Software Usability

Course notes for CSI 5122 - University of Ottawa

2023 Deck B:

Core Usability and UX Concepts

Part 1

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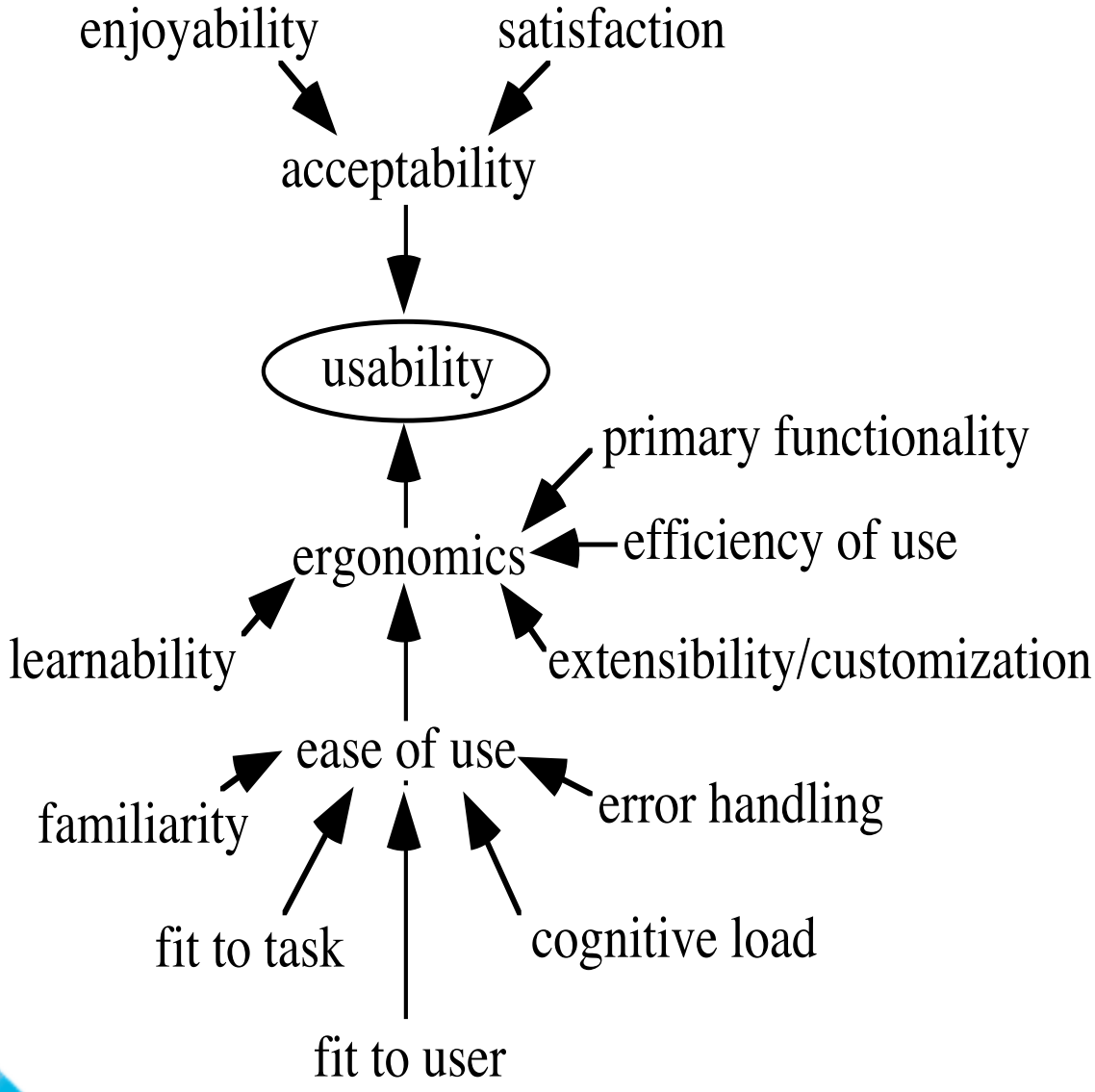
http://www.eecs.uottawa.ca/~tcl/csi5122

A model of factors contributing to UX/usability



User Experience (UX) - 1

UX Goes *beyond usability* focusing on the entire user experience

- Goal: Make the user excited and delighted to use your software
- Just as a person's decision to buy a car is not just about how usable it is to drive, its features, or its cost

Usability is has many *objective* measures, focusing on ease of learning, error rates, speed of working

UX balances objective with *subjective* issues

User Experience (UX) - 2

Beyond, Usability, UX Considers also

- User's 'internal state'
  - —Emotional responses / mood
  - —Motivations / Expectations
  - —Aesthetic sense
  - —Meaningfulness / voluntariness of task
- Visual / auditory design
  - —Making these appealing to users, not just pretty
  - —Content quality (e.g. video production value)
- Work or social context: e.g. business strategy
- Underlying technological ecosystem
- Trends and fashion

Disciplines that contribute to the study and improvement of usability and UX - 1

Cognitive psychology

- Capabilities and limitations of human senses and thought processes

Ergonomics

- Hardware and software efficiency, safety and reliability

Linguistics

- Syntax and semantics of commands
- Speech I/O

Artificial intelligence

- Speech I/O
- Intelligent 'guessing' what the user wants to do
- Knowledge representations of users and tasks

Contributing disciplines - 2

Sociology and social psychology

- Assisting people to work in groups with software
- Ensuring software works in different cultures

Industrial design

- Aesthetics
- Storyboarding etc.

General engineering

- Economic analysis, cost-benefit, alternatives analysis
- Standards-based approaches
- Integration with other qualities

SOME BASIC TERMINOLOGY

Some basic terminology of user interface design and UX - 1

- **Dialog**: A specific window, page or screen region with which a user can interact, but which is not the main one.
- **Control** or **Widget:** Specific components of a user interface.
  —E.g. button, textbox, video display area, clickable link,
- **Microinteraction**: Small near-atomic user interaction (each must be designed with care)
  —E.g. going back to the previous active application
  —E.g., one-click checkout
- **Feature**: A capability that is or can be added to a system, and can be described in a few words
  —Implemented by dialogs, controls, microinteractions.

Some basic terminology of user interface design and UX - 2

- **Affordance**: The set of operations and microinteractions that the user can do at any given point in time.
- **Discoverability**: Ease of which users can figure out the affordance
  —Many touch interactions are hard for users to discover
- **Actor**: A kind of user, each of whom would use different sets of features, and typically have different rights (e.g. administrator, manager, clerk, accountant, customer)
- **Persona**: A typical kind of user, including sample personality traits for whom you should design and test
  —E.g. an eager tech-savvy customer who wants to quickly buy a product
  —E.g. a hesitant senior who doesn't like computers)

Some basic terminology of user interface design and UX - 3

- **Goal**: What the user wants to have achieved when they have finished an interaction or an extended session with the software
  - —e.g. For a student t: to have registered set of courses that will be best for their career
- **Task**: A sequence of steps, including manual steps, needed to achieve a goal.
- **Use case**: A list of steps for one way to use the system to achieve a goal or solve a problem
  - —Steps are done by a user, with the system responding with feedback
- **Journey map**: A graph of many possible paths through the system

Some basic terminology of user interface design and UX - 4

- **State**: A stage in the interaction when the system is displaying certain information in certain widgets, and has a certain affordance.
- **Mode**: A situation in which the UI presents a limited affordance (restricts what the user can do).
- **Modal dialog**: A dialog in which the system is in a very restrictive mode (often just 'OK' and possibly 'Cancel').
- **Feedback**: The *response from the system* whenever the user does something, is called feedback.
- **Encoding techniques**. Ways of encoding information to communicate it to the user (text, images, animation, video, sound, colour, grouping, etc.)

USER-CENTRED DESIGN AND UX DESIGN

User Centered Design

A set of recommended approaches to software UX design that requires us to always think about the end-user's experience

- Initially developed in late 1970s by IBM when developing software for the Olympics
- The term has been declining in use, but is still relevant
- User Experience Design is now a more inclusive term

Tenets of User Experience (UX) Design – 1

- *Understand* your users ideally by creating personas
- Design software based on the understanding of the users' *tasks and personas*
- Ideate and brainstorm with users to generate design alternatives
- Design the user interface following research results, heuristics and guidelines for good usability
- Analyse competing and similar software to borrow good ideas

Tenets of User Experience Design – 2

- Repeatedly prototype, experiment with alternatives and redesign as needed following various types of evaluation
- Build the system in an agile manner; after prototyping create a Minimal Viable Product and gradually add features
- Evaluate in multiple ways: Experiments, think-aloud usability tests, A-B tests, questionnaires, interviews, analytics
- Ensure users are involved in *decision making* processes

Tenets of User Experience Design – 3

- Ensure users have a chance to test *all elements* of the system including tutorial and error handling cases
- Solicit user feedback on the production system and continually improve it
- Set *measurable* objectives for usability and work towards achieving those objectives

NEILSEN'S HEURISTICS

Overview link: https://www.nngroup.com/articles/ten-usability-heuristics/

Neilsen's Heuristic 1: Visibility of System Status

Keep users informed with feedback, quickly

- What will/would happen, and when
- What step of the process are we in
- What just happened

Communicate clearly (requires testing)

NNGroup page:

- https://www.nngroup.com/articles/visibility-system-status/
- Pdf Poster: https://media.nngroup.com/media/articles/attachments/Heuristic_1_compressed.pdf

Neilsen's Heuristic 2:
Match Between System and Real World

Speak the user's language

- Use familiar words/concepts
  - —Users likely won't understand things the way you do
  - —Avoid jargon, technical terms
- Consider the user's mental model

NNGroup page:

- https://www.nngroup.com/articles/match-system-real-world/
- Pdf Poster: https://media.nngroup.com/media/articles/attachments/Heuristic_2_compressed.pdf

Neilsen's Heuristic 3:
User Control and Freedom

Provide exits

- Cancel button, active back button, (sometimes escape key)

Provide and undo/redo (multi-level)

- Help people feel confident to explore and recover from errors

Make these discoverable and ideally visible!

NNGroup page:

- https://www.nngroup.com/articles/user-control-and-freedom/
- Pdf Poster: https://media.nngroup.com/media/articles/attachments/Heuristic_3_compressed.pdf

Neilsen's Heuristic 4: Consistency and Standards

UI elements should behave the same

- As in other applications
- Especially within your application suite

Meet users' expectations

Follow standards such as

- W3C Standards: https://www.w3.org/standards/
- Platform standards, e.g. Apple
  https://developer.apple.com/design/human-interface-guidelines/

NN group

- https://www.nngroup.com/articles/consistency-and-standards/
- https://media.nngroup.com/media/articles/attachments/Heuristic_4_compressed.pdf

Neilsen's Heuristic 5:
Error Prevention

Remove memory burden

Provide clues, constraints, defaults, and tolerant input

- e.g. any data or phone number format,

Slips: Unconscious errors caused by inattention

Mistakes: Conscious errors caused by confusion

Focus on high-cost errors first

NNGroup page:

- https://www.nngroup.com/articles/slips/
- Pdf Poster:
  https://media.nngroup.com/media/articles/attachments/Heuristic_5_compressed.pdf

Neilsen's Heuristic 6: Recognition Rather than Recall

Provide menus and comparison tables

Show people where they came from

Shortcut keys are good, command-lines can be useful

- but provide tips to remind people

Provide in-context help

- People can't remember a long tutorials

NNGroup page:

- https://www.nngroup.com/articles/recognition-and-recall/
- Pdf Poster: https://media.nngroup.com/media/articles/attachments/Heuristic_6_compressed.pdf

Neilsen's Heuristic 7:
Flexibility and Efficiency of Use

Provide shortcuts

- Especially for experts (hotkeys, macros)

Allow customization

Find ways to reduce the number of steps for time-consuming tasks

- E.g. automatically jumping and populating the next step

Ensure response time is excellent (more later)

NNGroup page:

- https://www.nngroup.com/articles/flexibility-efficiency-heuristic/
- Pdf Poster: https://media.nngroup.com/media/articles/attachments/NNg_Jakob's_Usability_Heuristic_7.pdf

Neilsen's Heuristic 8: Aesthetic and Minimalist Design

Focus on essentials

- Ask: what would it be like if we
  - —Left this out
  - —Left it to later
  - —Put this somewhere else

Focus on the user's primary goals

Get help from artists and graphic designers

(New) NNGroup:

https://www.nngroup.com/articles/aesthetic-minimalist-design/

Neilsen's Heuristic 9: Help Users Recognize, Diagnose, & Recover From Errors

Make error messages clear and useful

- Short
- Easy to see
- Ensure they immediately appear
- Highlight the problematic data
- Use simple language
- Give a link to help
- Give suggestions for solutions (even 1-click)

Umple Case study

And remember the Excel example?

Neilsen's Heuristic 10:
Provide Good Help and Documentation

In-line help

- Provide hover tips, new user suggestions, etc.

User manuals

- Provide videos, diagrams, examples, links, direct operation
- Group topics
- Provide good search, including in-document search

Reactive: When a user has a problem

Proactive: When a user wants to learn (more)

NNGroup page:

- https://www.nngroup.com/articles/help-and-documentation/
- Pdf Poster: https://media.nngroup.com/media/articles/attachments/NNg_Jakob's_Usability_Heuristic_10.pdf

MICROINTERACTIONS

Microinteractions

Trigger -> Rules -> Feedback -> Loops and Modes

Central to detailed UX design

A way to think about how the user will use each part of your system

Microinteractions: Triggers

Trigger -> Rules -> Feedback -> Loops and Modes

Triggers:

- **Explicit**: Clicking, touching, hard/long touch, typing
- **Moving**: Hovering, dragging
- **Voice, Sounds**
- **Gestures**: Specific movements
- **Event driven**: Arrival of email (alert), geofencing, social media mention, alarm, timer, certain data detected

Microinteractions: Rules

Trigger -> Rules -> Feedback -> Loops and Modes

Limiting the users actions

- Validation of data (e.g. password rules)
- Business rules (e.g. can't send money if balance < amount)
- Constraints on taking the next action (e.g. wait for approval)

The system taking proactive action

- E.g. expanding a search to search for synonyms

Sequence and timing of actions

Microinteractions: Feedback

Trigger -> Rules -> Feedback -> Loops and Modes

People have been known to smash machines in anger due to lack of feedback

Give feedback after

- A manual trigger
- When the user is constrained by a rule
- When the affordance or mode changes
- When an operation is ongoing slowly or completes

Options: Text, images, animations, audio (e.g. earcons), haptics (vibrations).

Microinteractions: Loops and Modes

Trigger -> Rules -> Feedback -> Loops and Modes

What happens when people **loop back to the same place, repeat something, need confirmation, etc.**

- E.g.Trying again after something didn't work
- E.g. 'Find next'
- E.g. 'Narrow search', 'broaden search'
- E.g. Make use of data in copy buffer, most recent message
- E.g. Use location info to do different things
- E.g. Play next episode automatically
- E.g. Remember login? Log in automatically?
- E.g. Pay with the same (or different) card
- E.g. 'Always/never notify me of this?'

Microinteraction case studies 1

We will look at these live, in class, through examples and discuss

App interaction in a phone

- How to get to the home page
- How to search
  - —Web, for app, in app, etc.
- How to organize apps
- Default interactions on apps (long press)
- How to get back to other running apps
- How to control key phone features
- How to bring up preferences for each app
  - —E.g. in Siri ‘open preferences’

Microinteraction case study 2

Map applications (Google vs. Apple)

Microinteraction case studies 3

Registering and logging in (numerous possibilities)

- Where are the buttons?
- What information is required
- Options for logging in with social media?
- Options for 2-factor
- Options for remembering login
- Options for working with password managers
- Specifying password: Feedback on strength?

Microinteraction case studies 4

Making payments on various devices

- Point of sale payments
  - —Apple/Google/Samsung pay Vs. card tap. Vs PIN
  - —Need to confirm amount? How to tip?
  - —Gas station payments (dongle / app)

- E-Commerce payments on phones and computers

Microinteraction case study 5

Email programs

- Setting up rules for saving messages
- Suggestion of text, senders, etc.
- Hiding, showing of senders
- Dealing with Spam

A good website with Microinteraction examples

http://littlebigdetails.com

More source material

http://microinteractions.com

More motivational examples

UOCampus system

- Professor's page
- Processing service requests

DOING A GOOD PRESENTATION

Presentations and Videos for Assignment 3: Tips and marking scheme - 1

25% Quality of slides (or other A/V elements).

- Use large fonts (20 point or higher) and point form.
- Use diagrams, tables etc. if possible.
- Each slide should have about 7-15 lines of text, or a graphic.
- Avoid more than about 7 'chunks' in a list
  —Use subheadings as on this page
- Each point should take no more than 2 lines.

25% Organization of material presented

- Did you provide enough background (but not too much)?
- Did you explain the method or study design (if appropriate)?
- Did you show interesting data (e.g. ?
- Did you show conclusions?

Presentations and videos marking scheme - 2

25% Delivery

- Pacing (e.g. 1 slide/screenshot every 1-5 minutes; explaining well but not too fast or too slow)
- Speaking clearly
- Avoiding reading what is written
- Leaving time for questions (for a presentation)
- Handling of questions (for a presentation)
- (For a blog post: 25% is for writing style)

25% Interestingness and information content

- Amount the class would have learned.
- You will not get good marks if you repeat material from lectures or state obvious things