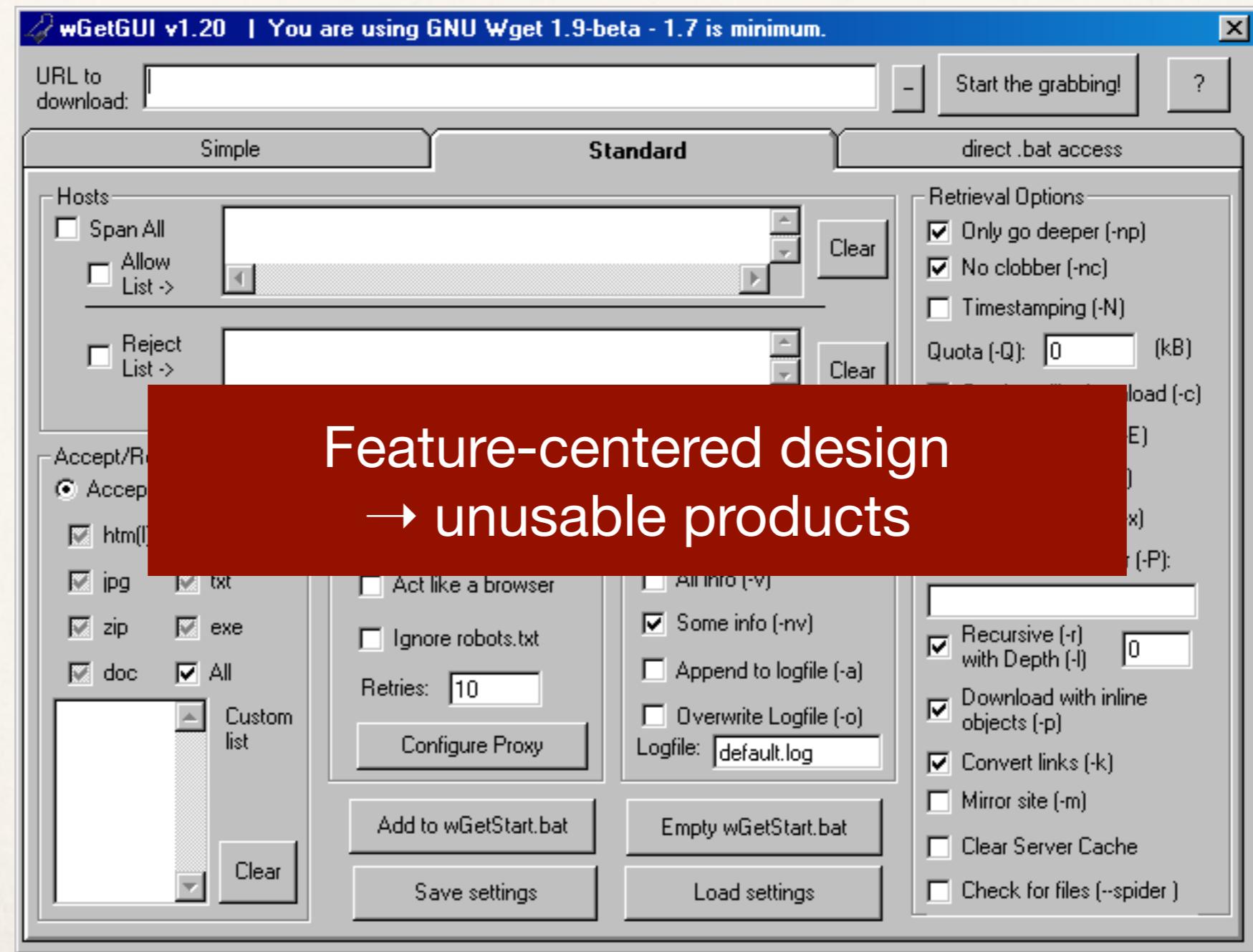
Goals of Interaction Design

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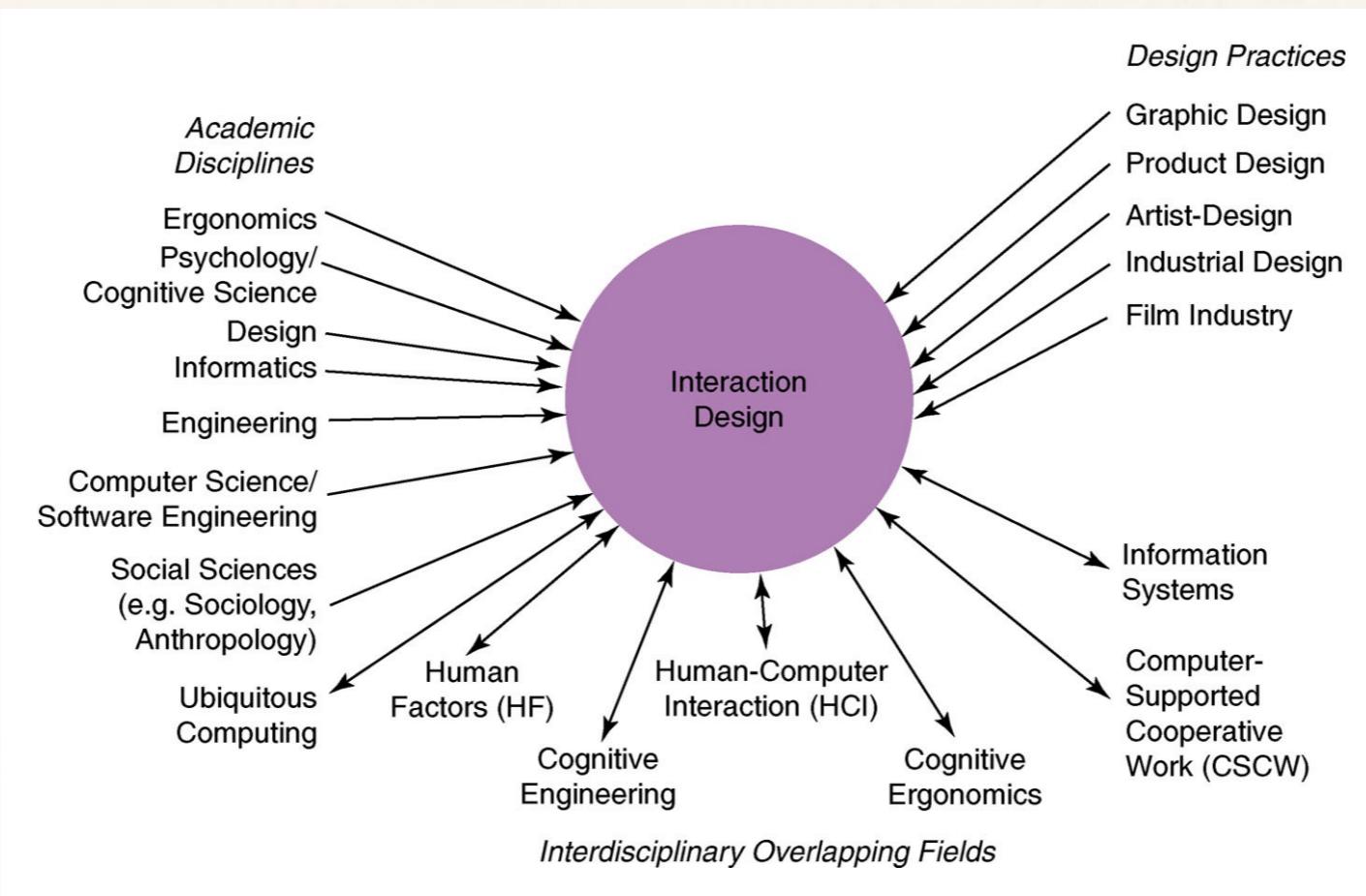


Design... Design... Which Kind of Design?

- ❖ Number of other terms used emphasizing what is being designed
 - ❖ e.g., user interface design, software design, user-centered design, product design, web design, experience design (UX)
- ❖ Interaction design is the umbrella term covering all of these aspects
 - ❖ fundamental to all disciplines, fields, and approaches concerned with researching and designing computer-based systems for people

HCI and Interaction Design

- ♦ HCI traditionally has narrow focus, being “concerned with the design, evaluation, and implementation of interactive computing systems of human use and with the study of major phenomena surrounding them” (ACM SIGCHI, 1992)



Relationship between ID, HCI and other fields

- ❖ **Academic disciplines contributing to ID:**
 - ❖ Psychology
 - ❖ Social Sciences
 - ❖ Computing Sciences
 - ❖ Engineering
 - ❖ Ergonomics
 - ❖ Informatics

Relationship between ID, HCI and other fields

- ❖ **Design practice contributing to ID:**
 - ❖ Graphic design
 - ❖ Product design
 - ❖ Artist-design
 - ❖ Industrial design
 - ❖ Film industry

Relationship between ID, HCI and other fields

- ❖ **Interdisciplinary fields** in interaction design:
 - ❖ HCI
 - ❖ Ubiquitous Computing
 - ❖ Human Factors
 - ❖ Cognitive Engineering
 - ❖ Cognitive Ergonomics
 - ❖ Computer Supported Co-operative Work
 - ❖ Information Systems

Working in Multidisciplinary Teams

- ◆ Many people from different backgrounds involved
- ◆ Different perspectives and ways of seeing and talking about things
- ◆ Benefits
 - ◆ more ideas and designs generated
- ◆ Disadvantages
 - ◆ difficult to communicate and progress forward the designs being created



Interaction Design in Business



- ❖ Increasing number of ID consultancies, examples of well known ones include:
 - ❖ **Nielsen Norman Group:** “help companies enter the age of the consumer, designing human-centered products and services”
 - ❖ **Cooper:** “From research and product to goal-related design”
 - ❖ **Swim:** “provides a wide range of design services, in each case targeted to address the product development needs at hand”
 - ❖ **IDEO:** “creates products, services and environments for companies pioneering new ways to provide value to their customers”

What do professionals do in the ID business?

- ❖ **interaction designers** - involved in the design of all the interactive aspects of a product
- ❖ **usability engineers** - focus on evaluating products, using usability methods and principles
- ❖ **web designers** - develop and create the visual design of websites, such as layouts
- ❖ **information architects** - come up with ideas of how to plan and structure interactive products
- ❖ **user experience designers (UX)** - do all the above but who may also carry out field studies to inform the design of products

The User Experience

- ❖ How a product behaves and is used by people in the real world
 - ❖ the way people feel about it and their pleasure and satisfaction when using it, looking at it, holding it, and opening or closing it
 - ❖ “**every product that is used by someone has a user experience**: newspapers, ketchup bottles, reclining armchairs, cardigan sweaters.” (Garrett, 2003)
- ❖ Cannot design a user experience, only design *for* a user experience

The User Experience



The iPod Nano Touch



Why was the iPod user experience such a success?

- ❖ Quality user experience from the start
- ❖ Simple, elegant, distinct brand, pleasurable, must have fashion item, catchy names, cool, etc.,

The Process of Interaction Design

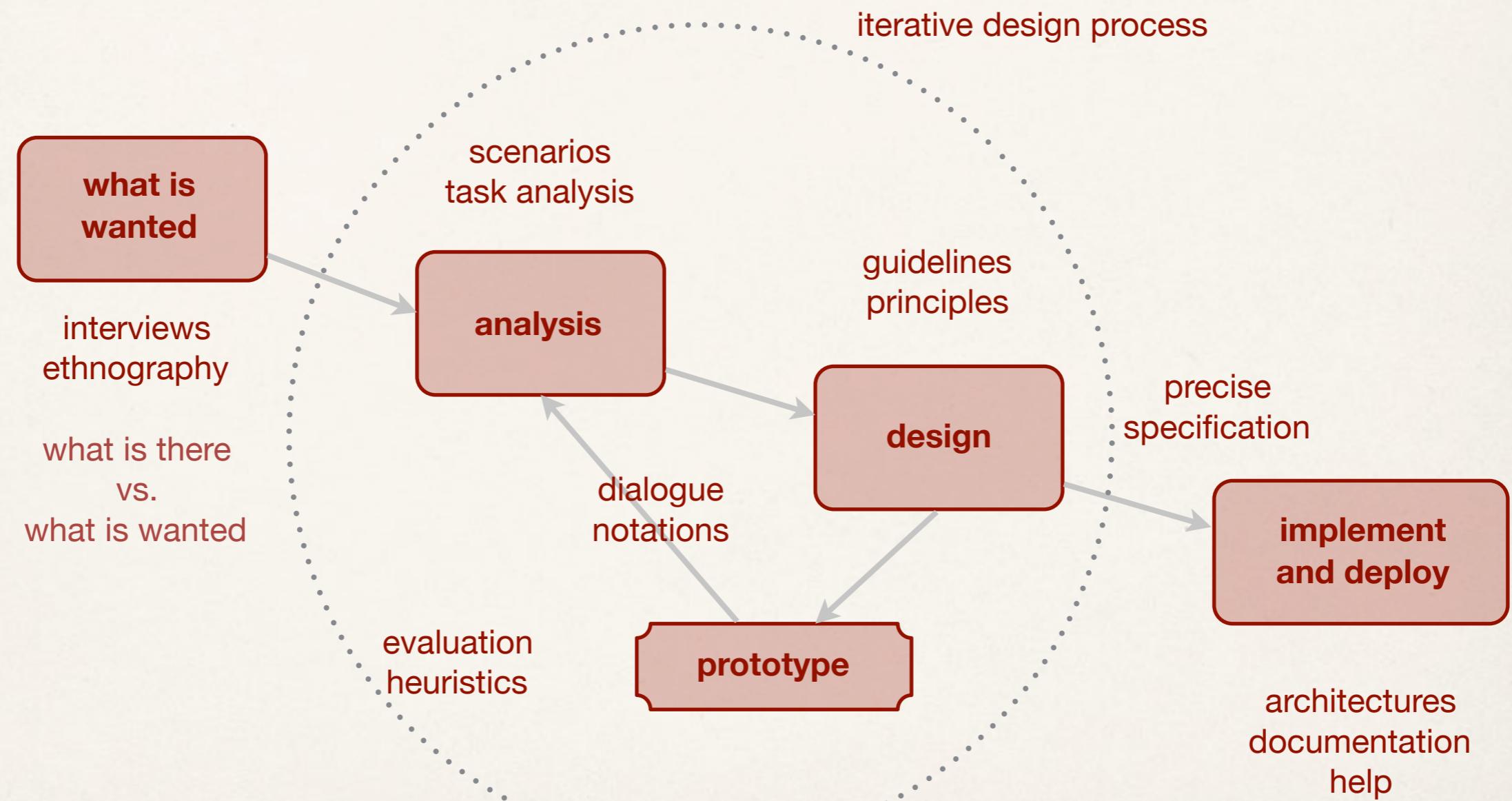
The Process of Interaction Design

- ◆ Establishing requirements
- ◆ Developing alternatives
- ◆ Prototyping
- ◆ Evaluating

Core Characteristics of Interaction Design

- ❖ **Users should be involved** through the development of the project
- ❖ Specific **usability and user experience goals need to be identified**, clearly documented and agreed at the beginning of the project
- ❖ **Iteration is needed** through the core activities

The Process of Interaction Design

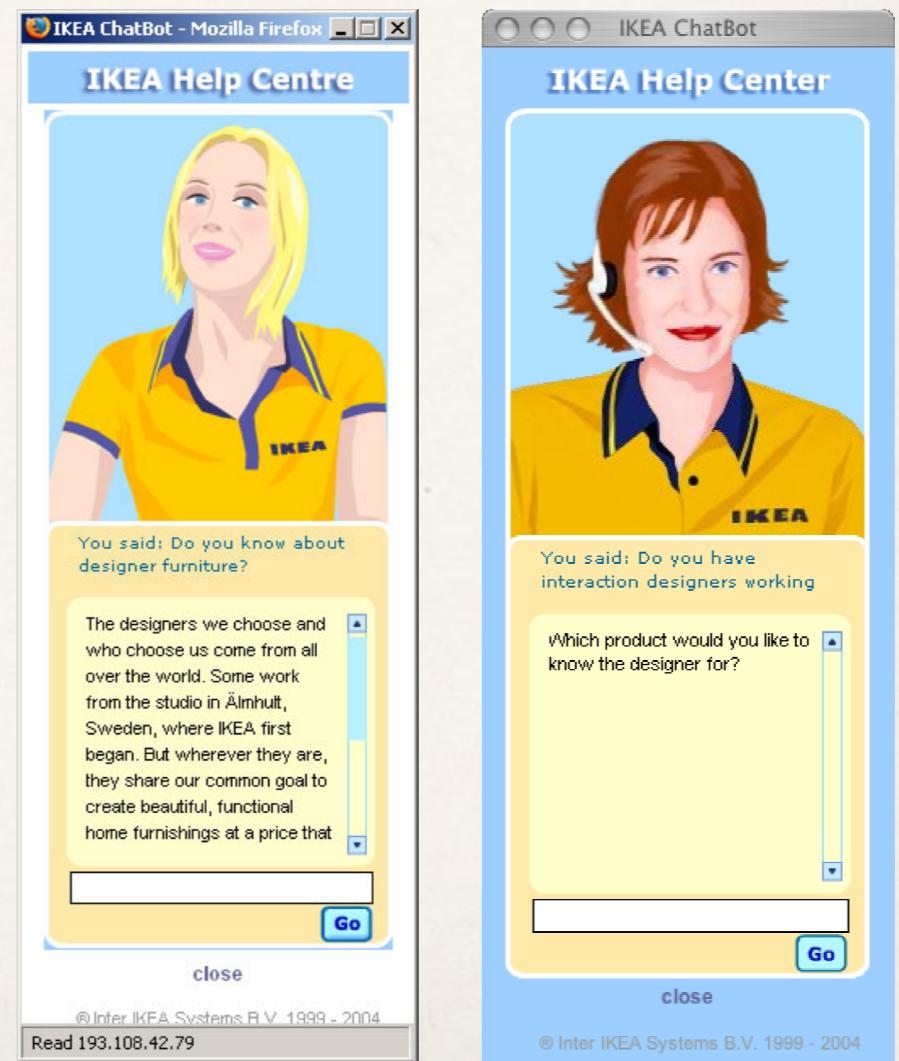


Why Go to This Length?

- ❖ Help designers:
 - ❖ understand how to design interactive products that fit with what people want, need and may desire
 - ❖ appreciate that one size does not fit all
 - ❖ e.g., teenagers are very different to grown-ups
 - ❖ identify any incorrect assumptions they may have about particular user groups
 - ❖ e.g., not all old people want or need big fonts
 - ❖ be aware of both people's sensitivities and their capabilities

Cultural Differences

- ❖ 5/21/2012 versus 21/5/2012?
 - ❖ Which should be used for international services and online forms?
- ❖ Asia: 2012/5/21
- ❖ Anna, IKEA online sales agent
 - ❖ Designed to be different for UK and US customers
 - ❖ What are the differences and which is which?



Usability Goals

- ◆ Effective to use
- ◆ Efficient to use
- ◆ Safe to use
- ◆ Have good utility
- ◆ Easy to learn
- ◆ Easy to remember how to use

User Experience Goals

- ♦ Desirable aspects

♦ satisfying	helpful	fun
enjoyable	motivating	provocative
engaging	challenging	surprising
pleasurable	enhancing sociability	rewarding
exciting	supporting creativity	entertaining
emotionally fulfilling	cognitively stimulating	

- ♦ Undesirable aspects

♦ boring	unpleasant
frustrating	patronizing
making one feel guilty	making one feel stupid
annoying	cutesy
childish	gimmicky

User Experience Goals



USB



Two different user experience - how is it different?

Usability and User Experience Goals

- ❖ Selecting terms to convey a person's feelings, emotions.
 - ❖ etc., can help designers understand the multifaceted nature of the user experience
- ❖ How do usability goals differ from user experience goals?
- ❖ Are there trade-offs between the two kinds of goals?
 - ❖ e.g. can a product be both fun and safe?
- ❖ How easy is it to measure usability versus user experience goals?

Design Principles

- ❖ Generalizable abstractions for thinking about different aspects of design.
- ❖ The do's and don'ts of interaction design.
- ❖ What to provide and what not to provide at the interface.
- ❖ Derived from a mix of theory-based knowledge, experience and common-sense.

Design Principles: Visibility

- ♦ This is a control panel for a hotel elevator.
- ♦ How does it work?
- ♦ Push a button for the floor you want?
- ♦ Nothing happens.
Push any other button?
Still nothing.
What do you need to do?
- ♦ It is not visible as to what to do!



Design Principles: Visibility

- ❖ ...you need to insert your room card in the slot by the buttons to get the elevator to work!

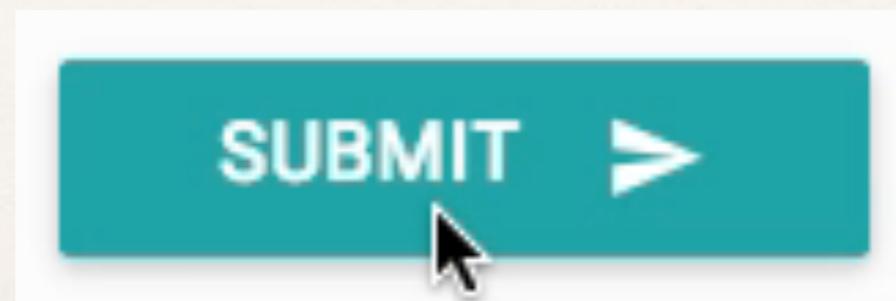


Design Principles: Visibility

- ❖ Make the card reader more obvious.
 - ❖ Provide an auditory message, that says what to do (which language?)
 - ❖ Provide a big label next to the card reader that flashes when someone enters.
-
- ❖ **Make relevant parts visible**
 - ❖ **Make what has to be done obvious**

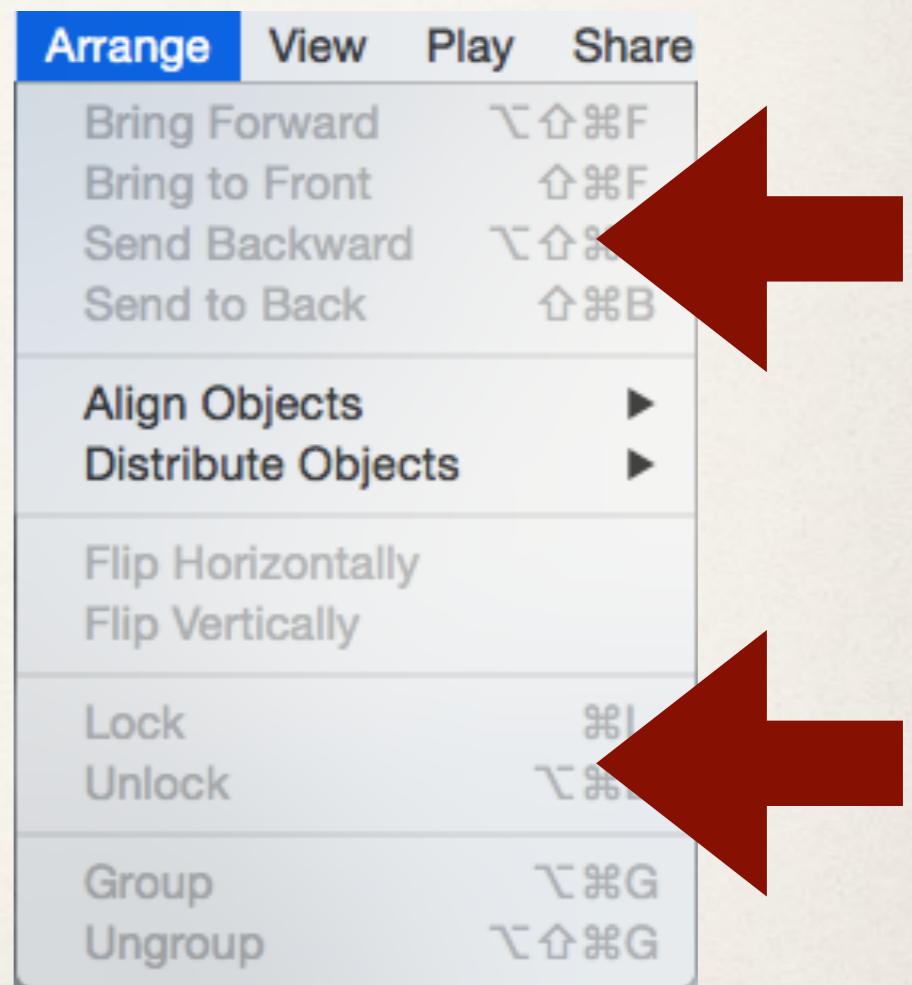
Design Principles: Feedback

- ❖ Sending information back to the user about **what has been done.**
- ❖ Includes sound, highlighting, animation and combinations of these.
 - ❖ e.g., when screen button clicked on provides sound or highlight feedback:



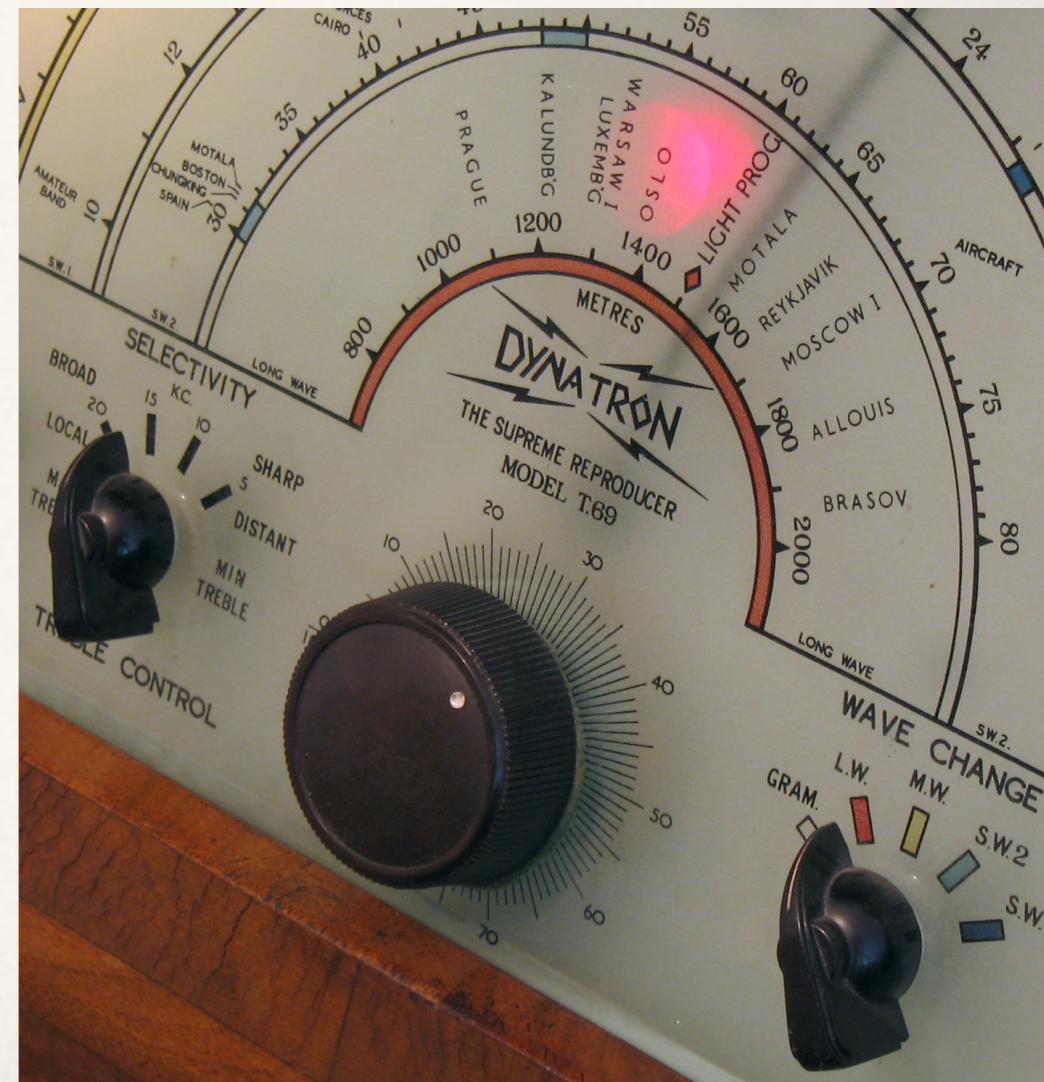
Design Principles: Constraints

- ❖ Restricting the possible actions that can be performed.
- ❖ Helps prevent user from selecting incorrect options.
- ❖ Physical objects can be designed to constrain things.
 - ❖ e.g. only one way you can insert a key into a lock



Design Principles: Constraints

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Design Principles: Consistency

- ❖ Design interfaces to have similar operations and use similar elements for similar tasks.
- ❖ For example:
 - ❖ always use ctrl key plus first initial of the command for an operation – ctrl+C, ctrl+S, ctrl+O
 - ❖ term consistency: copy - 복사
- ❖ Main benefit is consistent interfaces are **easier to learn and use**

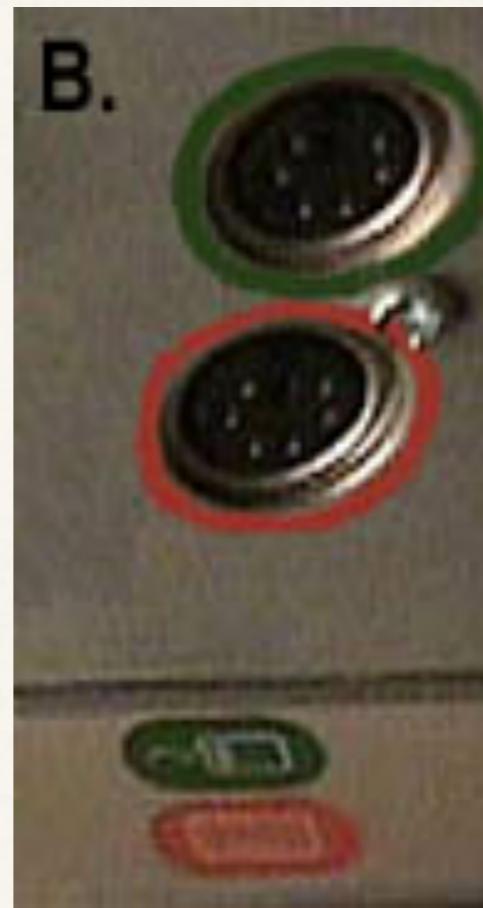
Design Principles: Consistency



From: www.baddesigns.com

- ❖ Where do you plug the mouse?
- ❖ Where do you plug the keyboard?
- ❖ Do the color coded icons help?

Design Principles: Consistency



From: www.baddesigns.com

- ♦ (i) A provides direct adjacent mapping between icon and connector
- ♦ (ii) B provides color coding to associate the connectors with the labels

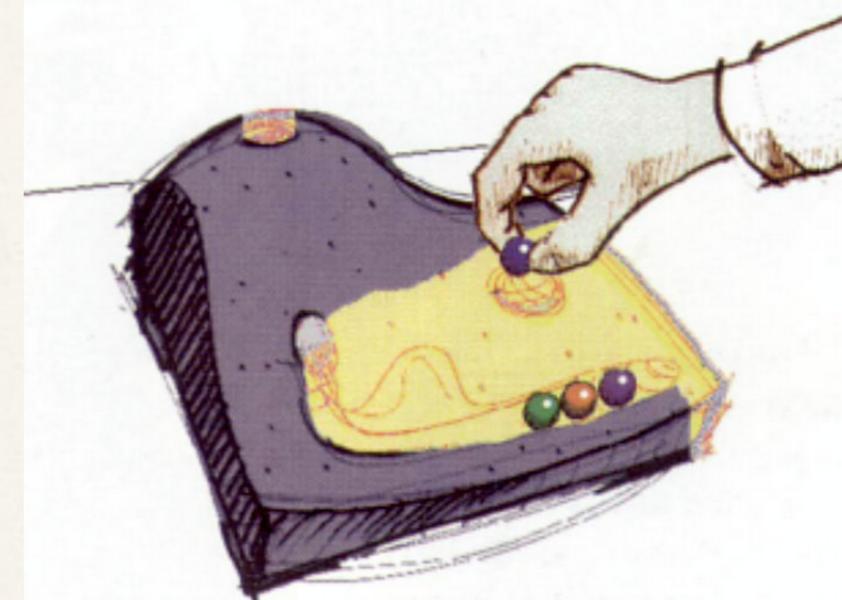
When Consistency Breaks Down

- ❖ What happens if there is more than one command starting with the same letter? (keyboard shortcuts)
 - ❖ e.g. save, spelling, select, style
- ❖ Have to find other initials or combinations of keys, thereby breaking the consistency rule
 - ❖ e.g. ctrl+S, ctrl+Sp, ctrl+shift+L
- ❖ Increases learning burden on user, making them more prone to errors

Design Principles: Affordances

- ♦ Affordance = Perceived Affordance (to give a clue)
- ♦ Refers to an attribute of an object that allows people to know how to use it.
 - ♦ e.g., a mouse button invites pushing, a door handle affords pulling
- ♦ Norman (1988) used the term to discuss the design of everyday objects.
- ♦ Since has been much popularized in interaction design to discuss how to design interface objects
 - ♦ e.g., scrollbars to afford moving up and down, icons to afford clicking on

Design Principles: Affordances



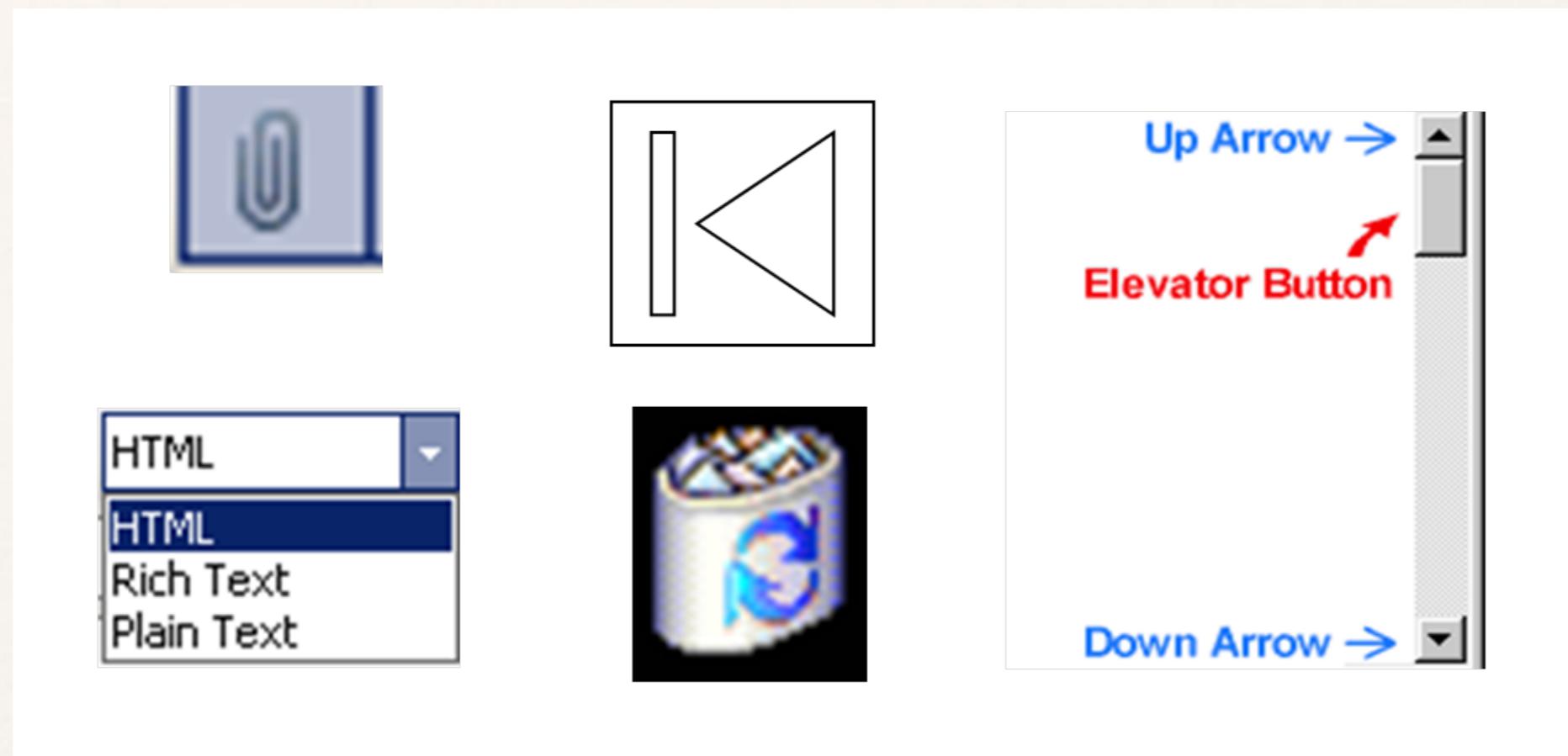
Design Principles: Affordances



What Does ‘Affordance’ Have to Offer Interaction Design?

- ❖ Interfaces are virtual and do **not have affordances like physical objects.**
- ❖ Norman argues it does not make sense to talk about interfaces in terms of ‘real’ affordances.
- ❖ Instead interfaces are better conceptualized as **‘perceived’ affordances.**
- ❖ Learned conventions of arbitrary mappings between action and effect at the interface.
- ❖ Some mappings are better than others.

Virtual Affordance



Skeuomorphism



<http://skeu.it>

<http://www.quora.com/Skeuomorphism>

Understanding the Problem Space

Understanding the Problem Space

- ❖ What do you want to create?
- ❖ What are your assumptions?
- ❖ Will it achieve what you hope it will?

What is an Assumption?

- ♦ Taking something for granted when it needs further investigation.
 - ♦ e.g., people will want to watch TV while driving



What is a Claim?

- ❖ Stating something to be true when it is still open to question.
 - ❖ e.g., a multimodal style of interaction for controlling GPS – one that involves speaking while driving – is safe

A Framework for Analyzing the Problem Space

- ❖ Are there problems with an existing product or user experience? If so, what are they?
- ❖ Why do you think there are problems?
- ❖ How do you think your proposed design ideas might overcome these?
- ❖ If you are designing for a new user experience, how do you think your proposed design ideas support, change, or extend current ways of doing things?

Benefits of Conceptualizing Design Space

- ❖ Orientation
 - ❖ enables design teams to ask specific questions about how the conceptual model will be understood
- ❖ Open-minded
 - ❖ prevents design teams from becoming narrowly focused early on
- ❖ Common ground
 - ❖ allows design teams to establish a set of commonly agreed terms

From Problem Space to Design Space

- ❖ Having a good understanding of the problem space can help inform the design space.
 - ❖ e.g., what kind of interface, behavior, functionality to provide
- ❖ But before deciding upon these it is important to develop a conceptual model.

Conceptual Model

Conceptual Model

- ❖ A conceptual model is:
 - ❖ “a high-level description of how a system is organized and operates” (Johnson and Henderson, 2002, p 26)
- ❖ it enables,
 - ❖ “designers to straighten out their thinking before they start laying out their widgets” (p 28)

Components

- ❖ Metaphors and analogies
 - ❖ understand what a product is for and how to use it for an activity
- ❖ Concepts that people are exposed to through the product
 - ❖ task–domain objects, their attributes, and operations (e.g. saving, revisiting, organizing)
- ❖ Relationship and mappings between these concepts

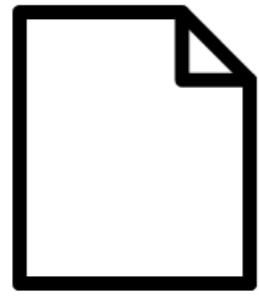
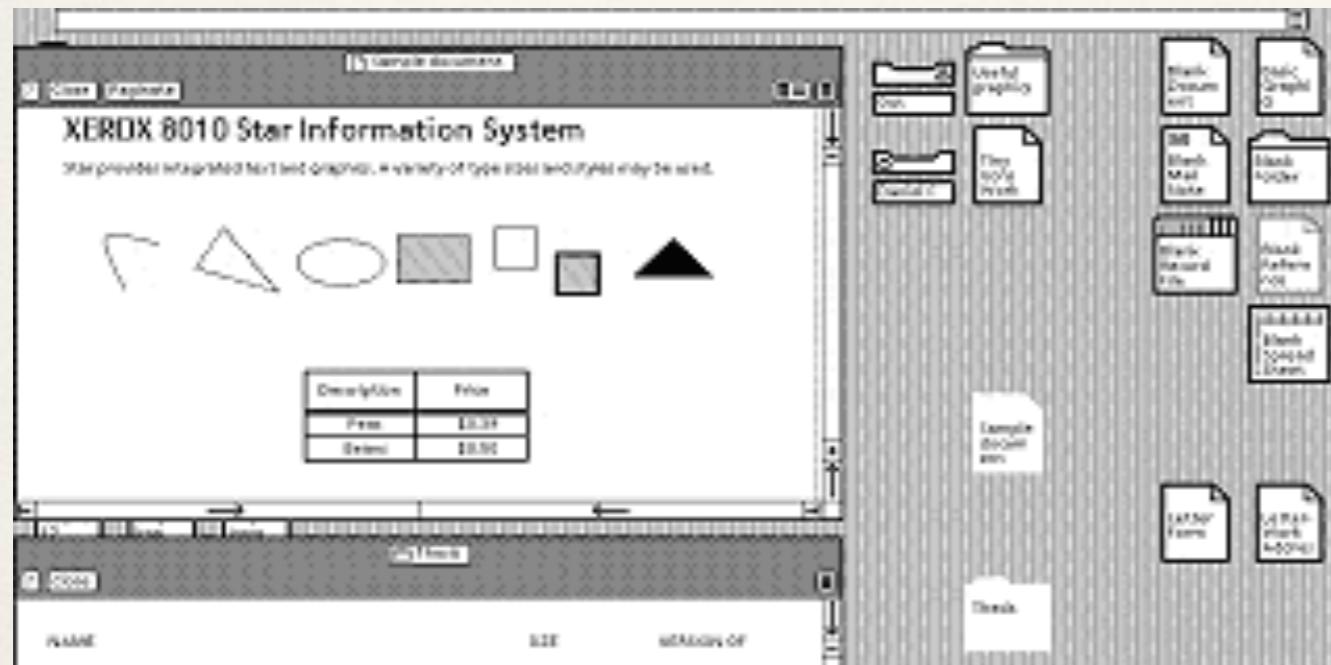
Formulating a Conceptual Model

- ❖ What will the users be doing when carrying out their tasks?
- ❖ How will the system support these?
- ❖ What kind of interface metaphor, if any, will be appropriate?
- ❖ What kinds of interaction modes and styles to use?
 - ❖ always keep in mind when making design decisions how the user will understand the underlying conceptual model

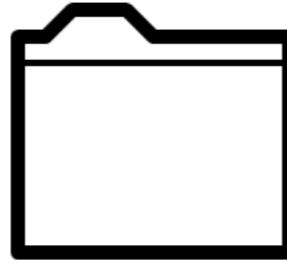
Interface Metaphors

- ❖ Metaphors are central component of conceptual model.
- ❖ Interface metaphors are intended to provide familiar entities that enable people to readily understand the underlying conceptual model and know what to do at an interface.

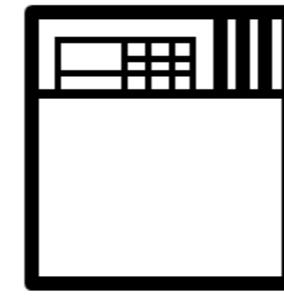
Interface Metaphors



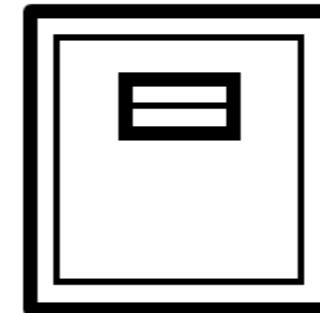
Document



Folder



Record File



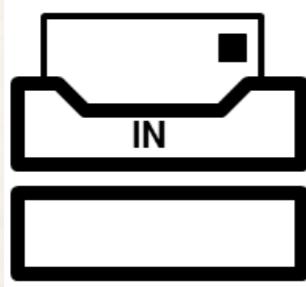
File Drawer



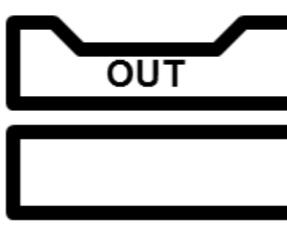
Calculator



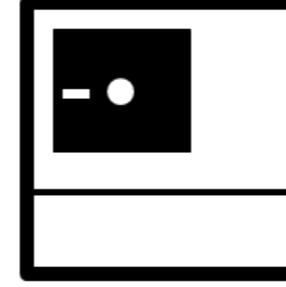
Terminal



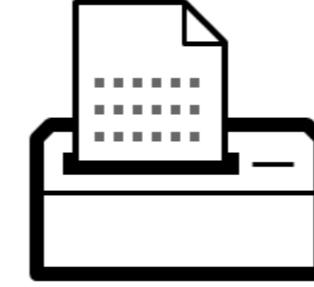
In Tray



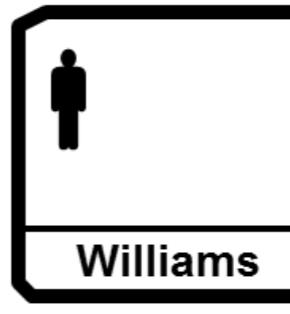
Out Tray



Floppy Disk
Drive

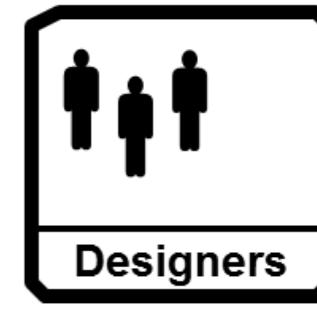


Printer



Williams

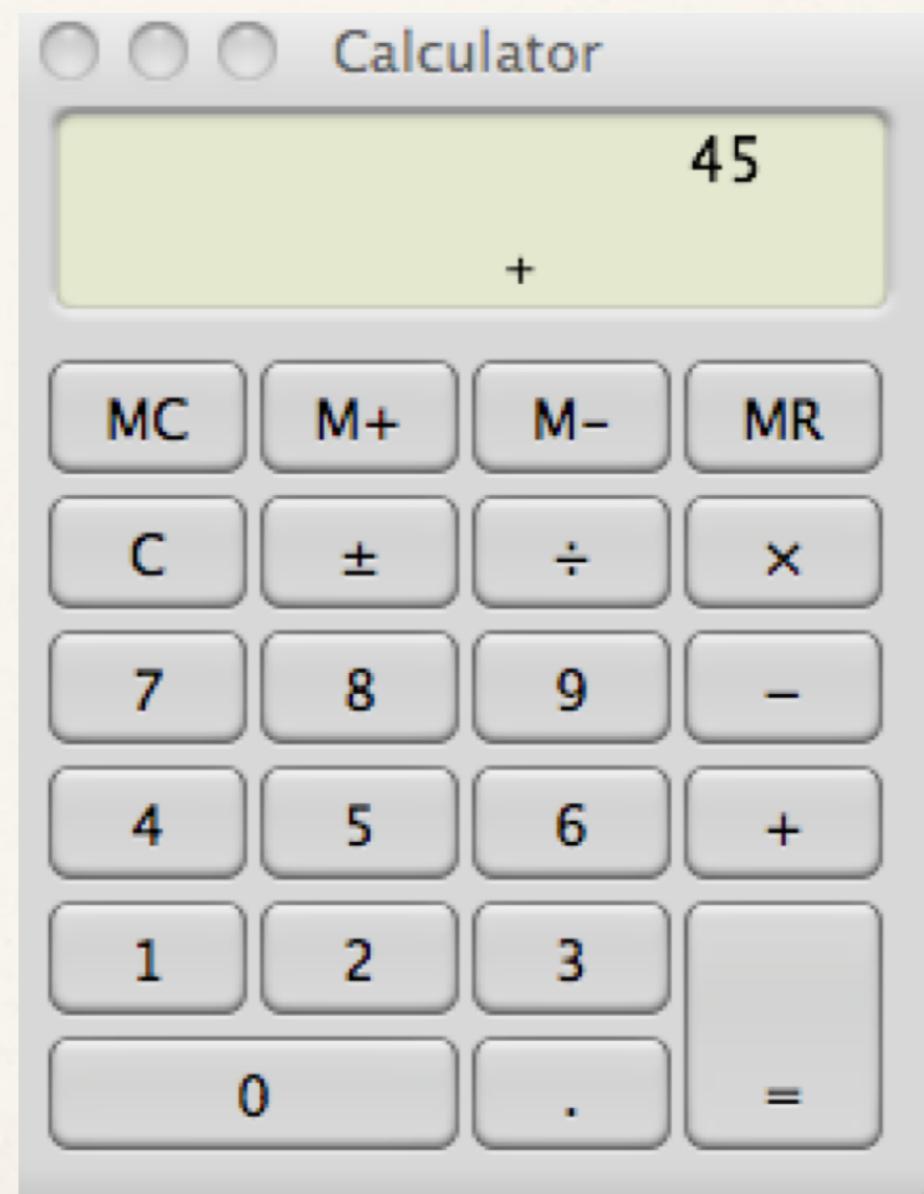
User



Designers

User Group

Interface Metaphors

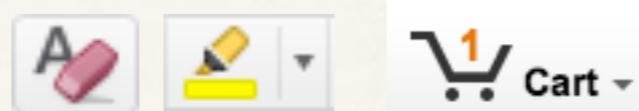


Interface Metaphors

- ❖ Conceptualizing what we are doing.
 - ❖ e.g. surfing the web
- ❖ A conceptual model instantiated at the interface.
 - ❖ e.g. the desktop metaphor
- ❖ Visualizing an operation.
 - ❖ e.g. an icon of a shopping cart for placing items into

Interface Metaphors

- ❖ Interface designed to be similar to a physical entity but also has own properties.
 - ❖ e.g. desktop metaphor, web portals
- ❖ Can be based on activity, object or a combination of both.
- ❖ Exploit user's familiar knowledge, helping them to understand 'the unfamiliar'



Benefits of Interface Metaphors

- ❖ Makes learning new systems easier.
- ❖ Helps users understand the underlying conceptual model.
- ❖ Can be very innovative and enable the realm of computers and their applications to be made more accessible to a greater diversity of users.

Problems with Interface Metaphors

- ❖ Break conventional and cultural rules.
 - ❖ e.g. recycle bin placed on desktop
- ❖ Can constrain designers in the way they conceptualize a problem space.
 - ❖ Limits designers' imagination in coming up with new conceptual models
- ❖ Conflict with design principles.

Interaction Types

Interaction Types

- ❖ Instructing
 - ❖ issuing commands and selecting options
- ❖ Conversing
 - ❖ interacting with a system as if having a conversation
- ❖ Manipulating
 - ❖ interacting with objects in a virtual or physical space by manipulating them
- ❖ Exploring
 - ❖ moving through a virtual environment or a physical space

Interaction Type: Instructing

- ❖ Where users instruct a system and tell it what to do.
 - ❖ e.g. tell the time, print a file, save a file
- ❖ Very common conceptual model, underlying a diversity of devices and systems
 - ❖ e.g. word processors, VCRs, vending machines
- ❖ Main benefit is that instructing supports quick and efficient interaction
 - ❖ good for repetitive kinds of actions performed on multiple objects

Interaction Type: Instructing

```
-- Accepting AUTHENTICATED call from 10.3.3.43:  
> requested format = gsm,  
> requested prefs = (),  
> actual format = ulaw,  
> host prefs = (),  
> priority = mine  
-- Executing Answer("IAX2/idefisk-2", "") in new stack  
-- Executing NoOp("IAX2/idefisk-2", "") in new stack  
-- Executing Math("IAX2/idefisk-2", "RetVar|20+15") in new stack  
-- Executing NoOp("IAX2/idefisk-2", "35.000000") in new stack  
-- Executing Hangup("IAX2/idefisk-2", "") in new stack  
== Spawn extension (test, 100, 5) exited non-zero on 'IAX2/idefisk-2'  
-- Hungup 'IAX2/idefisk-2'  
vincent*CLI>
```



```
drwx----- 7 joonhwan staff 238 Mar  7 18:24 Applications  
drwxr-xr-x@ 5 joonhwan staff 170 Mar  7 18:24 Applications (Parallels)  
drwx-----@ 5 joonhwan staff 170 Sep 21 21:17 Creative Cloud Files  
drwx-----+ 40 joonhwan staff 1360 Mar  8 23:30 Desktop  
drwxr-xr-x 16 joonhwan staff 544 Feb 25 00:53 Develop  
drwx-----+ 11 joonhwan staff 374 Jan  4 17:59 Documents  
drwx-----+ 31 joonhwan staff 1054 Mar  8 21:22 Downloads  
drwx-----@ 110 joonhwan staff 3740 Mar  8 14:50 Dropbox  
drwxr-xr-x@ 5 joonhwan staff 170 Sep 21 21:18 FontExplorer X  
drwx-----+ 69 joonhwan staff 2346 Jan 21 08:57 Library  
drwx-----+ 3 joonhwan staff 102 Sep 20 10:48 Movies  
drwx-----+ 4 joonhwan staff 136 Sep 26 07:48 Music  
drwx-----+ 29 joonhwan staff 986 Mar  8 21:23 Pictures  
drwxr-xr-x+ 5 joonhwan staff 170 Sep 20 10:48 Public  
drwxr-xr-x  7 joonhwan staff 238 Feb  7 16:13 Sites  
drwxr-xr-x  7 joonhwan staff 238 Nov 10 17:01 Things  
-rw-r--r--  1 joonhwan staff 73 Feb 20 18:43 pslog.txt  
-rw-r--r--  1 joonhwan staff 575 Dec 23 15:48 weka.log  
monotina:~ joonhwan$
```

Interaction Type: Instructing



simple



complex

Interaction Type: Conversing

- ❖ Underlying model of having a conversation with another human.
- ❖ Range from simple voice recognition menu-driven systems to more complex ‘natural language’ dialogs.
- ❖ Examples include timetables, search engines, advice-giving systems, help systems.
- ❖ Also virtual agents, toys and pet robots designed to converse with you.

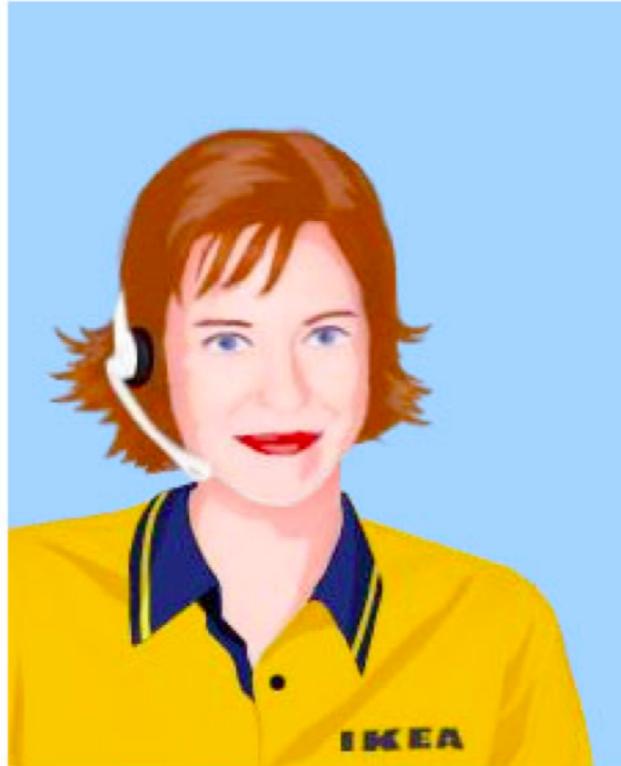
Interaction Type: Conversing

The image consists of three vertically stacked screenshots from a mobile application, likely a digital assistant or personal assistant app.

- Top Screenshot:** Shows a file menu with options like "New", "Open...", "Close", "Save", etc. To the right, a conversation log is displayed with the following entries:
 - "Enable Wi-Fi"
 - "Wi-Fi is already enabled"
 - "Turn Wi-Fi on for me please"
 - "Wi-Fi is already enabled"
 - "I would be extremely grateful if you turn on Wi-Fi"
 - "Wi-Fi is already enabled"A microphone icon is at the bottom, indicating voice input.
- Middle Screenshot:** Shows a "Format" menu with various options like "Font", "Text", "Table", "Chart", etc. A blue arrow points to the "Table" option, which is highlighted. To the right, a help search interface shows results for "add".
 - Search bar: "add"
 - Menu Items:
 - Table > Add Row Above
 - Table > Add Row Below
 - Table > Add Column Before**
 - Table > Add Column After
 - Help Topics:
 - Opening a Preaddressed Email M...
 - Automatically Substituting Text
 - Opening a Page in a Web Browse...
 - Creating a Table Build
 - Adding a Table
 - Creating a Custom Number Format
 - Finding and Replacing Text
 - Adding Rows to a Table
 - Sending Your Keynote Presentati...
 - Using Master Gridlines
 - Show All Help Topics
- Bottom Screenshot:** Shows a "Format" menu with options like "Font", "Text", "Table", "Chart", etc. A blue arrow points to the "Table" option, which is highlighted. To the right, a help search interface shows results for "add".
 - Search bar: "add"
 - Menu Items:
 - Table > Add Row Above
 - Table > Add Row Below
 - Table > Add Column Before**
 - Table > Add Column After
 - Help Topics:
 - Opening a Preaddressed Email M...
 - Automatically Substituting Text
 - Opening a Page in a Web Browse...
 - Creating a Table Build
 - Adding a Table
 - Creating a Custom Number Format
 - Finding and Replacing Text
 - Adding Rows to a Table
 - Sending Your Keynote Presentati...
 - Using Master Gridlines
 - Show All Help Topics

Interaction Type: Conversing

IKEA Help Center close window



Welcome to IKEA. I'm Anna, IKEA USA's Online Assistant. You can ask me about IKEA and our products and our services. I'll answer your questions, sometimes opening up relevant web pages along the way. Your inputs will be used to improve and expand my knowledge base. Thanks very much.

Go

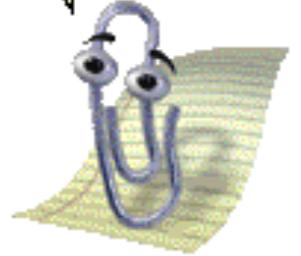
© Inter IKEA Systems B.V. 1999 - 2004

It looks like you're writing a letter.

Would you like help?

- Get help with writing the letter
- Just type the letter without help

Don't show me this tip again



Interaction Type: Conversing

- ❖ Allows users, especially novices and technophobes, to interact with the system in a way that is familiar.
 - ❖ makes them feel comfortable, at ease and less scared
- ❖ Misunderstandings can arise when the system does not know how to parse what the user says.
 - ❖ e.g. So many errors in Siri
- ❖ Slower interaction comparing to instructing.

Interaction Type: Manipulating

- ❖ Involves dragging, selecting, opening, closing and zooming actions on virtual objects.
- ❖ Exploits users' knowledge of how they move and manipulate in the physical world.
- ❖ Can involve actions using physical controllers (e.g. Wii) or air gestures (e.g. Kinect) to control the movements of an on screen avatar.
- ❖ Tagged physical objects (e.g. balls) that are manipulated in a physical world result in physical/digital events. (e.g. animation)

Interaction Type: Manipulating

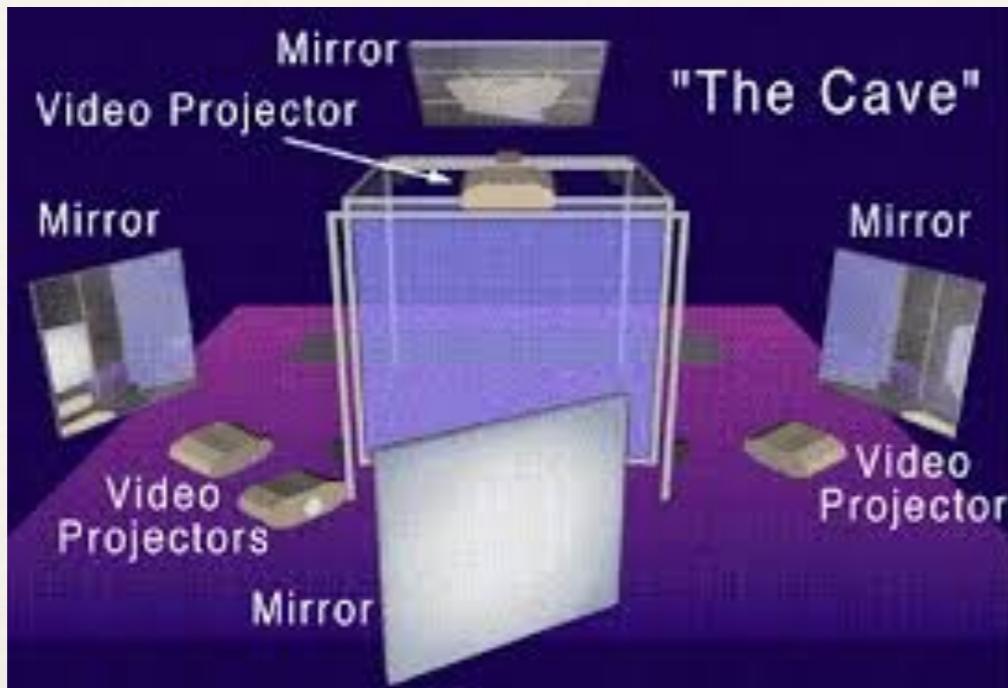
- ❖ Direct Manipulation
 - ❖ Shneiderman (1983) coined the term DM, came from his fascination with computer games at the time
 - ❖ Continuous representation of objects and actions of interest
 - ❖ Physical actions and button pressing instead of issuing commands with complex syntax
 - ❖ Rapid reversible actions with immediate feedback on object of interest

Disadvantage with DM

- ❖ Not all tasks can be described by objects and not all actions can be done directly.
- ❖ Some tasks are better achieved through issuing commands.
 - ❖ e.g. spell checking
- ❖ Moving a mouse around the screen can be slower than pressing function keys to do same actions.
 - ❖ e.g. expert vs novice (like in AutoCAD)

Interaction Type: Exploring

- ♦ Involves users moving through virtual or physical environments.
- ♦ Physical environments with embedded sensor technologies.
- ♦ Context aware



Which Conceptual Model is Best?

- ❖ Direct manipulation is good for ‘doing’ types of tasks.
 - ❖ e.g. designing, drawing, flying, driving, sizing windows
- ❖ Issuing instructions is good for repetitive tasks
 - ❖ e.g. spell-checking, file management
- ❖ Having a conversation is good for children, computer-phobic, disabled users and specialised applications (e.g. phone services)
- ❖ Hybrid conceptual models are often employed, where different ways of carrying out the same actions is supported at the interface - but can take longer to learn

Conceptual Models: Interaction and Interface

- ❖ Interaction type:
 - ❖ what the user is doing when interacting with a system,
e.g. instructing, talking, browsing or other
- ❖ Interface type:
 - ❖ the kind of interface used to support the mode, e.g.
speech, menu-based, gesture

More Interface Types...

- ◆ Command
- ◆ Speech
- ◆ Data-entry
- ◆ Form fill-in
- ◆ Query
- ◆ Graphical
- ◆ Web
- ◆ Pen
- ◆ Augmented reality
- ◆ Gesture
- ...

Paradigm, Theories, Models and Frameworks

Paradigm

- ❖ Inspiration for a conceptual model
- ❖ General approach adopted by a community for carrying out research
 - ❖ shared assumptions, concepts, values, and practices
 - ❖ e.g. desktop, ubiquitous computing

Examples of New Paradigms

- ❖ Ubiquitous computing (mother of them all)
- ❖ Pervasive computing
- ❖ Wearable computing
- ❖ Tangible bits, augmented reality
- ❖ Attentive environments
- ❖ Transparent computing

...

Theory

- ❖ Explanation of a phenomenon
 - ❖ e.g. information processing that explains how the mind, or some aspect of it, is assumed to work
- ❖ Can help identify factors
 - ❖ e.g. cognitive, social, and affective, relevant to the design and evaluation of interactive products

Models

- ❖ A simplification of an HCI phenomenon
 - ❖ intended to make it easier for designers to predict and evaluate alternative designs
 - ❖ abstracted from a theory coming from a contributing discipline, e.g. psychology, e.g. keystroke model

KLM-GOMS Model

- ◆ K: Keying (키보드 입력 시간) – 0.2초
 - ◆ 키보드에서 키를 누르는데 걸리는 시간. 최근의 연구에 의하면 keystroke는 기술 수준과 과제에 따라 영향을 받는데, 그 범위를 70msec ~ 220msec 정도로 보고, 주로 0.2 초로 계산.
- ◆ P: Pointing (마우스 이동시간) – 1.1초
 - ◆ 화면상에서 특정한 지점을 가리키는데 (pointing) 걸리는 시간. 평균 1100msec 정도가 소요.
- ◆ H: Homing – 0.4초
 - ◆ 사용자의 손을 키보드에서 GID로 혹은 GID에서 키보드로 옮기는데 걸리는 시간.

KLM-GOMS Model

- ◆ B: Mouse Button Click – 0.1초
 - ◆ 마우스 버튼을 누르는데 소요되는 시간
- ◆ M: Mentally Preparing – 1.35초
 - ◆ 정신적 준비 시간. 사용자가 다음 단계로 이행하기 위해 정신적으로 준비하는데 걸리는 시간.
- ◆ R: Responding
 - ◆ 사용자가 입력 후 컴퓨터의 반응을 기다리는 시간

KLM-GOMS Example

♦ GOAL: ICONISE-WINDOW

[select

 GOAL: USE-CLOSE-METHOD

- MOVE-MOUSE-TO-FILE-MENU
- PULL-DOWN-FILE-MENU
- CLICK-OVER-CLOSE-OPTION

 GOAL: USE-CTRL-W-METHOD

 PRESS-CONTROL-W-KEY

]

KLM-GOMS Example

- ♦ compare alternatives:
 - ♦ **USE-CTRL-W-METHOD** vs. **USE-CLOSE-METHOD**
(Windows OS)

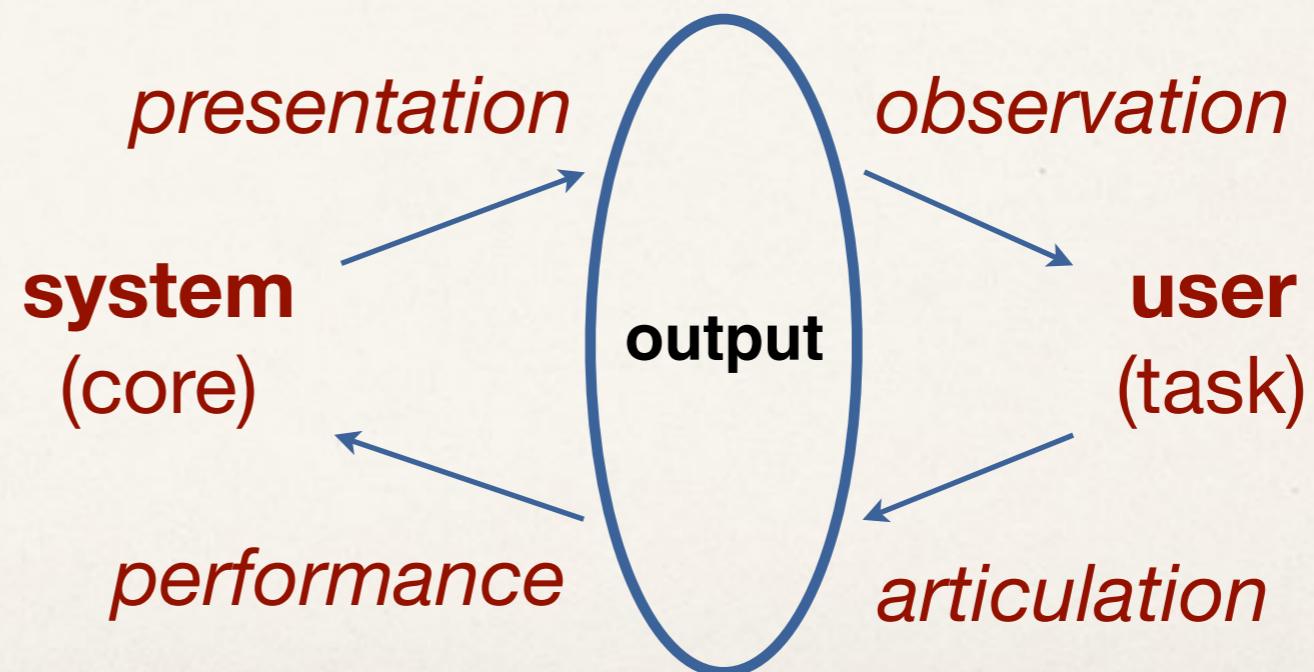
USE-CTRL-W-METHOD		USE-CLOSE-METHOD	
H[to kbd]	0.40	P[to menu]	1.1
M	1.35	B[LEFT down]	0.1
K[ctrlW key]	0.28	M	1.35
		P[to option]	1.1
		B[LEFT up]	0.1
Total	2.03 s	Total	3.75 s

Framework

- ❖ Set of interrelated concepts and/or specific questions for ‘what to look for’
- ❖ Many in interaction design
 - ❖ e.g. Norman’s conceptual models, Benford’s trajectories
- ❖ Provide advice on how to design
 - ❖ e.g. steps, questions, concepts, challenges, principles, tactics and dimensions

Framework of Interaction

- ♦ 4 steps in interaction design
 - ♦ Articulation
 - ♦ Performance
 - ♦ Presentation
 - ♦ Observation



Next Week: Reading Assignments

- ❖ T1: Interaction Design
 - ❖ Chapter 3: Cognitive Aspects
 - ❖ Chapter 6: Interfaces

Next Week: Reading Assignments

- ♦ Grudin, J. (2005). Three faces of human-computer interaction
- ♦ Card, S. & Moran, T. (1986). User technology—
from pointing to pondering
- ♦ Myers, B., Hudson, S. E., & Pausch, R. (2000).
Past, present, and future of user interface
software tools
- ♦ Weiser, M. (1999). The computer for the 21st
century
- ♦ Hollan, J., Hutchins, E., & Kirsh, D. (2000).
Distributed cognition: toward a new foundation for
human-computer interaction research

Next Week: Team Discussion

- ❖ 주제: How HCI shaped/will shape our computing life? (< 1 hour)
 - ❖ 5개의 페이퍼를 읽고 A, B 팀으로 나누어 발제 및 토론
 - ❖ A팀: 발제. 페이퍼당 5분 이내, 발제슬라이드는 3페이지 이내
 - ❖ B팀: 토론 준비

Questions...?
