

Lecture 4, Part 1

Interaction Design

UNIVERSITY OF AUCKLAND

COMPSCI 705 / SOFTENG 702

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Notes from:

The UX Book - Agile UX Design for a Quality User Experience, Chapter 17

Interaction Design (2002) Wiley

<https://www.nngroup.com/articles/first-principles-interaction-design/>

Learning Objectives

- Understand aspects of Interaction Design
- Consider principles of Interaction Design

What is Interaction Design?

- Contrast to
 - Software Engineering
 - Computer Science

“the design of spaces for human communication and interaction”
Winograd 1997

Designing for Interaction Needs

- Supporting tasks
 - How the user interacts with the ecology of systems
 - Displays
 - Controls
 - Sensory, cognitive and physical actions
- Different devices need different interaction designs
 - Different form factors
 - Different usage conventions
 - Different constraints
 - Different capabilities



Schipor et al. 2019

Usability aspects

- Effective to use (effectiveness)
- Efficient to use (efficiency)
- Safe to use (safety)
- Having good utility (usefulness)
- Easy to learn (Learnability)
- Easy to remember how to use (memorability)

User Experience aspects

- Satisfying
- Enjoyable
- Fun
- Entertaining
- Helpful
- Motivating
- Aesthetically pleasing
- Supportive of creativity
- Rewarding
- Emotionally fulfilling

Design Principles

- Visibility
- Feedback
- Constraints
- Mapping
- Consistency
- Affordance

- Heuristic evaluation
 - Nielsen's 10 heuristics

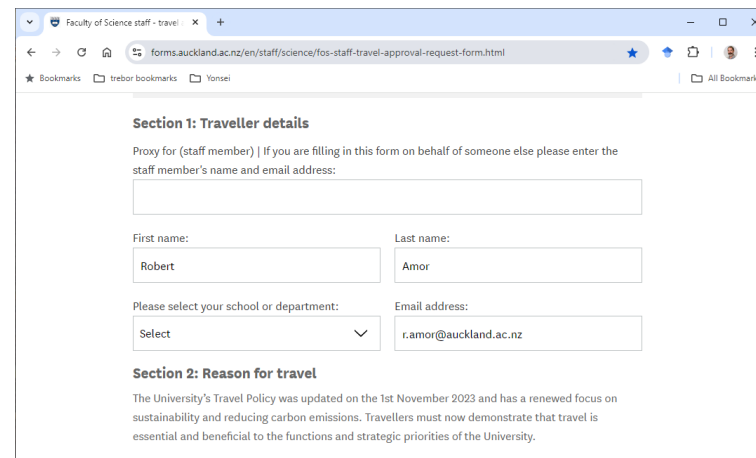
Principles of Interaction Design

■ Aesthetics

- Aesthetic design should be left to those schooled and skilled in its application: Graphic/visual designers
- Fashion should never trump usability
- User test the visual design as thoroughly as the behavioral design

■ Anticipation

- Bring to the user all the information and tools needed for each step of the process



The screenshot shows a web browser window displaying a form titled 'Faculty of Science staff - travel'. The form is divided into two sections. Section 1, 'Traveller details', includes a proxy field, first and last name fields (filled with 'Robert' and 'Amor'), a dropdown for school/department (set to 'Select'), and an email address field (filled with 'r.amor@auckland.ac.nz'). Section 2, 'Reason for travel', contains a paragraph of text about the university's travel policy update on November 1st, 2023, emphasizing sustainability and carbon emissions.

Principles of Interaction Design

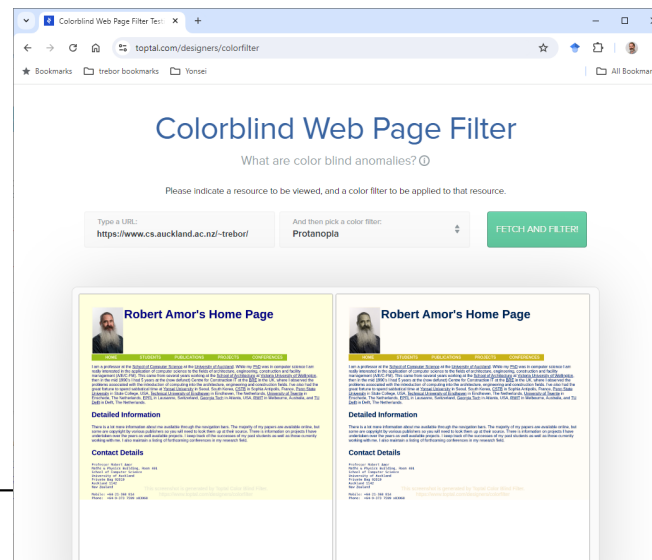
■ Autonomy

- The computer, interface, and task environment all “belong” to the user, but user-autonomy doesn’t mean we abandon rules
- Enable users to make their own decisions, even ones aesthetically poor or behaviorally less efficient
- Exercise responsible control
- Use status mechanisms to keep users aware and informed
- Keep status information up to date and within easy view
- Ensure status information is accurate

Principles of Interaction Design

■ Color

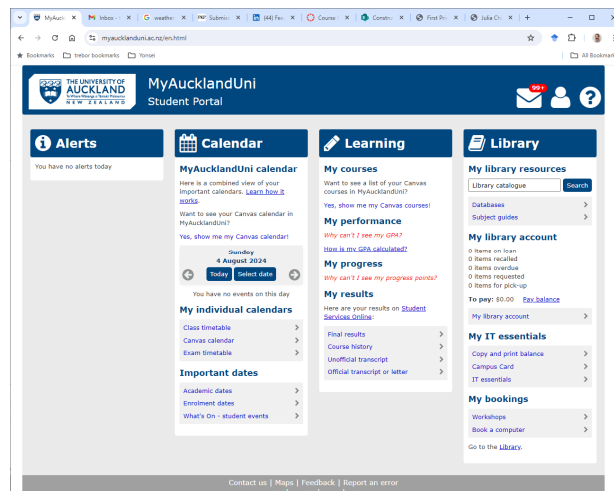
- Any time you use color to convey information in the interface, you should also use clear, secondary cues to convey the information to those who cannot see the colors presented
- Test your site to see what color-blind individuals see
- Do not avoid color in the interface just because not every user can see every color
- Do not strip away or overwhelm color cues in the interface because of a passing graphic-design fad



Principles of Interaction Design

■ Consistency

- The importance of maintaining strict consistency varies by level
- It is just important to be visually inconsistent when things act differently as it is to be visually consistent when things act the same
- Over time, strive for continuity, not consistency
- “The most important consistency is consistency with user expectations”—William Buxton



Principles of Interaction Design

■ Defaults

- Defaults within fields should be easy to “blow away”
- Defaults should be “intelligent” and responsive
- Replace the word “default” with a more meaningful and responsive term
- Both your vocabulary and visual design must communicate the scope of a reversion

The screenshot shows a web browser window with the address bar displaying 'forms.auckland.ac.nz/en/staff/science/fos-staff-travel-approval-request-form.html'. The page content is divided into two sections:

Section 1: Traveller details

Proxy for (staff member) | If you are filling in this form on behalf of someone else please enter the staff member's name and email address:

First name: Robert

Last name: Amor

Please select your school or department: Select

Email address: r.amor@auckland.ac.nz

Section 2: Reason for travel

The University's Travel Policy was updated on the 1st November 2023 and has a renewed focus on sustainability and reducing carbon emissions. Travellers must now demonstrate that travel is essential and beneficial to the functions and strategic priorities of the University.

Principles of Interaction Design

■ Discoverability

- Any attempt to hide complexity will serve to increase it
- If you choose to hide complexity, do so in the showroom only
- If the user cannot find it, it does not exist
- Controls and other objects necessary for the successful use of software should be visibly accessible at all times
- There is no “elegance” exception to discoverability
- With the exception of small mobile devices, controls do not belong in the middle of the content area
- Communicate your gestural vocabulary with visual diagrams
- Strive for Balance
- User-test for discoverability

Principles of Interaction Design

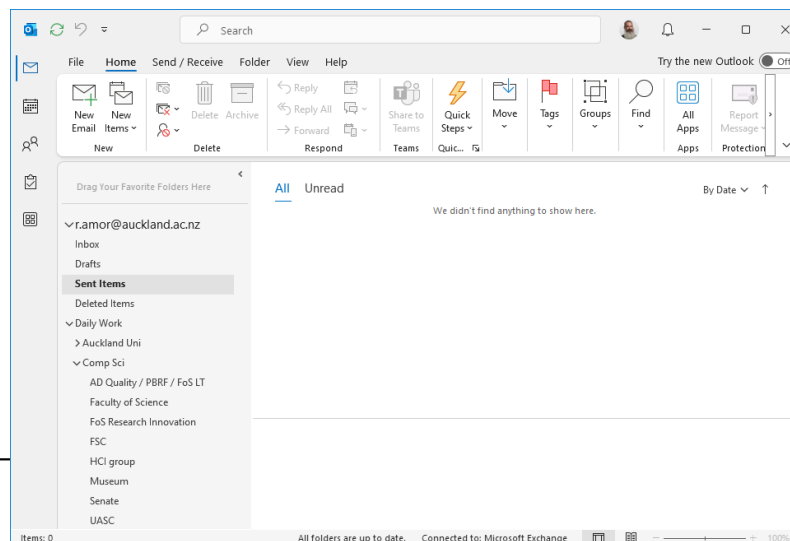
- Efficiency of the User

- Look at the user's productivity, not the computer's
- Keep the user occupied
- To maximize the efficiency of a business or other organization you must maximize everyone's efficiency, not just the efficiency of the IT department or a similar group
- The great efficiency breakthroughs in software are to be found in the fundamental architecture of the system, not in the surface design of the interface
- Error messages should actually help

Principles of Interaction Design

■ Explorable Interfaces

- Give users well-marked roads and landmarks, then let them shift into four-wheel drive
- Sometimes you do have to provide deep ruts
- Offer users stable perceptual cues for a sense of “home”
- Make Actions reversible
- Always allow “Undo”
- Always allow a way out
- Make it easy and attractive to stay in



Principles of Interaction Design


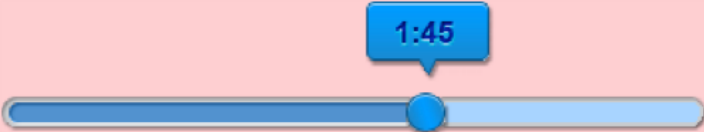
■ Human Interface Objects

- Human-interface objects can be seen, heard, felt, or otherwise perceived
- Human-interface objects have a standard way of being manipulated
- Human-interface objects have standard resulting behaviors
- Human-interface objects should be understandable, self-consistent, and stable
- Use a new object when you want a user to interact with it in a different way or when it will result in different behavior

Principles of Interaction Design

■ Latency Reduction

- Reduce the user's experience of latency
- Keep users informed when they face delay

Expected Delay	Indication
1/2 to 2 seconds	Use animated mouse cursor or other "busy" indicator 
> 2 seconds	Tell them potential length of wait
> 5 seconds	Use an animated progress indicator  Process must end by the time indicator is full!
> 10 seconds	Keep users a) informed & b) entertained
> 15 seconds	Same as >10 plus add at end a noticeable sound & strong visual indication so users know to return

- Make it faster to begin with

Principles of Interaction Design

- Learnability
 - Limit the Trade-Offs (e.g., to usability)
 - Avoid only testing for learnability

- Use of Metaphors
 - Choose metaphors that will enable users to instantly grasp the finest details of the conceptual model
 - Bring metaphors “alive” by appealing to people’s perceptions—sight, sound, touch, and proprioception/kinesthesia—as well as triggering their memories
 - Expand beyond literal interpretation of real-world counterparts
 - If a metaphor is holding you back, abandon it

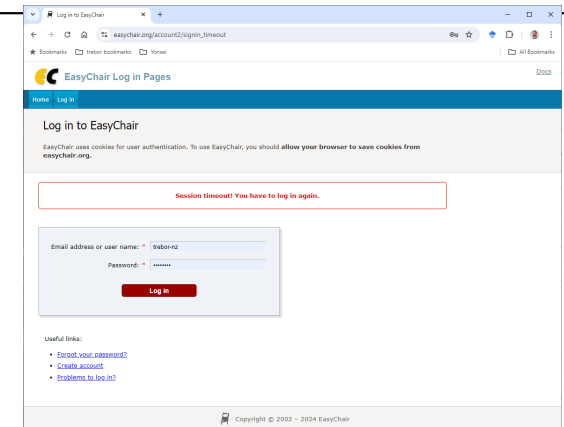
Principles of Interaction Design

■ Protect Users' Work

- Ensure that users never lose their work

■ Readability

- Text that must be read should have high contrast
- Use font sizes that are large enough to be readable on standard displays
- Favor particularly large characters for the actual data you intend to display, as opposed to labels and instructions
- Menu and button labels should have the key word(s) first, forming unique labels
- Test all designs on your oldest expected user population
- There's often an inverse relationship between the "prettiness" of a font and its readability



Principles of Interaction Design

■ Simplicity

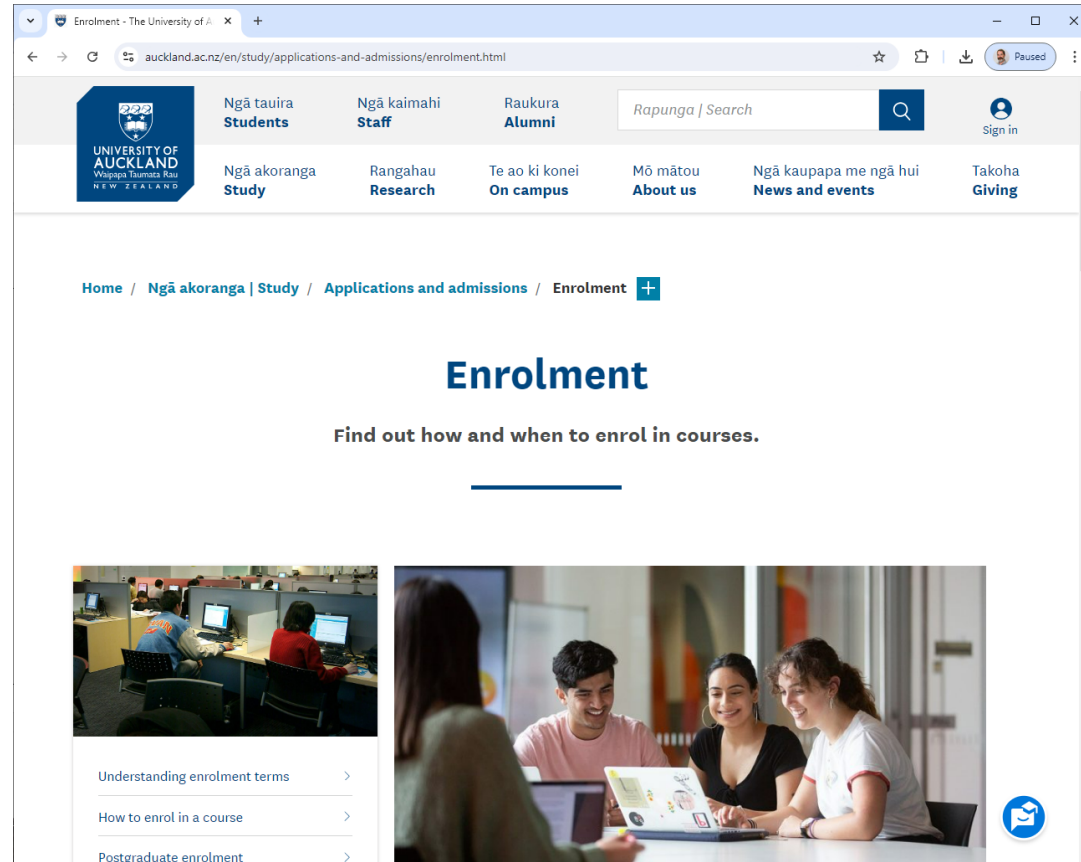
- Balance ease of installation vs. ease of use
- Avoid the “Illusion of Simplicity”
- Use Progressive Revelation to flatten the learning curve
- Do not simplify by eliminating necessary capabilities

■ State

- Because many of our browser-based products exist in a stateless environment, we have the responsibility to track state as needed
- State information should be stored in encrypted form on the server when they log off
- Make clear what you will store and protect the user’s information

Principles of Interaction Design

- Visible Navigation
 - Make navigation visible
 - Limit screen counts by using overlays



Sources

- R. Hartson, P. Pyla, "UX Book - Agile UX Design for a Quality User Experience (2nd Edition)," Elsevier, 2019, retrieved from <https://app.knovel.com/hotlink/toc/id:kpUXBAUXD2/ux-book-agile-ux-design/ux-book-agile-ux-design>
- B. Tognazzini, "First Principles of Interaction Design," 2014, last accessed 16/8/2020, <https://www.nngroup.com/articles/first-principles-interaction-design/>
- T. Winograd, "From computing machinery to interaction design", in P. Denning and R. Metcalfe (eds) Beyond Calculation: the Next Fifty Years of Computing. Springer-Verlag, 149-162, 1997.