

User Interface Design

COMP1650

User-Centred Design

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Learning Outcomes

The activities and content in this lecture are linked to the learning outcome

- B. Demonstrate an awareness of human-computer interface standards and guidelines;
- C. Apply the principles, concepts and models of user-centred design methods to the development and evaluation of interactive system interfaces;

- User-Centred Design is a framework of iterative processes that puts the User at the Centre of all design decisions.





“User-centered design means working with your users all throughout the project.”

Don Norman

User-Centred Design

“User-Centred Design (UCD) is the process of designing a tool, such as a website’s or application’s user interface, from the perspective of how it will be understood and used by a human user. ”

[Usability First](#)

Design and Implementation

“designing the right thing” (design process) and "designing the thing right" (implementation process) (Boehm, 1981)

- Design and Implementation processes require thoughtful integration
- Project teams need to have design and development competencies to develop successful products

Integration of user centred design activities with other lifecycle models

- Try to keep software development and design in two separate tracks
- Maintain a coherent vision for User- Centred Design
- Integrate with agile methods
- Do user research!

Contexts for User-Centred Design

- Web Sites and Applications
- Mobile Applications
- Games
- Smart Home devices (e.g. [Nest Thermostat](#), [Philips Hue Lights](#)) and Internet of Things applications
- In car-entertainment systems
- Wearables (Smart watch, fitness bands etc.)
- Interactive Art Installations
- Collaborative Systems
- Interactive TV
- Social Media

User Centred Design

Three UCD core principles:

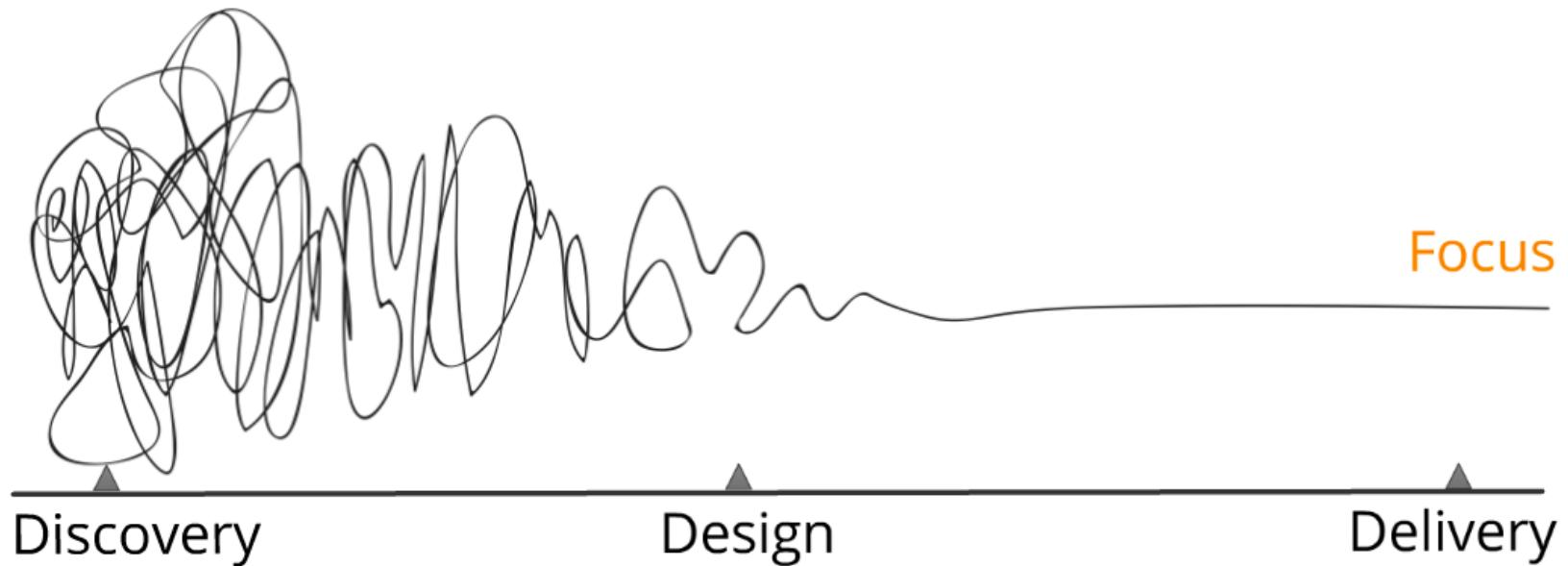
1. Focus early in the design process on users and their tasks. You need to understand them by directly studying their cognitive, behavioural, physical and attitudinal characteristics.
2. Measure users' reactions and performance to scenarios (early in lifecycle) and prototypes (later in lifecycle). These observations should be recorded and analysed.
3. Design iteratively: when problems are found in user testing, fix them and carry out more research and prototyping

UCD: Design Process

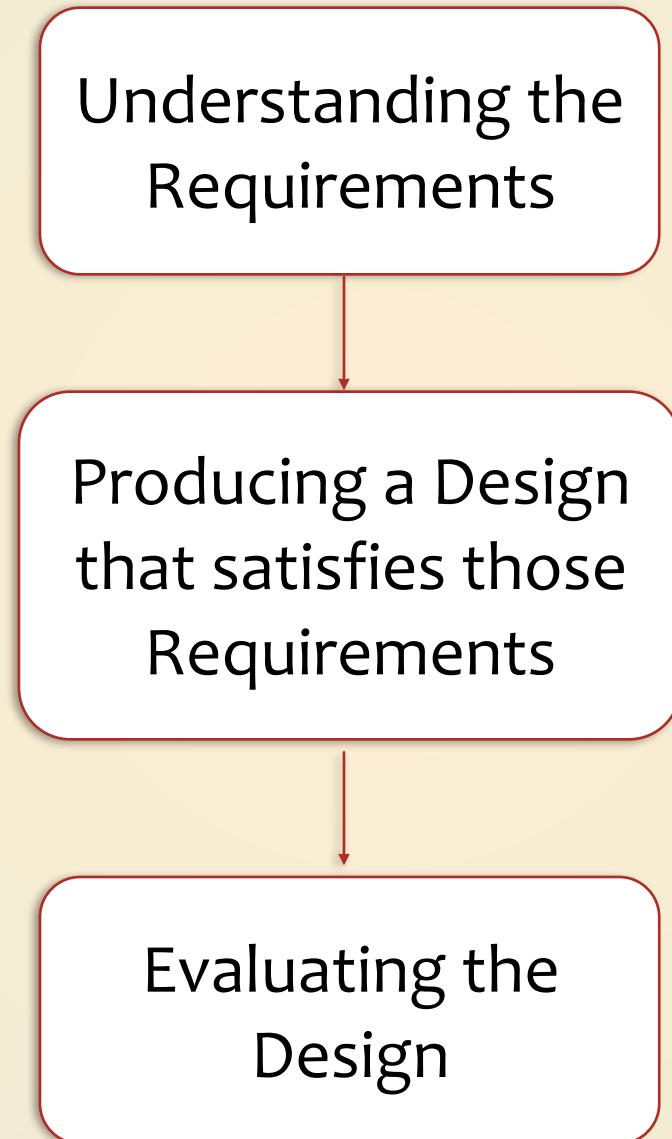
Uncertainty



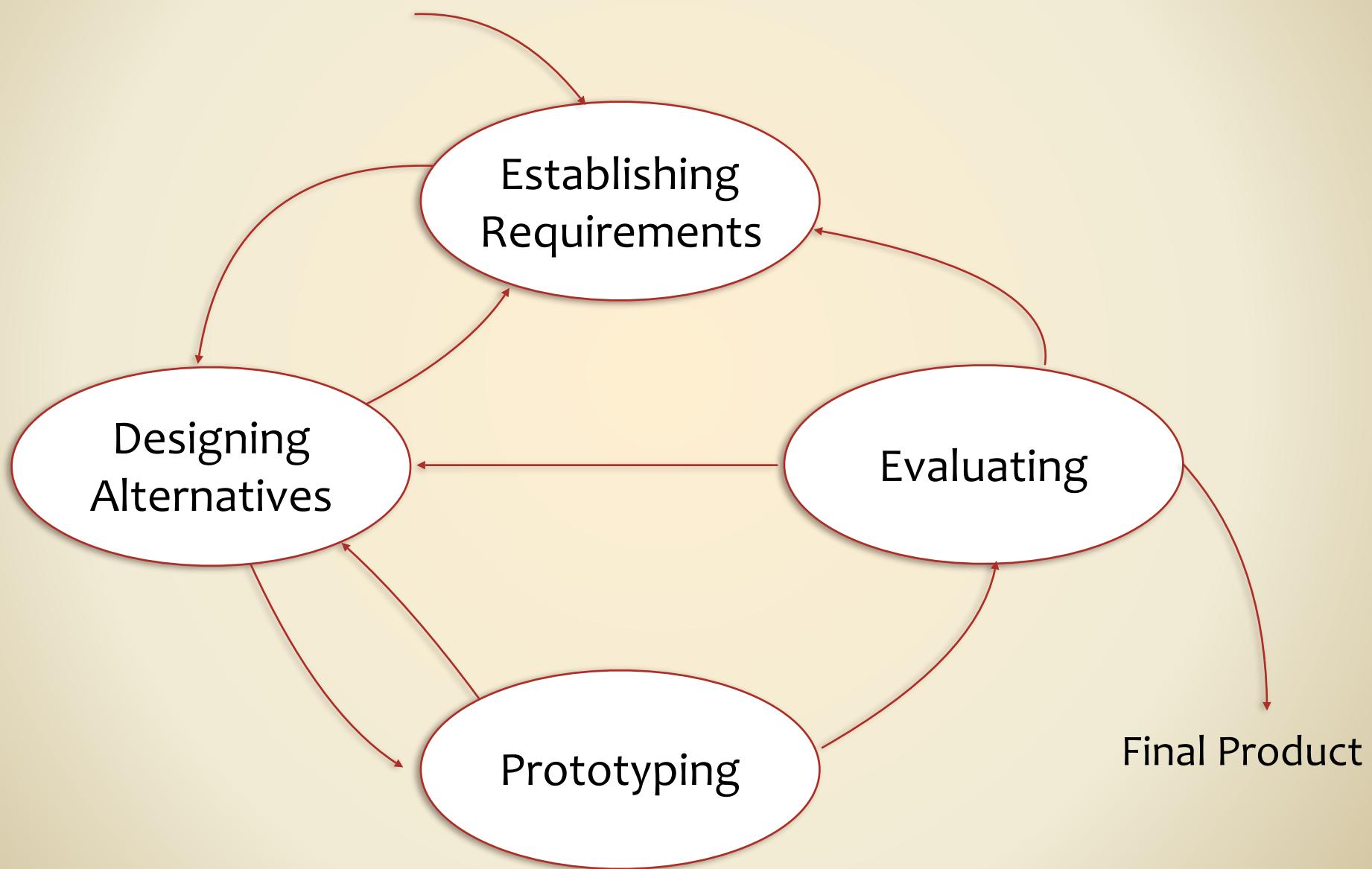
Damien Newman



User-Centred Design Process



User Centred Design Lifecycle



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



A framework for analysing a problem space

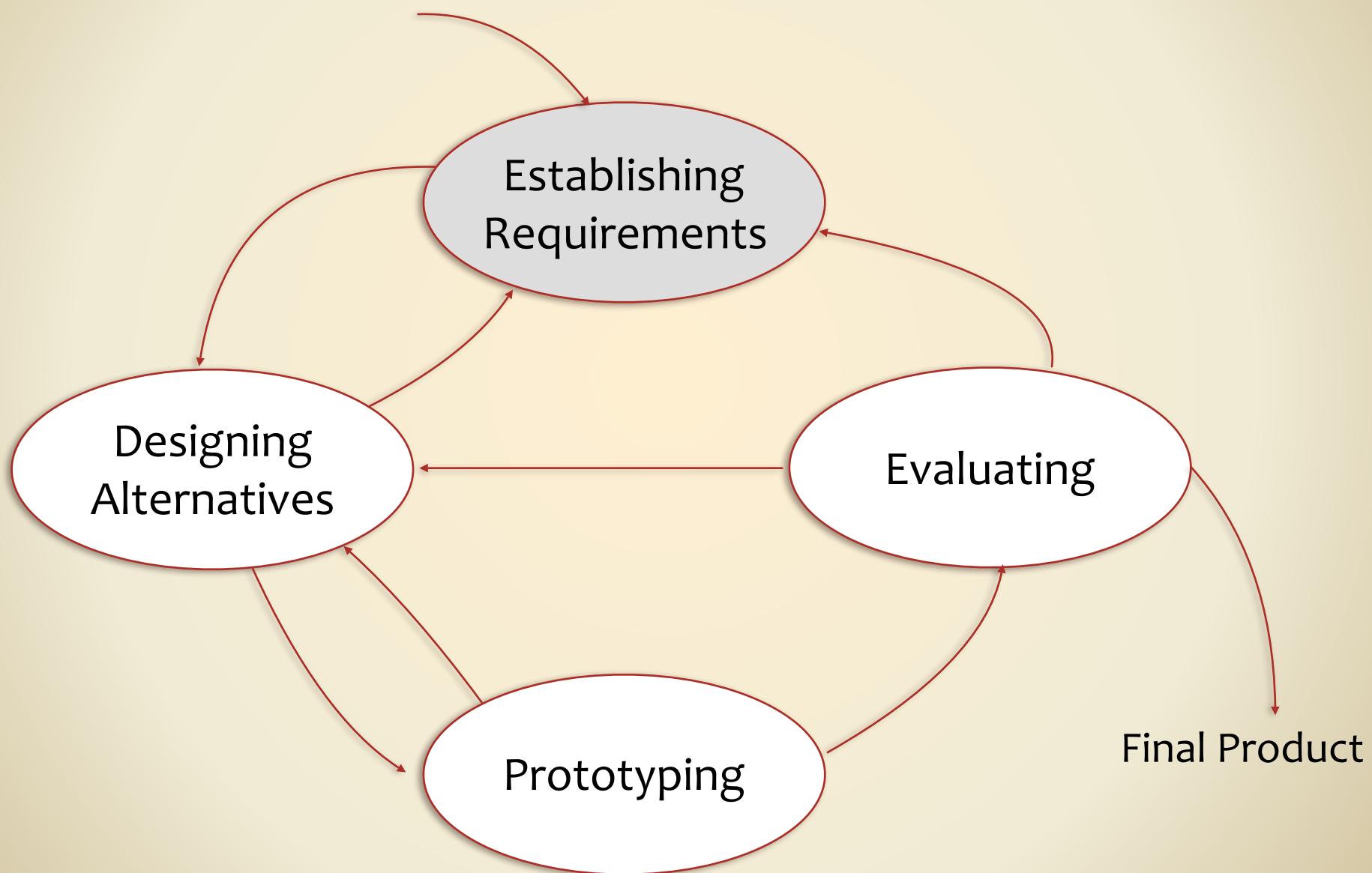
- Are there problems with an existing product or user experience and what are they?
- Why do you think there are problems?
- How do you think your proposed design ideas might overcome these?
- If you are designing for a new user experience how do you think your proposed design ideas support, change or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

Activity (15 minutes)

What are the assumptions and claims made about 3D?



User Centred Design Lifecycle



Generating Requirements



How the customer explained it



How the Project Leader understood it



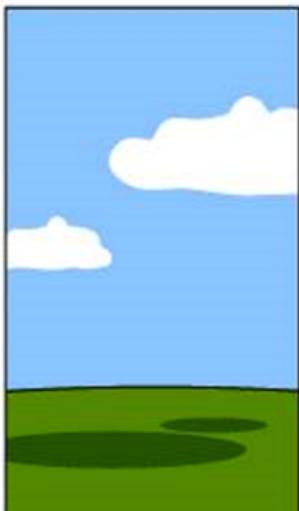
How the Analyst designed it



How the Programmer wrote it



How the Business Consultant described it



How the project was documented



What operations installed



How the customer was billed



How it was supported



What the customer really needed

Generating Requirements

- Why - To understand as much as possible about the users, their activities and the context in which they engage in the activities
- To produce stable requirements that form the basis for your design
- Sequential process of data gathering, analysis and interpretation
- Generating requirements is an iterative activity
- Finding and fixing issues after delivery is expensive!

Generating Requirements

- A requirement is “something the product must do or a quality that the product must have” (Robertson and Robertson, 1999)
- Documentation of requirements that are then turned into a new or revised product, system or service
- Requirements specification is often a project deliverable
- Requirements inform the project planning process and timelines
- Need to be measurable through test and ought to be clearly formulated

Requirements - Data Gathering

- Interviews and Questionnaires
- Focus Groups
- Direct Observations (e.g. Contextual Inquiry)
- Indirect Observations (e.g. Diary studies, Log file analysis)
- Ethnographic studies
- Personas, Scenarios and use cases
- Task Analysis
- Researching related products
- Probes

Focus Groups

What are they? A focus group involves a group of intended/actual users of a system to share their thoughts, feelings, attitudes and ideas on a certain subject. Organising focus groups can also be useful in getting buy-in to a project from within that company.

When to use Used as an input to design and useful to gain knowledge about what the user's tasks are.

Issues Need to have an experienced moderator and analyst for a focus group to be effective.

**Don't miss design
opportunities!**



**“If I had asked people what they wanted,
they would have said faster horses.”**

Henry Ford

Personas

Confident learner



Picture credits –
[Nerdcoregirl, Flickr CC](#)
<http://www.flickr.com/photos/nerdcoregirl/>

Samantha Bell

"I'd love to keep in contact with my friends"

Sam is about to go abroad for her gap year, so her parents decided to get her a new camera, to make sure she's able to record everything she gets up to.

She likes the camera as it looks so modern, and it's able to do so much more than a lot of her friends' cameras.

She loves being in contact with people all the time, and finds it's a great way to kill time like when waiting for the bus. She uses a lot of the more advanced features – panoramic shots, online upload and .

When she encounters a problem she ignores it most of the time - she's not sure if she even got a manual with the camera. When she has trouble she can't ignore she speaks to her friends, or goes into a camera store – she wants to be talked through the problem.

Ideal features

- Ability to take pictures
- Ability to upload images to personal site using 3G/Wifi
- Allowing others to access her pictures remotely
- Long battery life
- Ability to name and add comments to uploaded images
- Ability to create several albums, and upload pictures to each

Frustrations

- Lack of wireless/3G access
- Slow uploads
- Low battery life
- Need to be plugged in to upload images
- Slow shutter speed
- Want to be able to name/add comments to uploaded images
- Getting online is confusing
- Creating new albums

First time user

Female, 27 year old, single

Student

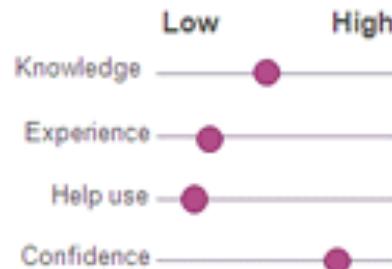
Sam prefers to learn how to things by trying things out by herself. She isn't worried about 'breaking' anything. If she does need help she would prefer to not to refer to a manual but "do it herself".

Needs

In order of preference:

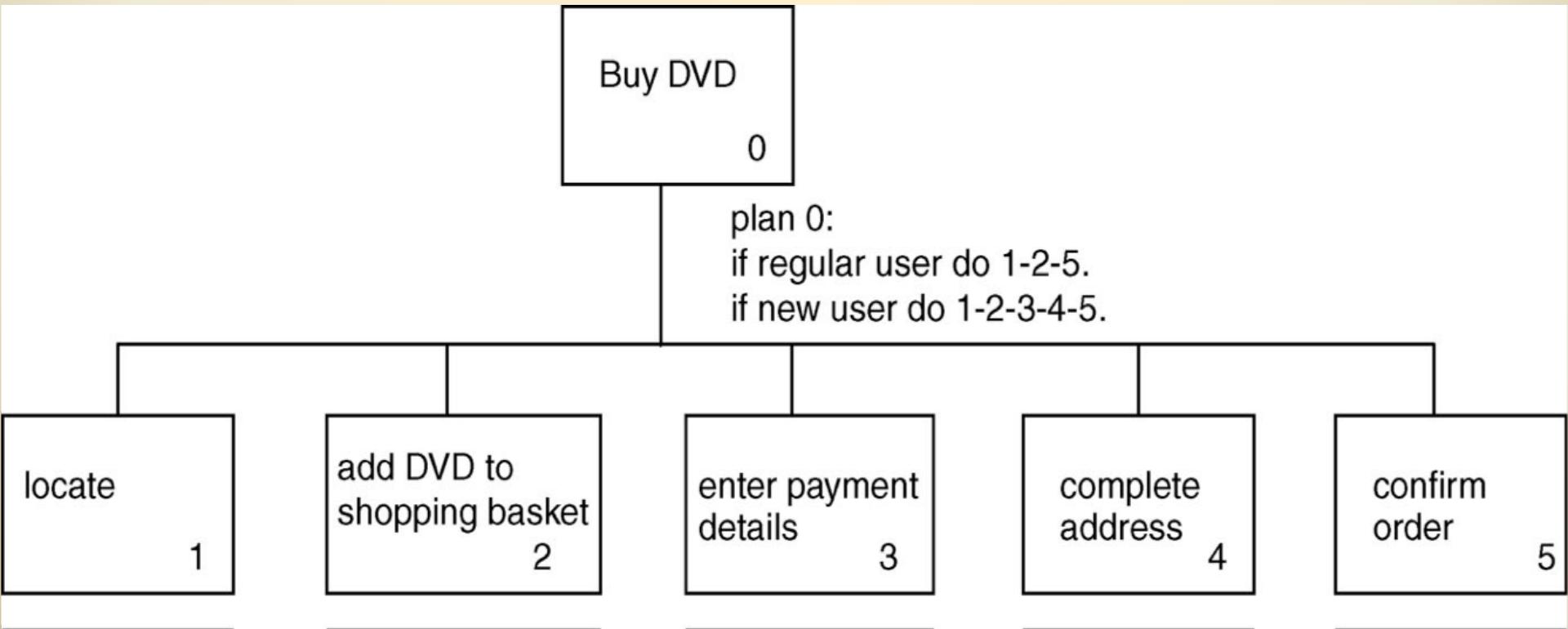
- To share pictures with her parents
- To share her pictures with her friends
- To share her pictures with people she meets whilst travelling

Key attributes



Use Cases and Task Analysis

- Use cases (often based on personas and scenarios)
- Task Analysis (mainly existing products)



Diary Studies

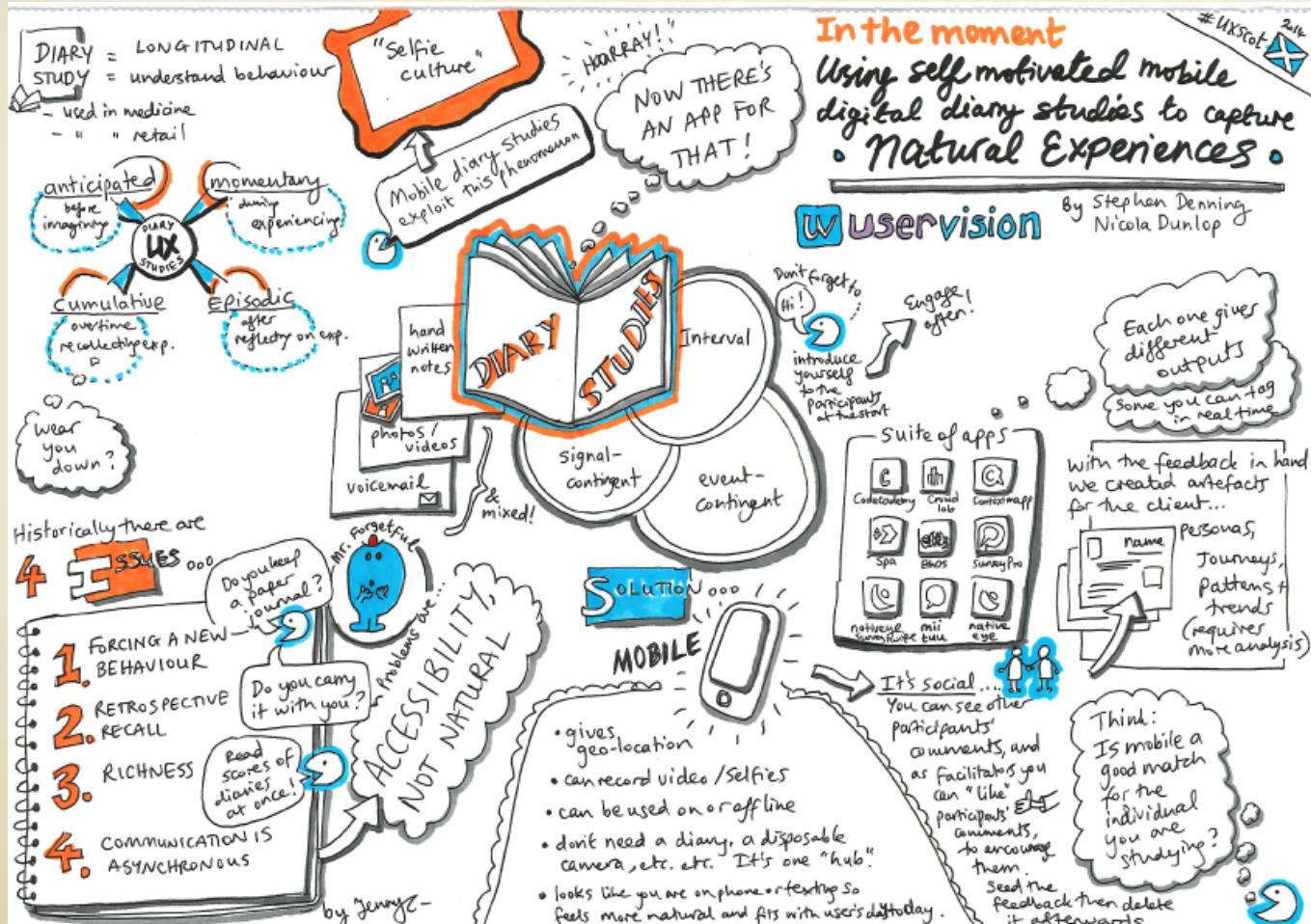


Need						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
3am						
6am						
9am						
12pm						
3pm						
6pm						
9pm						
12am						

You needed: Info Assist. Other
What did you need? to know if people could be used on Don Valley RT Trail
Why did you need it? wanted to tell story by mobile phone but it never be ice-free
Where were you? at home shopping
What were you doing? grocery shopping
When did you need it? 5-10 mins
What I needed was very important.
I want to share the information with?
 People around me People who visit this location Anyone anywhere
Other

Share						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
3am	3am	3am	3am	3am	3am	3am
6am	6am	6am	6am	6am	6am	6am
9am	9am	9am	9am	9am	9am	9am
12pm	12pm	12pm	12pm	12pm	12pm	12pm
3pm	3pm	3pm	3pm	3pm	3pm	3pm
6pm	6pm	6pm	6pm	6pm	6pm	6pm
9pm	9pm	9pm	9pm	9pm	9pm	9pm
12am	12am	12am	12am	12am	12am	12am

What did you want to share? Pictures are on sale It's a great sale
Where were you? Downing Street Home
What were you doing? Shopping Eating
I want to share the information with?
 People around me People who visit this location Anyone anywhere
Other



Probes - Examples

- Cultural Probes (Gaver, Dunne & Pacenti, 1999)
- Tales of Things

The screenshot shows the homepage of the Tales of Things website. At the top left is the logo 'Tales OF Things'. The top navigation bar includes links for HOME, SIGN UP, LOG IN, and ADD A THING. Below the navigation is a search bar with the placeholder 'SEARCH FOR A THING' and a red 'Submit' button. A breadcrumb trail at the bottom left indicates the user's location: You are here: Home (Things) > Thing - Piece o... The main content area features a large image of a person holding a piece of shrapnel. Below the image is the title 'PIECE OF SHRAPNEL' and the text 'Creator: HillingdonTales on 6 Oct 2010, 4:31 p.m.'. It also states 'Tale recorded at Uxbridge Library, UK, on 4 September 2010.' Below this are social sharing buttons for Facebook ('Like 0') and Twitter ('Tweet 0'). To the right, there is a sidebar titled 'In Collection...' which lists 'HillingdonTales's things' with a dropdown arrow. Below the sidebar are two smaller images: one of a person in a costume labeled 'TOWN CRIER' and another of a rolling pin labeled 'ROLLING PIN'.



Requirements Types

- Data Requirements (e.g emails, messages, contacts; how will it be stored and exchanged)
- Functional Requirements (what the system should do)
- Product or Service Qualities (e.g. brand, emotions that should be evoked)
- Context of use (e.g. sunlight, water resistance)
- Constraints (e.g. time to ship, budget, legal requirements)

Generating Requirements - Users

- Novice - Experts
- Occasional, Casual or Frequent Use
- Background and Abilities
- Expectations
- Ergonomics (e.g. height, strengths, impairments)



Requirements - Documentation as User Stories

When Agile Project Methodologies are used requirements are often captured as User Stories in custom software (e.g. Pivotal Tracker, Trello).

The screenshot shows the Pivotal Tracker web application interface with three boards visible:

- Current/Backlog**: A board for the current backlog with 33 items. One item is selected: "Admin should be able to login (JWD, MB)" with status "Finish". Other items include "Admin should be able to import multiple new products from CSV file (JWD, MB, RO)", "Shopper should see list of products, with primary photo as thumbnail (JW, MB)", "Admin should be able to upload product", and "Initial demo to investors".
- Shopping**: A board for the Shopping epic with 10 stories and 16 points. One story is selected: "Shopper should see list of products, with primary photo as thumbnail (JW, MB)". Other stories include "Shopper should be able to enter credit card information and shipping address", "Integrate with payment gateway", "When shopper submits order, authorize total product amount from payment gateway", and "If authorization is successful, show".
- photo**: A board for the photo epic with 3 stories and 7 points. One story is selected: "Shopper should see list of products, with primary photo as thumbnail (JW, MB)". Other stories include "Admin should be able to upload product photo (JWD)", "Admin should be able to upload multiple product photos and mark one as the primary (MB)", and "Admin, blocked".

A tooltip at the bottom right says "Pin Search panel, Save Search, Settings".

<http://www.pivotaltracker.com/help/gettingstarted>

Requirements - Documentation as User Stories

HOME TOUR BLOG



Sign Up

Log In

Want to subscribe to these cards?

Sign up for free

or learn more about Trello

User Stories

ChronoZoom Public

Overview

January: Github and Dev rampup

February: New foundations: Time series, UI/UX, temporary authoring tool

March: Finish UX design, simple authoring (form based), large data test

April: Content rampup, advanced authoring (visual), basic tours

May: Authoring, Time series support, Tour authoring

June: Testing, Quality Assurance, Bug Fixes

Community Event: June 13, 2013 - Student's Big History Conference

1

1

Sprint 6 Agreed Upon

LEARNINGS - PAST BUGS LOGGED OVER TIME



Fix Sprint 6 Bugs

5

11



Record non-dev efforts for sprint 6



Identify partners and post launch outreach



Handoff package - including "new Things", operational procedures, "Secrets" etc.



Merge content: AIDS timeline, UW student work, UCB student work



Sprint 5 - 90% Complete



Improve scalability in the client

20

1

9/12

AT W

Sprint 5 Completed



The dynamic stylesheet language.

Code Improvements: As a developer, I would like to remain productive and work in a maintainable code base that allows new developers to ramp up quickly.

1

1

18/18

Read Only - Timeseries Climate Data

3

2

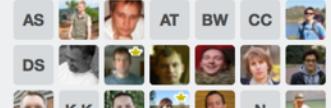


Search Engine Optimization: As a user I would like Bing and Google to

Menu

Members

AS DS VA CH



AT BW CC K R N S

Activity

Jay Beavers left As a team, I want ChronoZoom to be entered into contests like SXSW and have a deployment system that can be easily scaled to meet spikes in usage.
Jul 30, 2013 at 02:06

Jay Beavers left As a developer I want to be able to engage the CZ team by pull requests and issue submission..
Jul 30, 2013 at 02:06

<http://www.trello.com>

Requirements - Priorities MoSCoW Method

- **Must have** - fundamental requirements without which the system will be unworkable and useless, effectively the minimum usable subset
- **Should have** - would be essential if more time were available, but the system will be useful and usable without them
- **Could have** - of lesser importance, therefore can more easily be left out of the current development
- **Want to have** - can wait till a later development.

Requirements - Priorities MVP

“A minimum viable product has just those core features that allow the product to be deployed, and no more. “
Wikipedia

- Get the product to customers as early as possible
- Accelerated learning for the design and development team
- Minimum viable not minimum product!
- Reduce waste of resources

Activity - Establishing Requirements

Scenario:

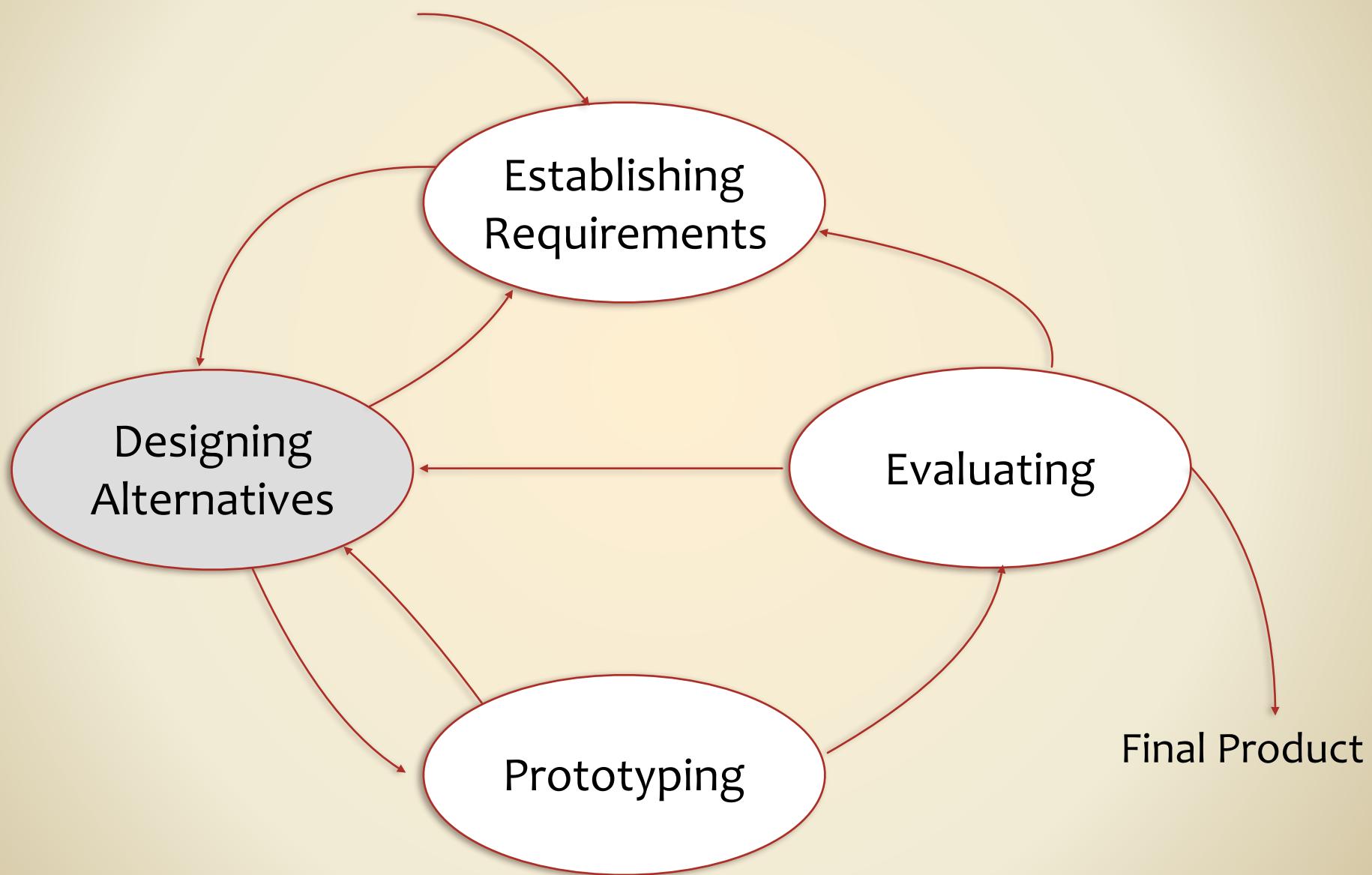
You have been commissioned to design an online-shopping and home delivery system for a new supermarket chain. Your clients want the system to somehow reproduce the best aspects of real shopping without the drawbacks. They want the system to appeal to all adults with access to a home computer.

What techniques would be suitable for carrying out an requirements analysis for the shopping application?

Explain the reasons for your choices and any potential limitations on the conclusions you could draw from their use.

Work in small groups (2-4 people) 10 minutes, present you group results to your peers (5 minutes);

User Centred Design Lifecycle



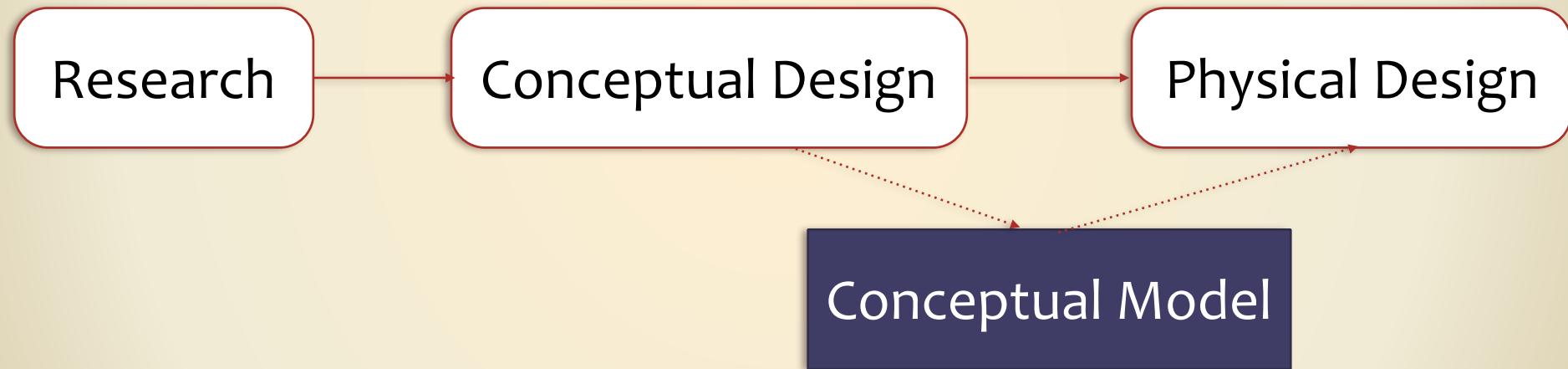
From problem to design space

Having a good understanding of the problem space can help inform the design space

e.g. what kind of interface, behaviour, functionality to provide

But before deciding upon these it is important to develop a conceptual model!

Conceptual and Physical Design



What is a conceptual model?

“A conceptual model is a high-level description of how a system is organized and operates.”

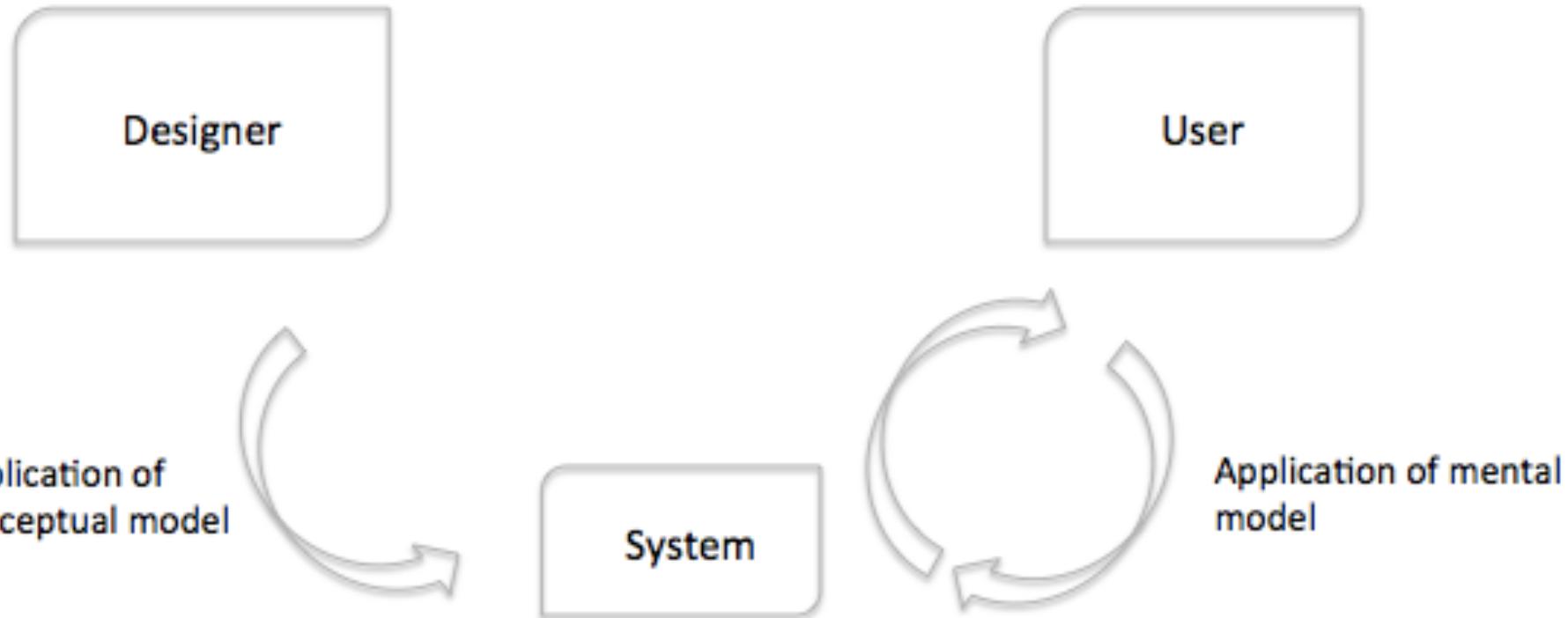
(Johnson and Henderson, 2002)

Conceptual Model

Is a term that describes the various ways in which systems are understood by different people. Primarily,

- the way users conceptualise and understand a system and
- the way interaction designers conceptualise the view of a system.

Conceptual Model and Mental Model



Conceptual Models consist of

- Metaphors
- Concepts
- The relationships between the different concepts
- The mapping between the concepts and the user experience via interaction types

The first steps of designing 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

Session Summary

- We defined UCD and introduced a UCD life cycle model
- We discussed the different stages of the UCD process
- We explored different methods to generate user requirements
- We investigated applications of conceptual models

Additional Resources

- The User Experience Team of One (Buley, 2013)
- Designing for the Digital Age (Goodwin, 2009)
- Designing Interactive Systems (Benyon, 2014)
- Interaction Design (Preece, Rogers & Sharp, 2015)

