

Comp 341/441 - HCI

Spring Semester 2020 - Week 4

Dr Nick Hayward

Project outline & mockup assessment

Course total = 15%

- begin outline and design of group project
- design a new or re-imagined UI and UX for a chosen application or device
- outline concept, research conducted to date
- consider applicable design patterns
- mockups, designs, paper prototypes...
 - *demo current designs, concepts, and mockups*
 - *any working tests or models...*

Project mockup demo

Assessment will include the following:

- brief presentation or demonstration of current project work
 - *~ 5 to 10 minutes per group*
 - *analysis of work conducted so far*
 - *presentation and demonstration*
 - outline current state of app concept and design
 - show mockups, designs, &c.
 - *due Wednesday 12th February 2020 @ 7pm*

Users & Mental Models

interface concepts, syntax, general rules...

- application is designed to solve a problem or meet a specific requirement
- syntax and rules required known as either
 - *application domain, business domain, or problem domain*
- problem domain may actually be pretty small
- user may only need to know a handful of concepts
- more complex and involved applications can be designed with inherent assumption of
 - *experience and prior-knowledge*
 - *a thorough understanding and awareness of required domain*
- awareness of problem domain gained via
 - *education, training, experience...*
- other applications may need to communicate and highlight their domain's concepts
 - *games, e.g. role-playing and fantasy, often seen as extreme example*
- simpler games also require adaptation to their domain's objects, goals...

Users & Mental Models

interface concepts, syntax, general rules...cont'd

- many scenarios only require a user's cursory understanding of an application
 - *e.g. users may not need to know about URLs to use a web browser*
- semi-automated apps following pre-defined paths reduce user learning curve
 - *online ticket sites, package delivery...*
- many complex applications, e.g. MS Word, still allow a user to get started quickly
 - *users may be unaware, or even care, about advanced options*
 - *learning can be built upon initial, cursory understanding and usage*

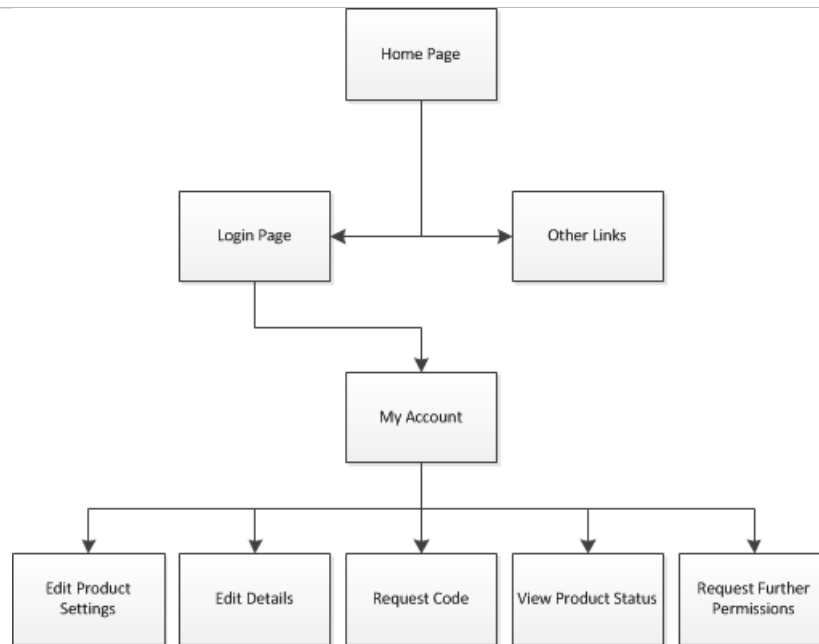
Users & Mental Models

navigation map

- many applications include the notion of places
 - *pages, screens, tabs, windows...*
- a navigation map will be formed by a user
 - *allows a user to differentiate between these places*
 - *return quickly to common places*
- navigation becomes a regular action for users in applications
- maps often applied to comparative applications
 - *expectation of similar usage and interaction*
- multiple options for same location
 - *users may not always be aware of competing routes*
 - *preferred routes often take precedence*

Image - Navigation Map

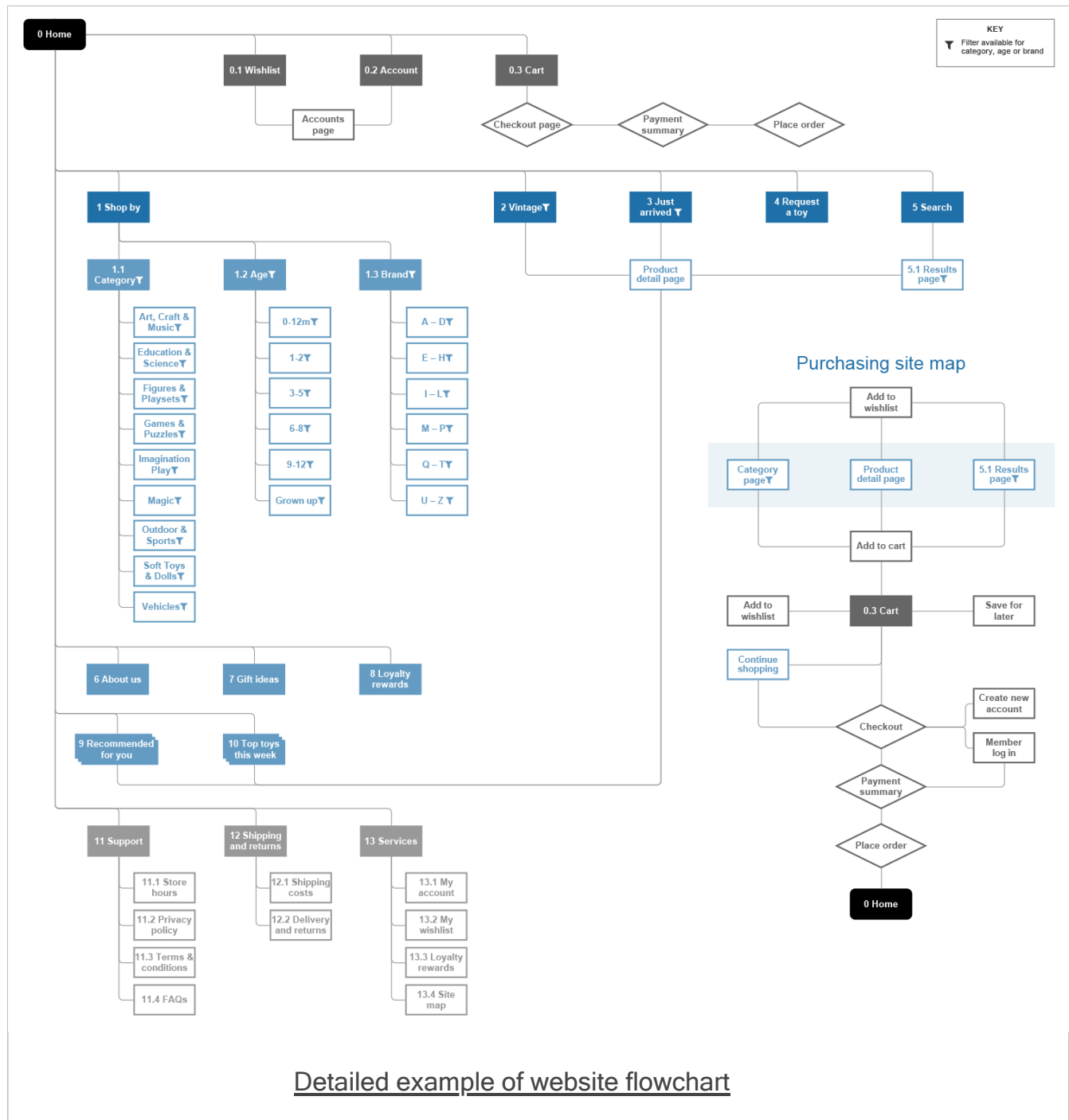
simple website example



Simple example of website flowchart

Image - Navigation Map

detailed website example



Video - Navigation Map

Planning a site design

Designing a website - Episode 1: Planning & site map!



Source: Designing a website - YouTube

Users & Mental Models

plans & strategies for accomplishing tasks & reacting to problems...

- users often memorise plans of action for given tasks
- an action plan might reflect a simple sequence of required user steps
- a more experienced user may internalise a required conceptual structure
 - *this mental depiction may not be complete or accurate*
- user may not be aware of why a sequence works or not
 - *simply memorised the sequence*
- taught users may know how but not why
- success by trial and error

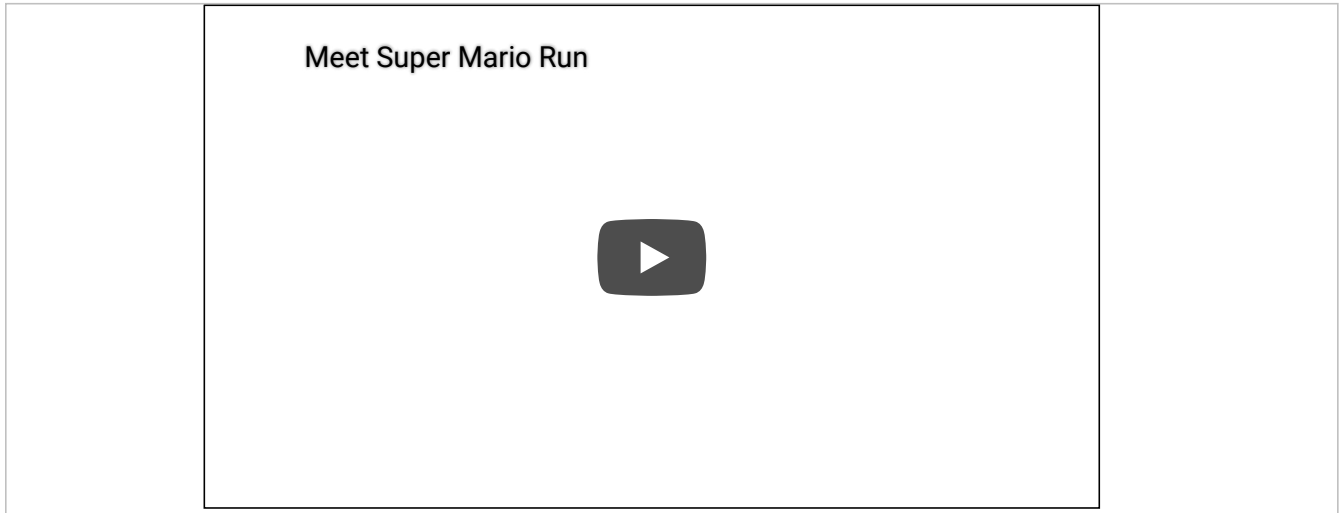
Users & Mental Models

heuristics, conventions...

- general heuristics may be included in a user's mental model
 - *rule of thumb style guidelines*
 - *other conventions acquired from a broader context*
- learned and added from experience
- subsequently applied to a given system
- common UI elements between disparate applications
 - *application and operating system*
 - *allows a user to infer interaction patterns for an application*

Video - Mobile Gaming

Meet Super Mario Run



Source - YouTube

Users & Mental Models

perception of application's implementation model

- users infer patterns for behaviour within an application
- an application's code and implementation will often remain hidden to a user
- does not prevent a user from recognising usage patterns
 - *not always a bad thing for an application*
 - *such patterns can be beneficial for a designer*
- content output and rendering a good example of pattern forming
 - *user adds content to table*
 - *notices data added to top*
 - *infers table output pattern*

Users & Mental Models

communicating a mental model

- mental models are also part of the initial design process
- designers naturally form a conceptual mental model for our own application
- our goal is to ensure a user's mental model matches our own
- we can provide structured learning and education
 - *documentation, training, demos...*
- many users may not read the documentation or follow tutorials
- many users still rely on trial and error

Users & Mental Models

communicating a mental model...cont'd

- visual presentation of UI provides cues and guidance to users
 - *how to complete actions and tasks*
- application behaviour provides feedback to the user
 - *whether those actions and tasks have been successful or not*
- hoped that as a user develops familiarity with an application's UI
 - *their mental model will more closely approximate the designers*
- Don Norman refers to the **design model** and **user's model**
 - *refers to product's interface as **system image***
- design model and system image need to align

Video

Hyperlinking

How the hyperlink changed everything | Small Thing Big Ide...



TED: How the hyperlink changed everything

Source - YouTube

Users & Mental Models

a few questions

Q: Choose one of your products, again good or bad, and think of the **user model** that you have developed for this interface?

Q: What influenced the development of that **user model**? For example, was it good or bad design, interaction options, previous experience with similar product interfaces, and so on.

Q: Did further training or experience modify that **user model**? How and why?

Human memory

intro

- context in user interaction is important
 - *helps establish an application in a user's short-term memory*
- predominant models for human memory include
 - *short-term or working memory*
 - *long-term memory*
- inter-related structural nature of working and long-term memory

Human memory

short-term, working memory

- conceptually similar to a temporary memory store
- able to hold a limited amount of data
 - *might include words, numbers, symbols...*
 - *related to current user task*
- working memory decays quickly & often lost
 - *we lose focus, switch to another task...*
- rehearsal and repetition of a given task is useful prevention
 - *helps us maintain useful or important information*
- capacity of working memory
 - *“seven, plus or minus two”*
 - *Miller, G. A. “The magical number seven, plus or minus two: Some limits on our capacity for processing information.” 1956.*
- 7 numbers for North American local dialling
- harder for most people to hold more than about 7 digits...

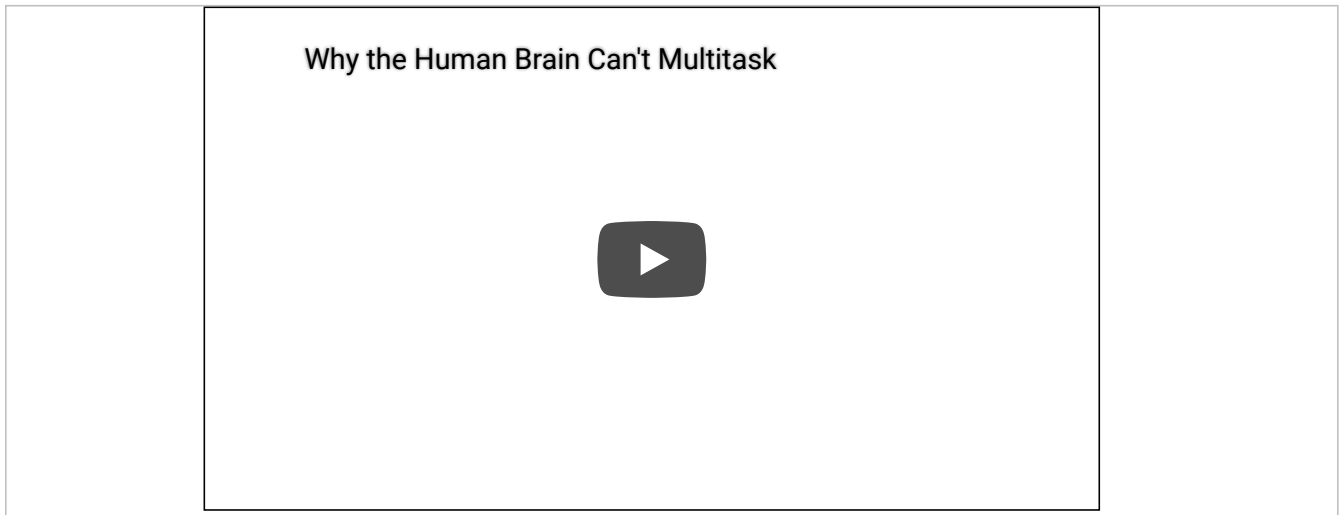
Human memory

changing limited capacity in working memory

- free up working memory to replay and rehearse new information
- compare with computer memory, and related performance without free memory
- learning is naturally reduced and slows down
- a good example of this is mental arithmetic
- difficult to hold even limited amounts of information and process effectively
- burden on working memory is known as 'cognitive load'
- reduction of cognitive load fosters learning by freeing working memory

Video - Human memory

working memory - why the brain can't multitask



Source - YouTube

Human memory

long-term memory

- more permanent, persistent store
- allows us to save and recall knowledge, memories at a later date
- store any facts, both good and bad
- also stores procedures and skills
 - *both cognitive and sensory-motor tasks related*
- also permanent memory store
 - *some data will naturally degrade or deteriorate over time*
- may experience some sense of false recall
 - *memory items become confused or combined irregularly*

Human memory

the very act of memorisation

- the act of intentionally committing something from short-term to long-term memory
- normally achieved through repetition
 - *more frequent we encounter something, more likely we are to remember*
- eg: studying involves actively & intentionally re-reading, rehearsing & practicing
- also need to be able to store other long-term data
 - *important, novel, surprising, and unusual information without repetition*
- exact nature of how this works still remains largely unknown
- such memories are believed to be stored symbolically
- we may not retain exact copy of event or material
 - *instead we create symbolic hooks to allow easier recall of data*

Human memory

memory storage and recall

- tend to store information in logical groupings
- psychologists refer to this as **chunks**
- memory most effective when **chunks** are related
 - *these are logical connections or relationships*
- eg: association between a person and related information
 - *their face and name*
 - *their job title and name*
 - *family or colleague associations...*

Human memory

memory recognition and recall

- recall of information, events etc normally triggered by a prompt or cue
 - *eg: recognising someone in a crowd may trigger recall of their name...*
- more recent information tends to lead to better recall
 - *known as recency effect*
- often easier to recall related information as well
- poor, fractured recall shows imperfect nature of long-term memory
- often recall hazy or false data from long-term memory

Video - Human Memory

How memories form and how we lose them - Catharine Yo...



TED-Ed: How memories form and how we lose them

Source - TED-Ed - How memories form and how we lose them - YouTube

Image - Human memory

a test of memory and recall



a test of memory and recall...

Human memory

retrieval and transfer of new knowledge and skills

- not sufficient to simply add new knowledge to long-term memory
 - *new knowledge needs to be easily retrieved in context*
- retrieval of new skills essential for successful transfer of knowledge and experience
- knowledge successfully stored in long-term memory
 - *no use unless we may successfully recall later, as required*
- interface design necessarily needs to incorporate context to help retrieval
 - *examples and practice exercises*

Human memory

retrieval and mnemonics

- interface design necessarily needs to incorporate context to help retrieval
 - *examples and practice exercises*
 - *simple mnemonics as a child*
- mnemonics to help with easier recall
 - *e.g. N.E.C.E.S.S.A.R.Y, SOHCAHTOA*
- might ask users to apply their new knowledge relevant to actual scenarios
 - *job learning and training scenarios, role play, troubleshooting exercises...*
- often see this example within games or education applications
 - *a skill is demonstrated and then the user is asked to practice*
 - *before moving on to the main application or game*
- link or hook new knowledge to long-term memory

Video - Human memory

Sherlock Holmes' Mind Palace trick



Source - Critical Commons

Resources

- Card, S.K., Moran, T.P. and Newell, A. *The psychology of human-computer interaction*. Lawrence Erlbaum Associates. 1983.
- Krug, S. *Don't make me think, revisited: A common sense approach to web usability*. 3rd Edition. New Riders. 2014.
- Miller, G. A. *The magical number seven, plus or minus two: Some limits on our capacity for processing information..* Psychological Review, Vol. 63, Issue 2. PP. 81-97. 1956.
- Norman, D. *The Design of Everyday Things*. Basic Books. 2013.