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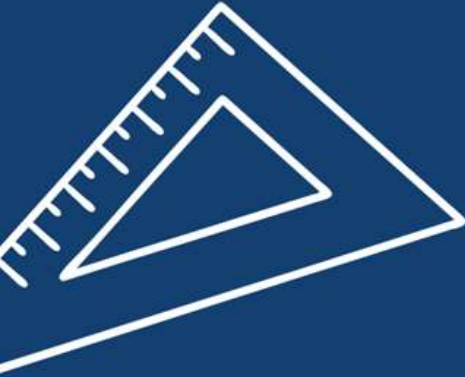
International
SCHOOL OF LONDON
Qatar

DP DESIGN TECHNOLOGY

TOPIC 7

USER-CENTERED DESIGN

NOTES & GUIDANCE BOOKLET

2020-2022

This booklet contains the Notes, and teaching support material for Topic 7

DP DESIGN WITH
MR MONEEB

Contents Page

Teaching & Learning Presentations

Topic 7: What is covered?

These are the topics covered in Topic 7:

HL TOPICS		Topic Covers	Approx Lessons hours on each topic	Total Lesson Hours	Checklist (✓)	Exam Mark	Exam (%)
7	User-centred design	7.1. User-centred design (UCD)	2	10			
		7.2. Usability	2				
		7.3. Strategies for user research	2				
		7.4. Strategies for UCD	2				
		7.5. Beyond usability—designing for pleasure and emotion	2				

7.1 User-Centred Design

Essential Idea: The fundamental principle of UCD is understanding the needs of the users is the key to designing the best products and services.

Concepts and principles:
- The designer needs to have a deep understanding of the user, task and the environment.
- The process is iterative, led by the user and developed through user-centred evaluation.
- The product must address the whole user experience.
- UCD design teams are multidisciplinary.
- The five stages of UCD: research, concept, design, implementation, launch
- Inclusive design

Guidance:
- UCD design teams may include anthropologists, ethnographers and psychologists.
- Inclusive design requires designing universally accessible products for all users including those with physical, sensory, perceptual and other challenges and impairments.

Aim:
The ability to put aside one's own ideas and bias is essential for UCD. Designers must act with integrity and not project their own ideas of what the user requirements are when trying to create technological solutions to their problems.

Nature of design:
As a designer you must consider the needs, wants and limitations of the end user within every element of the design cycle. The ability to identify how users will interact with a product, service or system is vital for its success. To achieve this, designers must be able to acquire and analyse valid data without making assumptions about how the product may be used.

7.1 USER-CENTRED DESIGN (UCD)

A designer must consider the needs, wants and limitations of the end user within every element of the design cycle. The ability to identify how users will interact with a product, service or system is vital for its success. To achieve this, designers must be able to acquire and analyse valid data without making assumptions about how the product may be used.

The ability to put aside one's own ideas and bias is essential for UCD. Designers must act with integrity and not project their own ideas of what the user requirements are when trying to create technological solutions to their problems.

Human Centred Design

The Designer Needs to Have a Deep Understanding of the User, Task and the Environment.

Donald Norman (who developed the concept) found that products:

- were difficult to use.
- **often included style changes solely for style sake which reduced usability.**
- these inclusions increased the cost.
- **increased complexity.**
- reduction in efficient use.

The principles of UCD to the design process.

- A design is based upon an explicit understanding of users, tasks and environments.
- Users are involved throughout design and development.
- The design is driven and refined by user-centred evaluation.
- The process is iterative.
- The design addresses the whole user experience.
- The design team includes multidisciplinary skills and perspectives, such as Don Norman's engineering and psychology degrees.
- Students should be able to apply the above.

User-Centered Design and the User, Task & Environment

Term: UCD is a design process paying particular attention to the needs of potential users of a product through involvement of users at all stages of the design process.

Term: Empathetic – When the designer takes the place of the user to see who potentially could use the product and the object could be better suited for the consumer.
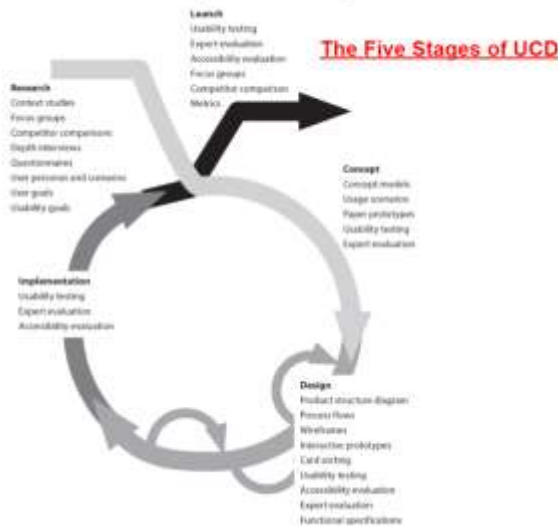

User-Centered Design and the User	User-Centered Design and the Task	User-Centered Design and the Environment
Term: User – Person utilising the product, person who is being affected by the product or who is reaping benefits/drawbacks.	Term: Task – The thing that the product is supposed to do, however the user may have several sub uses for the product.	Term: Environment – The place where a product is likely to be used.

• It considers how users are likely to use the product and tests products with actual users.
 • Sometimes called 'empathic design', the user-centred approach puts the design team in direct contact with the people they are designing for, that is, to empathize with potential users and so gain a better understanding of users' thoughts, needs, values and beliefs.
	• Takes into account common tasks such as ticketing vending machines, ATM or a stove top need special consideration
	 • The interface should be a standard that is understood and can perform the task easily and efficiently
	 • Important functions are easily recognised.
		• Takes into account in the use of a product in a particular environment.
		 • Environments like open plan office, car or kitchen (working envelope).
		 • Car: location and layout of controls promote efficiency and safety while driving
		   ○ car window controls on the door
		   ○ stereo controls on the steering wheel

The Process is Iterative, Led by the User and Developed Through User-Centred Evaluation

Term: Iterative – Act of repeating a process with the aim of approaching a desired goal, target or result. Each repetition of the process is also called an iteration, and the results of one iteration are used as the starting point for the next iteration.

UCD is iterative just like the design cycle. Here though emphasis is on the user throughout the product design cycle. At each stage the user is consulted and modifications are made until the consumer requirements are met. Then it is released. See below the Five Stages of UCD

The Five Stages of UCD

User-Centred Evaluation

Research	Concept	Design	Implementation	Launch
• Business and User problems and requirements are analysed. • The user, task and environment are considered. • This can be done with a multi-disciplinary teams of ethnographer, anthropologists and psychologists. • NB the above diagram for Research	• Initial ideas are put forward • Concept modelling takes place, including paper models • Allows for tactile and appearance evaluations • valuation is fed back into the design cycle • It is quick and cheap to carry out. • A multi-disciplinary team of designers, various engineers and psychologists. • NB the above diagram for Concept	• Development of ideas. • Scaled models such as prototypes, mock ups etc are made • Monitoring of performance against usability requirements • Allows for more continued evaluation by the user and design team. • Evaluation is fed back into the design cycle • NB the above diagram for Design	• Various testing and evaluations are carried out with a wide range of end users • Evaluation is fed back into the design cycle • A multi-disciplinary team is used to measure the end-users psychological and physiological experience • NB the above diagram for Implementation	• The end product is launched • Continuous evaluation is carried out • Monitoring of performance against usability requirements • NB the above diagram for Launch

UCD Design Teams are Multidisciplinary.

As can be seen from the five stages of UCD that many other experts are used in the design and production of a UCD product.

These include: anthropologists (study humans, human behaviors and society), ethnographers (study in people and cultures), engineers (deal with the built environment), psychologists (study of the mind) and focus groups to advise the creative designers.

Inclusive Design

Inclusive design is:

- Welcoming to everyone
- Responsive to people's needs
- Intuitive to use
- Flexible
- Convenient so they can be used without undue effort or special separation and so that they maximise independence

UCD is a part of **Inclusive design**. Inclusive design is about designing universally accessible products for all users regardless of age, physical, sensory, perceptual functioning levels (disability). By designing products for all users regardless ability will ensure there is a market for their products and increases their feasibility as an innovation.

The Product Must Address the _Whole User Experience_.

Term: User Experience – _A person's perceptions and responses that result from the use or anticipated use of a product, system or service, this can modify over time due to changing usage circumstances._

UCD answers questions about users and their tasks and goals, then uses the findings to make decisions about development and design.

- Who are the users of the product?
- What are the users' tasks and goals?
- What are the users' experiences and expertise with the product and products like it?
- What functionality do the users require of the product?
- What other stakeholders will be impacted by the product?
- Why is the product being developed?
- What are the overall objectives?
- How will the product be used?
- How will it be judged a success?
- What are the technical and environmental constraints?
- What functionality is needed by users?
- What are the typical scenarios of how and why users will use the product?
- What are the usability goals?
- How important is ease of use and ease of learning?
- How long should it take users to complete their tasks?
- Is it important to minimize user errors?
- Are there any initial design concepts?

7.2 - Usability

Aims

- Understand that a design team should be "user" driven and frequent contact with potential users is essential.
- Understand how a product, service or system may be used and how as a designer you must consider the prior knowledge and experience of the users, as well as their typical psychological responses.
- How evaluation methods are used that utilize appropriate testing and trialling strategies to determine these aspects.

User Requirements Analysis — Conceptual Design — Launch and Maintenance — Design and Implementation — Usability Evaluation

USER-CENTERED DESIGN PROCESS

7.2 USABILITY

A design team should be "user" driven and frequent contact with potential users is essential. To understand how a product, service or system may be used, the designer must consider the prior knowledge and experience of the users, as well as their typical psychological responses. Evaluation methods that utilize appropriate testing and trialling strategies must be used to determine these aspects

Designers must consider the limits of population stereotypes. Through recognizing these limits, the designers can critically assess the appropriateness of their product in relation to those who will use it.

User-Centered Design

7.2 USABILITY

- **Usability** is how well a human-made product (tool, machine, webpage, a system or process) can be effectively (completely and accurately) and efficiently (fast and with minimum effort) used by users.
- It **functions** in a **predictable** and **consistent** way.
- The human-made product can be considered **intuitive, pleasant, enjoyable** to use, prevents user errors or if errors occur then the user can easily recover.

From the ISO … Usability is concerned with "the extent to which a product can be used by specified users to achieve specific goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11, 1998)

YD
YANKO DESIGN

A PERFECT EXAMPLE OF USER-CENTERED DESIGN

Press to link to site

Usability objectives

Usefulness

- Once users have learned the design, how quickly can they perform tasks?
- Efficiently – fast and with minimum effort

Attitude

- Satisfaction or likability when the client uses or interacts with the product, service or system design.
- How pleasant is it to use the design?

Effectiveness

- Use the design completely and accurately
- Prevents errors
- User can recover if errors occur.

Learnability

- It is the ease at which the user can learn to use a product?
- The intuitiveness to use a product, service or system design.
- How easy is it for users to accomplish tasks the first time they encounter the design?
- Memorable – when the user returns they do not have to re-learn how to use it.

Enhanced usability

Benefits of enhanced usability include:

- improved product acceptance
- improved user experience
- improved productivity
- reduces user error
- reduces the need for training and support

Characteristics of good user-product interfaces

Characteristics of good user-product interfaces (is the space where a user and machine interact) include:

- **Simplicity** – simple design allows for clarity on how the design can be used such as an iPod interface.

- **Ease of use** – iPod interface has limited menu items that are easily and quickly accessed.

- **Intuitive logic and organization** – Novice users of a product should be able to learn all its basic functions within one or two hours.

- However, many products are **full of confusing detail** and are **difficult to learn**. This can lead to incomplete use of the product's functionality and frustration for the user.
- **Instruction manuals** are often poorly written and poorly organized. It is difficult for the designer of a product to distance him/herself from the product and look at it through the eyes of the prospective user. Re-innovation of a product often involves adding features to the basic design rather than redesigning the user–product interface from scratch, and this can result in a disorganized interface. It is important to consider necessary and desirable features, not ones that increase complexity without enhancing usefulness for most users.

Characteristics of good user-product interfaces

- **Low memory burden** – the user does not need to have to memorise many features, how to use it, etc.
    - Do not have to relearn functions. Poor organization of a product imposes a memory burden on users, who have to learn and remember how the various functions work.
    - This results in them not using the full functionality of a product but focusing on a limited set of features and ignoring those that are difficult to remember.
    - Thinking about how intuitively the product features can be accessed by users can reduce memory burden and make the product more user-friendly.
- **Visibility** – Controls should be visible and it should be obvious how they work.
    - They should convey the correct message, for example, with doors that need to be pushed, the designer must provide signals that indicate where to push.

Characteristics of good user-product interfaces

- **Feedback** – Feedback is the provision of information, for example, an audible tone to a user, as a result of an action.
    - The tone on a telephone touchpad or the click of a key on a computer keyboard provides feedback to indicate that a key has been pressed.
    - The "egg timer" icon on a computer screen tells the user that an action is being undertaken.
- **Affordance** – Affordance is the property of an object that indicates how it can be used.
    - Buttons afford pushing, and knobs afford turning.
    - On a door, handles afford pulling, whereas push plates afford pushing.
    - Consider how the use of a handle on a door that needs to be pushed open can confuse users, and how in an emergency this might impact on safety considerations.

Characteristics of good user-product interfaces

- **Mapping** – Mapping relates to the correspondence between the layout of the controls and their required action.
    - For example, the layout of the controls on a cooker hob can take advantage of physical analogies and cultural standards to facilitate a user's understanding of how it works.
- **Constraints** – Constraints limit the way that a product can be used.
    - The design of a three-pin plug or a USB (universal serial bus) device ensures that they are inserted the correct way.
    - This reduces or eliminates the possibility of a user making errors.

The user–product interfaces of many electronic products are extremely complex rather than being intuitive and easy to use. Products with intuitive and easily accessible interfaces are likely to be more popular with consumers.

Population stereotypes

A stereotype is when a person is categorised into a population based on culture, class, gender, etc. This allows assumptions and associations on how that particular stereotyped population may, react in a situation, dress, use of products, aesthetics, values and so on.

- White is Western culture symbolizes, purity, elegance and peace. Brides often where white wedding gowns. In Asian cultures white represents, death, mourning or bad luck. Traditionally white is worn at funerals.
    - A short list of different traditional wedding dress colors.
    - This has implications on color selection and aesthetics.
- In Australia and China, to turn a light switch it is flipped down. In the USA it is flipped up.
    - This has implications of standardization of products.
- In Australia and China the difference in the orientation of a 3 pin electrical wall socket is another example.

Chinese Wall Socket

Australian Wall Socket

Advantages and disadvantages of using population stereotypes for designers and users.

Advantages:

- Allows you to form assumptions and associations about of a group of people. D
- Judgements and decisions can be made quickly. D
- Possibly predict the behavior or possible use of a product or system. D & U
- The user needs and behavior can be identified and thus usability considerations are met. U

Disadvantages:

- Assumptions and associations of a particular stereotype may not fit all people of that population. D
- Judgements and decisions could be incorrect. D
- Not all people who 'look alike act/think alike' therefore behavior or way a product was intended to be used may be wrong. U & D

International Mindedness

Population stereotypes based on cultural expectations contribute to human error and designers must consider this when designing good user-product interfaces.

7.2 Usability

Aims
- Understand that a design team should be "user" driven and frequent contact with potential users is essential.
- Understand how a product, service or system may be used and how as a designer you must consider the prior knowledge and experience of the users, as well as their typical psychological responses.
- How evaluation methods are used that utilize appropriate testing and trialling strategies to determine these aspects.

USER-CENTERED DESIGN PROCESS
- User Requirements Analysis
- Conceptual Design
- Design and Implementation
- Usability Evaluation
- Launch and Maintenance

Essential Idea: Usability is about how easy it is to use a product or system.

Concepts and principles:
- Usability objectives
- Enhanced usability
- Characteristics of good user-product interfaces
- Population stereotypes

Essential Understanding:
- Usability objectives include usefulness, effectiveness, learnability, attitude (likeability)
- Benefits of enhanced usability include product acceptance, user experience, productivity, user error, training and support
- Characteristics of good user-product interfaces include simplicity, ease of use, intuitive logic and organization, low memory burden, visibility, feedback, affordance, mapping and constraints.
- Advantages and disadvantages of using population stereotypes for designers and users

Aim:
Designers must consider the limits of population stereotypes. Through recognizing these limits, the designers can critically assess the appropriateness of their product in relation to those who will use it.

Nature of Design:
A design team should be "user" driven and frequent contact with potential users is essential. To understand how a product, service or system may be used, the designer must consider the prior knowledge and experience of the users, as well as their typical psychological responses. Evaluation methods that utilize appropriate testing and trialling strategies must be used to determine these aspects.

7.3 STRATEGIES FOR USER RESEARCH

Designers should select research strategies based on the desired user experiences in the context of the product, service or system. The purpose of user research is to identify needs that reveal the complexities of personae. Real-life scenarios that simulate "actual" user experiences can generate new findings.

The various strategies for user research can be used by the designer to explore the true nature of a problem. Through the use of personae and use cases, the designer can build a range of possible scenarios with which to explore the problem in detail.

Usability Objectives

Usability is the extent to which a product can be used by specified users to achieve specified goals effectively (completely and accurately) and efficiently (fast and with minimum effort) while functioning in a predictable and consistent manner. If so, the product can be considered intuitive, pleasant, satisfying to use and tolerant of user errors (that is, it prevents and enables users to recover from errors).

*Jeffrey Rubin describes usability objectives as:*

- **Usefulness** - product enables user to achieve their goals - the tasks that it was designed to carry out and/or wants needs of user.

- **Effectiveness** (ease of use) - quantitatively measured by speed of performance or error rate and is tied to a percentage of users.

- **Learnability** - user's ability to operate the system to some defined level of competence after some predetermined period of training. Also, refers to ability for infrequent users to re-learn the system.

- **Attitude** (likeability) - user's perceptions, feelings and opinions of the product, usually captured through both written and oral communication.

Usability testing

Usefulness- achieve the goals
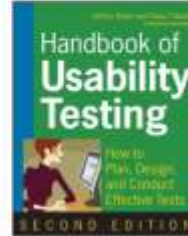
Usability testing: J Rubin

Usability objectives include: usefulness. effectiveness, learnability and likeability

Benefits of Enhanced Usability

Enhanced usability increases:

- **Product acceptance** – The knowledge that a product or service paid for will meet up to its defined specifications. If it says it will do it, it will.

- **User experience** - a person's perceptions and responses that result from the use or anticipated use of a product, system or service, this can modify over time due to changing usage circumstances. A key click on a phone will influence feelings when typing a message which will in turn provide an experience of the phone itself, all part of the user experience. This can lead users to brand loyalty and increased sales for a company.

- **Productivity** - Developing products and services with the user in mind can reduce time wasting or difficult to understand aspects of a product. This can lead to a more efficient output level for the manufacturer and a more pleasant user experience. For example, a stereo system with simple controls (play, pause etc) would be easier to use and produce than a complex sound system, increasing productivity when manufacturing, less parts. Or one click to buy buttons on various websites

Enhanced usability decreased:

- **User error** – With simpler interfaces and controls, user error is reduced or even eliminated. This leads to a better user experience and product acceptance through reduced frustration with products and services.

- **Training and support** – If a product has a more intuitive user interface, a more pleasant user experience and simpler controls, there is less need for training and support to the consumer and so, reduced costs in these fields.

List 4 usability objectives

....1
....1
....1
....1
....1

Characteristics of good user-product interfaces

There are disadvantages of user–product interfaces that are not well organized and cannot be learnt intuitively and remembered easily. Novice users of a product should be able to learn all its basic functions within one or two hours.

However, many products are full of confusing detail and are difficult to learn. This can lead to incomplete use of the product's functionality and frustration for the user. Instruction manuals are often poorly written and poorly organized.

It is difficult for the designer of a product to distance him/herself from the product and look at it through the eyes of the prospective user. Re-innovation of a product often involves adding features to the basic design rather than redesigning the user–product interface from scratch, and this can result in a disorganized interface. It is important to consider necessary and desirable features, not ones that increase complexity without enhancing usefulness for most users.

Self Check in- need assistance or just customer service?

Intuitive- ease of use

Dieter Rams- good design

Dieter Rams- 10 principles

Poor organization of a product imposes a **memory burden** on users, who have to learn and remember how the various functions work. This results in them not using the full functionality of a product but focusing on a limited set of features and ignoring those that are difficult to remember. Thinking about how intuitively the product features can be accessed by users can reduce memory burden and make the product more user friendly.

Usability strategies are used when testing a variety of user experiences. They are examined within their social and cultural context to see how new technologies can fit with accepted ways of doing things. In the process, new technologies can also change the way the activity is conducted and therefore testing includes, ease of use, intuitive logic/logic of use.

Good design makes a product understandable. Dieter Rams

What are the issues with user–product interfaces?

The user–product interfaces of many electronic products are extremely complex rather than being intuitive and easy to use.

"When planning a user interface, a designer should focus on the **needs of the end users**. It often happens, instead, that designers are too busy with citations from other cool, award-winning products that may result in a nightmarish implementation for the developer and a complete mystery for the end user. " (Marinilli 2002)

Benefits of enhanced usability include product acceptance, user experience, productivity, user error, training and support. Products with intuitive and easily accessible interfaces are likely to be more popular with consumers (especially more affluent and older consumers).

Important characteristics are to consider include **simplicity, ease of use, intuitive logic, organization, low memory burden, visibility, feedback, affordance, mapping and constraints**

Simplicity and ease of use

Most consumers want a product that is simple and easy to use. They want a product that minimises complex controls and allows the product to be used with little instruction

Consider the app Shazam, once opened, one tap on the centre of the screen allows it to not only identify the song being played but also to find it on Apple Music!. i Tunes and Spotify and in some cases link to websites selling tickets and merchandise

This Bose docking station also could be considered a good example of simple design. Simply plug in an mp3 player and it plays music. Volume and tracks can be changed but no confusing controls are present and the quality of sound is good regardless of setting

Products with intuitive and easily accessible interfaces are likely to be more popular with consumers (especially more affluent and older consumers).

Intuitive logic, organization and low memory burden

Easy to use intuitive interface design allows new operators to quickly become competent in the basic operations of a product. Good user interface design can be the discriminating factor for a consumer's level of customer satisfaction or frustration in their interactions with a product. This can be the contributing factor between product acceptance and failure in the marketplace.

Poorly designed, less intuitively organized interfaces place a high level of learning through trial and error. They also increase the memory burden placed on consumers who may use the product intermittently and be destined to repeat the learning process over.

When simple operations require high levels of concentration or memory, the full feature set of a product would tend to be less well exploited

However, many products are full of confusing detail and are difficult to learn. This can lead to incomplete use of the product's functionality and frustration for the user. Instruction manuals are often poorly written and poorly organised.

Novice users of a product should be able to learn all its basic functions within one or two hours.

What are the disadvantages of user–product interfaces that are not well organized and cannot be learnt intuitively and remembered easily.

Reducing memory burden

Thinking about how intuitively the product features can be accessed by users....

....can reduce memory burden and make the product more user-friendly.

Why is it difficult for designers to develop simple intuitive user–product interfaces...?

...because innovation of a product often involves adding features to the basic design.... rather than redesigning the user–product interface from scratch, and this can result in a disorganized interface.

It is difficult for designers to develop simple intuitive user–product interfaces because...

.....the designer of a product has to distance him/herself from the product and look at it through the eyes of the prospective user (UCD)

Intuitive design

What impact does memory burden have on the user-friendliness of a product?

Poor organization of a product imposes a memory burden on users, who have to learn and remember how the various functions work.

This results in them not using the full functionality of a product but focusing on a limited set of features and ignoring those that are difficult to remember.

It is difficult for designers to develop simple intuitive user–product interfaces because...

...it is important to consider necessary and desirable features, not ones that increase complexity without enhancing usefulness for most users.

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Feedback

Feedback is the **provision of information**, for example, an audible tone to a user, as a result of an action. The tone on a telephone touchpad or the click of a key on a computer keyboard provides feedback to indicate that a key has been pressed. The "egg timer" icon on a computer screen tells the user that an action is being undertaken.

Feedback in a product is designed to stimulate the users receptors to our dedicated organs:

Users receptors	Dedicated organ
Hearing	Ears
Sight	Eyes
Smell	Nose
Touch	Varying degrees of touch receptors on your body
Taste	Mouth

What feedback will the user experience here?

Feedback is the **provision of information** that is received through the human senses

(a) State **one** type of feedback that could be used in the design of a microwave oven to alert the user that the cooking cycle is complete. [1]

....

....

Visibility

Controls should be visible and it should be obvious how they work.

They should convey the correct message, for example, with doors that need to be pushed, the designer must provide signals that indicate where to push.

Push pad to open

Affordance

Affordance is the property of an object that **indicates how it can be used**. Buttons afford **pushing**, and knobs afford **turning**. On a door, handles afford **pulling**, whereas push plates afford pushing.

Consider how the use of a handle on a door that needs to be pushed open can confuse users, and how in an emergency this might impact on safety considerations.

affordance this camera offers the user

In this talk from 2003, design critic Don Norman turns his incisive eye toward beauty, fun, pleasure and emotion, as he looks at design that makes people happy. He names the three emotional cues that a well-designed product must hit to succeed

(b) Describe why affordance is an important consideration in relation to the design of a product.

[2]

Population stereotypes

White is the traditional color for a wedding dress in the United States, but in some Asian cultures it is the traditional color worn to a funeral. Western countries have the color red often associated with warning or stopping. That is not necessarily the case in all countries. If, for instance, someone came to the United States from a country where red meant go and don't worry about any possible dangers then a big red button to turn off a machine when it is having a problem may be intuitively understood to start the machine instead.

For many common types of controls on machines, we expect that certain actions, such as turning or sliding them in certain directions, will produce expected kinds of results. Expectations that are found to be widespread in a population are known as conventions or stereotypes.

Consider the arrangement in this example; which way would you turn the knob to make the pointer on the dial rotate from 1 to 6?

When walking into a room, assuming it is dark, what way would you flip a toggle switch to turn the lights on? You have two choices, up flip or down flip.

Indeed, most Americans think that up is on but in other countries, the opposite is true. Making use of population stereotypes in the design of the controls for products is relevant. It is usually anti clockwise for 'on' when dealing with fluids and gases (a tap) and clockwise for 'on' when dealing with mechanical products (a radio). Population stereotypes can be displaced (changed or relearned) by alternative learnt responses, but they frequently reassert (return) under conditions of stress such as tiredness or

Mapping

Mapping relates to the correspondence between the layout of the controls and their required action.

For example, the layout of the controls on a cooker hob can take advantage of physical analogies and cultural standards to facilitate a user's understanding of how it works.

Consider the advantages and disadvantages of using population stereotypes for designers and users in the mapping of controls.

Why do population stereotypes based on cultural expectations contribute to human error?

Why do designers need to consider this when designing good user-product interfaces.

Constraints

Constraints limit the way that a product can be used.

The design of a three-pin plug or a USB (universal serial bus) device ensures that they are inserted the correct way.

This reduces or eliminates the possibility of a user making errors.

Consumers can misuse many products due to inappropriate human factors considerations in their design so it is obvious from looking at products how they should be used. Visibility, feedback, mapping, affordance and constraints are vital for intuitive and user-friendly design.

10 Usability Heuristics
according to Jakob Nielson

7.3 Strategies for User Research

Essential Idea: The designer needs to understand the reasons behind the behaviours, wants, and needs of the user.

Concepts and principles:
- User population
- Classification of users
- The use of personae, secondary personae and anti-personae in user research
- Scenarios provide physical and social context for different personae
- Use case

Guidance:
- Users can be classified by age, gender and physical condition.
- Scenarios are based on best, worst and average case.

Aim:

The various strategies for user research can be used by the designer to explore the true nature of a problem. Through the use of personae and use cases, the designer can build a range of possible scenarios with which to explore the problem in detail.

Nature of Design:

Designers should select research strategies based on the desired user experiences in the context of the product, service or system. The purpose of user research is to identify needs that reveal the complexities of personae. Real-life scenarios that simulate "actual" user experiences can generate new findings.

Theory of Knowledge:

Design considers the needs of individuals as paramount. Is this the case in other areas of knowledge?

User population

Population is defined as the group expected to make use of or use an item, instrument, product or data. Designers should select research strategies based on the desired user experiences in the context of the product, service or system.

User populations are a range of users for a particular product or system. There may be particular user populations a product is designed for; however, many products are designed for use by different or multiple populations.

Broad range of population: Apple products

Some products, such as Apple's iPhone shown here are aimed at a **broad ranging user population** but it is highly successful. Assess why the product is so effective for the target user population. These products are **universally successful**. They can be successful to a group of users with wide ranging cognitive and physical qualities.

Design for care   Design for society   Design for futures

Aircraft cockpit: physical & cognitive knowledge required

Many products are successful because they are only aimed at a **narrow user population**. For example the cockpit of A380 aircraft are only successful because the physical and cognitive characteristics of the user population are know as exact and narrow qualities, therefore the product can be optimised specifically for that user.

There may be particular user populations a product is designed for; however, many products are designed for use by different or multiple populations.

Classification of user

User populations can be classified into groups depending on age, gender and physical condition. This can allow the designer to gather detailed feedback to generate insights for design development that are particular to each group.

Physical condition might include:

- Arthritis   -Children
- Partial paralysis   -Elderly & infirm
- Parkinson's disease   -
- Repetitive Strain injury
- Blindness
- Hearing
- Reduced sense of feeling

Design solutions: elderly or infirm

A group of users who suffer from arthritis in their wrists would have different concerns with the design of a range of products as shown here and would give different feedback than a population of users with no arthritis.

IDEO have worked on a project designing homes for 'Wounded Warriors'. For the end product to be successful the had to fully understand their users' needs in order to be able to design the perfect home layout for them. To do this they had to identify and fully understand the criteria by which they should group their users.

Wounded warriors- IDEO

Designers can also classify users into groups by considering criteria such as **interests, habits, nuances, emotional responses to specific stimuli etc.** The criteria about which a product will be designed will be defined by the classification of the user population.

Designers use user groups data to represent a personae or profile that is representative of the user group

Personae

The original of the work persona comes from the Latin *personare* meaning *speak through*. In Greek theatre the actor wore a mask to adopt a character and to speak as their character.

Greek theatre masks- *personare*

A persona is a fictional person who represents a major user group and is behaviour-based, user archetype and used to make decisions about a product's features, use and design. Personas are presented to the design team as a single human with a name, face, attitudes, and goals.

Personas put a human face on the amorphous 'user' because they are based on actual human user needs. They save time by focusing development toward real cases and away from unlikely, 'edgy' and loosely defined cases.

Personae are fictional constructs derived from ethnographic research

Personae development supports the design process by identifying and prioritizing the roles and user characteristics of key audiences for a product, system, or website, then creating composite individuals to represent the key audiences. The product team forms a unified vision of the intended uses of a design through reference to agreed-on personas.

A personae profile

Personae development begins with assumptions about user profiles, based on data from initial market research. Through interviews and observation, researchers expand and validate the profiles by identifying goals, motivations, contextual influences, and typical user stories for each profile. Having a fictional person (personae) representing a profile grounds the design effort in "real users."

The contents or information that might find it way into a personae:

Name (a real name like Greg or Madeline, etc.) age, a photo, personal information, including family and home life, work environment (the tools used and the conditions worked under, rather than a job description) computer proficiency and comfort level, personal and professional goals, candid quotes

Personae

John K. | Sr. Data Analyst

Alvin Carl | Duty Manager

Mike Carriker | Chief Pilot

Personas

Secondary Personae, Anti Personae & Use Case

For designers the three main personae are the primary personae, the secondary and also the introduction of the anti-personae. Each of these provide the design an opportunity to consider the user-centred issue in ideating design outcomes.

Personae are typical stakeholders and people whose needs must be satisfied. Multiple primary personas require separate interfaces.

Secondary personae are those who are not the primary target audience for a product, but whose needs the product should meet. They are able to provide valuable alternative insights to the development of a product.

Anti-personae are those for whom the product is not designed.

The reasons why a personae is created is to:

-understand the customer profoundly and in detail as if you knew them fully

-identify which group of customers need to be valued discover the needs of the customer which the actual customer may -not have recognised themselves

-improve the quality of products and services across a wide spectrum of design

Use case is a written document that describes the interaction from the user experience.

Patient- primary personae

Medical team- secondary personae

Use case relates to way in which a user of a product or system will interact with its functionality. The use case is a written document that describes the interaction from the user experience.

A use case will provide information about usability and over experience whilst the user interacts with the design solution.

Use case documents should include:

-Who is using the product or system

-What the user want to do

-The user's goal

-The steps the user takes to accomplish a particular task

-How the product or system should respond to an action

Scenario [user story]

Real-life scenarios that simulate "actual" user experiences can generate new findings.

Scenario is an imagined sequence of events in the daily life of a persona based on assumptions by researchers and designers. Students need to be able to consider best-, worst- and average-case scenarios that provide a physical and social context for different personae.

While personas tell us who the user is, UCD user stories tells us what they do. They are descriptions of how the users may interact with the system. Each UCD user story represents one type of user performing steps to achieve a specific goal. Like a story in literature, a good user story should have:

- A well-defined character as represented by a persona
- A setup that establishes the goal of the user
- An exposition that describes the actions of the user and the system's responses
- A resolution that describes the resulting state of the users and the system at the end of the story.

The UCD user stories tell the designer:

- When users will interact with the system
- Why users will interact with the system
- What users wish to achieve through interaction with the system

Storyboards are user stories with visual accompaniment such as wireframes.

It is important to not mistake UCD user stories and storyboards for user stories in Agile environments. In Agile, user stories are used to describe a specific function to be developed in a single sprint from a user perspective. Agile user stories are the product of good design, while UCD user stories inform the design. Of course, UCD stories serve as an excellent source for creating Agile user stories once a design is ready.

Story or user story - graphic based

Story or user story - digitally based

Scenarios

- Scenarios offer a physical and social context for different personae
- A scenario is an imagined sequence of events in the daily life of a persona based on assumptions by researchers and designers.
- Scenarios are based on best, worst and average case. Imagining any conceivable situation.
- *Students need to be able to consider best-, worst- and average-case scenarios that provide a physical and social context for different personae.*

https://youtu.be/Agyauj5epHI

Use Case

- A set of possible sequences of interactions or event steps between a user and a product to achieve a particular action.
- It depict all possible interactions
- Can be shown in step form or in a diagram
- Use case sample on this website

Use Case Diagram
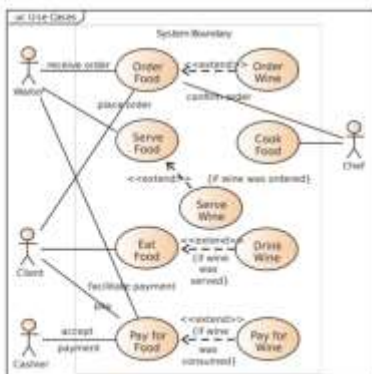
https://youtu.be/tLJXJLfLCCM

7.4 Strategies for UCD

Essential Idea: Users have a central role in evaluating whether the product meets their wants and needs.

Concepts and principles:
- Field research
- Method of extremes
- Observation, interviews and focus groups
- Questionnaires
- Affinity diagramming
- Participatory design, prototype and usability testing sessions
- Natural environments and usability laboratories
- Testing houses versus usability laboratories

Guidance:
- Advantages and disadvantages of different UCD strategies

Aim:

By including potential consumers in the testing of designs and prototypes, designers gain valuable data relating to how they will interact with a product.

Nature of Design:

For designers to successfully integrate usability into the design process, they require a holistic understanding of how a product, service or system is used. Designers must identify user requirements through the use of careful observation and interviews. A clear strategy for UCD will improve acceptability and usability, reducing costs and effort, while fulfilling user requirements.

Theory of Knowledge:
- Is it ever possible to eliminate the effect of the observer?
- To what extent does the language used on questionnaires shape the results?

Primary & secondary research

Primary research is the collection and analysis of original information from persons or organizations perceived as the actual or intended market for a product or service.

Secondary research involves the analysis of existing information even though it might have been collected for a purpose other than the issue under investigation. Secondary research involves the use of available information it is normally undertaken first for the very good reason that it is easier and quicker to consult existing records than to collect original data.

Primary research

User trial
User research
Field trials
Product analysis
Observation

Secondary research

Literature search
Web search

Qualitative & quantitative research

Measuring sets of variables (things that might vary that you are measuring) or quantities and their relationship to one another produces quantitative research. This form of research is built around numbers, logic and **objective** data. For example a person studying the effects of global warming may take measurements of the temperature over a given amount of time to determine the rate in which the climate is changing. Also incorporating statistical methods, quantitative market research techniques such as questionnaires can be used, the responses to which can be scored and measured. For example say a designer wanted to determine the user interface of a mobile phone and user satisfaction, the designer could ask a population of users to fill out a questionnaire. The information gathered would then be scored and measured. The resulting information could be used in developing further designs, or act as an evaluation of the final design.

Whereas Quantitative data deals with **objective** data such as numbers and logic, qualitative research deals with **subjective** materials such as **words** and **images**. This form of research normally uses tools such as interviews and literature search. Qualitative research is open to bias and lacks the statistical reproducibility of the quantitative methods.

Qualitative data is essentially concerned with **how** and **why** people behave, whereas quantitative research is more focused on **who, what, where** and **when**. At its simplest, qualitative research consists of asking actual or potential customers their attitudes, interests and opinions (hence AIO, research) towards the objects or topics the designer is interested in.

Quantities are measurable
Qualities are subjective

Quantitative	Qualitative
He is 6 feet 7 inches tall	He is tall
They eat six times a day	They eat all the time
The president approval rating is 73%	The president is really well liked
She saves $2000 every month	She is good with money
The cruise ship served 3000 passengers	The cruise ship was huge
The cat weighs 20lbs	The cat is fat

Field research

Is a companys product really as good and useful as they think it is? Do they really know who who's buying their product? One way to find out is by going into the field and observing their customers firsthand. Watching people in a retail store, for instance, may shed some light on how they manage shopping lists and purchase items on impulse. Field studies are one of the various qualitative methods that market researchers use to better understand customers' needs and wants.

What's key is that the work that field researchers conduct takes place in the participants' environment—such as a homework, store, bank, or hospital.

Field research also is good to use when redesigning a product. Chances are, customers have some frustrations with the current product. Using a field study, it may be discovered that the redesign is solving the wrong problem or that there are parts of the old way of doing things that work pretty well so you should be held onto.

Field research is quite powerful because it allows a company to see what people do as opposed to hearing what they have to say. What people say rarely matches what they do. For instance, the customer may tell you something is easy to use, but when you actually observe them doing that task in a field study, you can see all of the problems and inefficiencies they didn't recall or couldn't articulate

The biggest downside to field research is the cost, which could run to thousands of dollars. Still, the value of information gathered today can help with the future growth and development of the company.

Method of extremes

One common way of defining the range of a user population is the so-called method of extremes. Using this method, sample users are selected to represent the extremes of the user population plus one or two intermediate values. In a study to establish recommended kitchen work surface heights, three groups of sample female users were selected for the experiments (as seen in the picture).
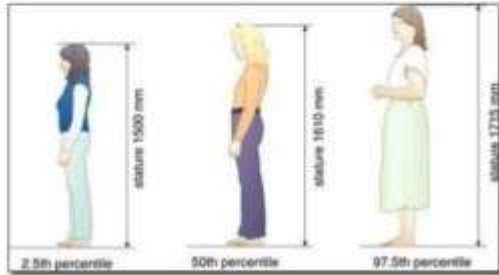
1. The shortest is around the 2.5th percentile of the stature range, that is, 1500 mm ± 25 mm.

2. The mean is around the 50th percentile of the stature range, that is, 1625 mm ± 25 mm.

3. The tallest is around the 97.5th percentile of the stature range, that is, 1740 mm ± 25 mm.

Above figure: Height requirements for the three groups of people selected for an investigation of the heights of kitchen work surfaces

For example, if we were designing a doorway using the height, shoulder width, hip width etc., of an average person, then half the people using the doorway would be taller than the average, and half would be wider. Since the tallest people are not necessarily the widest, more than half the users would have to bend down or turn sideways to get through the doorway. Therefore, in this case we would need to design using dimensions of the widest and tallest people to ensure that everyone could walk through normally.

Deciding whether to use the 5th, 50th or 95th percentile value depends on what you are designing and who you are designing it for.

Method of extremes

Usually, you will find that if you pick the right percentile, 95% of people will be able to use your design. For instance, if you were choosing a door height, you would choose the dimension of people's height (often called 'stature' in anthropometry tables) and pick the 95th percentile value – in other words, you would design for the taller people. You wouldn't need to worry about the average height people, or the 5th percentile ones – they would be able to fit through the door anyway.

What is it that you are aiming for with your design?	Design examples:	Examples of measurements to consider:	Users that your design should accommodate:
Easy reach	Vehicle dashboards, Shelving	Arm length, Shoulder height	Smallest user: 5th percentile
Adequate clearance to avoid unwanted contact or trapping	Manholes, Cinema seats	Shoulder or hip width, Thigh length	Largest user: 95th percentile
A good match between the user and the product	Seats, Cycle helmets, Pushchairs	Knee-floor height, Head circumference, Weight	Maximum range: 5th to 95th percentile
A comfortable and safe posture	Lawnmowers, Monitor positions, Worksurface heights	Elbow height, Sitting eye height, Elbow height (sitting or standing?)	Maximum range: 5th to 95th percentile
Easy operation	Screw bottle tops, Door handles, Light switches	Grip strength, Hand width, Height	Smallest or weakest user: 5th percentile
To ensure that an item can't be reached or operated	Machine guarding mesh, Distance of railings from hazard	Finger width, Arm length	Smallest user: 5th percentile Largest user: 95th percentile

Examples of other situations- your design project will normally fit into one of these groups

Sometimes you can't accommodate all your users because there are conflicting solutions to your design. In this case, you will have to make a judgment about what is the most important feature. You must never compromise safety though, and if there is a real risk of injury, you may have to use more extreme percentiles "methods of extremes" (1%ile or 99%ile or more) to make sure that everyone is protected (not just 90% of people).

Observation

A User trial is the observation of people using a product and collection of comments from people who have used the product. In examinations observing persons behavior is often emphasized rather than the collection of comments. You can just observe a person use a product and not ask for comments and this would still be a user trial.

Users can be given products to test over a particular period of time. This is often done as part of commissioning a new product or redesigning an old product. Manufacturers obtain feedback from the users to see if a final design or existing product meets the needs of the intended market. The manufacturers can then identify and rectify any problems with in the new product before full production begins and the product enters the market.

- User Trials normally create quantitative data. The data could be collected using market research technique of a questionnaire which asks specific information or give multiple choice answers to questions. You could also interview the person but this would be more qualitative.
- A user trial is classed as Primary data.
- User trials are useful and appropriate for gaining information concerning ease of use (ergonomics), performance, aesthetics and price.
- The usability of products can be tested and tell the designer how it can be used and abused from a wide range of sample users. Users can identify the strength and weaknesses of the design.
- Normally uses a real product.

Observation

Examples of 'observing' user trials could be: Observing and obtaining user's responses with the layout of street furniture, trying a new food product, using a toothbrush, collecting ergonomic data for a bicycle design and using a prototype refrigerator.

Advantages:
- Users trials are readily available
- Users may carry out tests in unexpected ways so truly challenge the design
- User trails are cost effective as they are cheap to undertake, as non- specialists
- They provide valuable data and feedback to refine a product and inform future design development, which will ensure product success in the market place.
- Health and safety issues particularly associated with the use/ abuse of the product which can be difficult for a designer to predict can be ironed out.

Disadvantages:
- A number of products need to be produced for users to test- cost issue
- Interpretation of collected data may be difficult.
- The results of the user trials may give contradictory results/ biased results
- Time consuming and may delay product going to market.

Interviews and questionnaires

User research is obtaining user responses, usually through questionnaires or interviews.

This is similar to user trial in that users/ consumers are involved. However, in this case the user merely answers questions posed to them about a product or context, but they do not have to have the actual product or test the actual product. We then can get comments from potential users of the product.

- User research is classed as a market research strategy, and uses data collection techniques such as supermarket surveys, questionnaires and interviews.
- Helps to establish the target market which is carried out prior to designing.
- Is important in helping to establish the "need" i.e. formulating the design brief/ specifications, this then would mean the brief matches the needs of the market.
- User research is classed as Primary data.
- User research is largely qualitative.

Focus groups are facilitated sessions with a number of individuals from your target audiences brought together to discuss specific elements of your digital offering and customer experience.

Focus groups

Focus groups could be used for testing user responses to particular products and obtaining less specific ideas on user preferences. For example a prototype might be shown to a group of users who are the asked to give their views on it, to compare it with other products with which they may be familiar. This will give the designers some indications of user response to the product. Less specific preferences or attitudes can be explored by asking a group to discuss more general features of a broad product type, using questions such as 'what most annoys you about lawnmowers?' or "which gardening activities would you like new products to help you with?'

Affinity diagramming

Affinity diagrams are a graphic tool designed to help organize loose, unstructured ideas generated in brainstorming or problem solving meetings.

1. Identify a general theme. The theme may be associated with a problem situation or an opportunity situation, or simply a situation in our physical and/or social environments.

2. Collect facts, opinions, and ideas. Data/information may be generated by a group of people in any number of formats. For example, we can use work teams, focus groups, groups of experts, or data/information existing in files or archives.

3. Express and enter the data/information in a common format. Here, we might use sticky notes on a wall, cards on a table, or computer software capable of expressing each piece of data/information in a medium that can be "moved around."

4. Identify the groups/clusters. Here, we identify/label/describe the groups or clusters regarding the common attribute(s) or summary characteristics that apply.

5. Cluster the data/information pieces. At this point we cluster or organize our data/information into cohesive groups.

6. Repeat steps 4 and 5 to form super groups/clusters. It may be possible to relate two or more of the initial groups/clusters and develop a super group or super cluster. Super grouping can be repeated until the facts, opinions, or ideas are suitably classified/organized.

7. Present the results. The final product is an organized set of facts, opinions, and ideas that make sense in terms of providing help in understanding the nature of the situation or theme from step 1.

Affinity Diagram

A tool used to organise ideas and information

Participatory design

Participatory design seeks to include the intended users either in the research, concept, design or production of an outcome. It does not just ask users opinions on design issues, but actively involves them in the design and decision-making processes.

An example of **participatory design** is when users representing the target market for a product perform realistic tasks by interacting with a paper version of the user-product interface manipulated by a person acting as a computer who does not explain how the interface works.

An example would be a participatory design workshop in which developers, designers and users work together to design an initial prototype. This initial prototype would then feed into a more traditional design process.
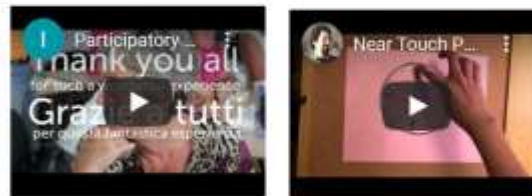
Projects which only utilise participatory design are very rare.
A disadvantage of participatory design sessions is that they require a experienced moderator with thorough knowledge of the domain to guide them.

PARTICIPATORY DESIGN IS ITERATIVE

Open Ideo- Tim Brown

An example would be a participatory design workshop in which developers, designers and users work together to design an initial prototype. This initial prototype would then feed into a more traditional design process.
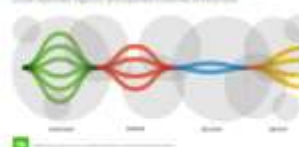
Participatory design seeks to include the intended users either in the research, concept, design or production of an outcome. An example of **participatory design** is when users representing the target market for a product perform realistic tasks by interacting with a paper version of the user-product interface

Paper prototype and usability testing sessions

Paper Prototyping and usability is a variation of usability testing and example of participatory design, where representative users perform realistic tasks by interacting with a paper version of the interface that is manipulated by a person who doesn't explain how the interface is intended to work.

Paper prototyping is sometimes called **low-fidelity prototyping**. It is one example of participatory design, that is, it involves users in design development.

Low-fidelity prototyping are several types of findings from paper prototype usability tests:

- Usability issues. All the things you typically find in usability testing - confusing concepts, poor terminology, layout problems, lack of feedback, etc.

- Missing (or misspecified) functional requirements. Users often have needs that the development team isn't aware of, or the team may have a mistaken assumption about what functionality will satisfy a user requirement.

- Preference for one design alternative. Sometimes there are multiple ways to provide a function and they're equally easy to implement. But users may have a clear preference for one way over another.

- Priorities. No company has unlimited resources — paper prototyping can separate the gotta-haves from the nice-to-haves.

- Issues outside the user interface. A product is more than just a user interface. The brand and the company's reputation are important, as is the context in which the product will be used. Paper prototypes are often sufficiently realistic that they encourage test participants to extrapolate to real-world situations of use. Thus, they can uncover issues beyond the user interface.

Paper prototyping is sometimes called **low-fidelity prototyping.**

Paper prototype and usability testing sessions

There are various roles in paper prototyping sessions, these include the facilitator, the user, the computer and the observer

Facilitator: explains the purpose of the session to the user and how to interact with the prototype. The facilitator's main responsibility is to ensure that the session isn't too stressful on the test participants, who tend to blame themselves when they run into difficulty with the interface. On the other hand, the facilitator needs to probe into the issues that arise, so the development team can get the information they need to make improvements to the interface.

User: represents the target market for the product, and interacts with the user–product interface to "use" the product in response to guidance from the facilitator.

Computer: a human being simulating the behaviour of the computer program in response to instructions from the user. The main difference in paper prototype testing is the addition of the human computer, who manipulates the paper interface pieces to mimic the behavior of the system. Users are instructed to "click" (touch) buttons or links, and "type" (handwritten) data directly onto the prototype. The Computer responds to those actions as the system would. The Computer does not explain the interface (most machines can't talk), so it's up to the users to figure out how to accomplish their tasks. Being the Computer does not require any special training, though this role should be played by someone who understands how the interface behaves. Typically, the Computer is one of the lead developers, though technical writers, marketers, training specialists, and customer support reps may also have sufficient knowledge of the product to play this role.

Advantages of paper prototyping include:
It is cheap and easy to implement. A paper prototype can be quickly and easily modified and retested in the light of feedback from representative users, so designs can be developed more quickly. It promotes communication between members of the development team. No computer programming is required, so paper prototyping is platform-independent and does not require technical skills. A multidisciplinary design team can collaborate on design development.

Explain **three** advantages of paper prototyping in the design of the controls for electronic products.

[9]

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Natural environment and usability laboratories

Usability testing is carried out in a **usability laboratory**. Typically, users are seated with an instructor who observes them performing a particular task with the product. Another group of observers is behind a one-way mirror, where they can record the activity and note insights. Often the tests are recorded for later reference and analysis. There are many advantages and disadvantages between using natural environments and usability laboratories and between using usability laboratories and testing houses for design companies. Students will need to consider these.

Usability Labs- Seattle USA

Usability labs are environments where users are studied taking part in focus groups or some form of participatory design.

This video is an example of what a lab can look like. Sometimes, to make users more comfortable and therefore more likely to interact with a product more realistically, a company may allow users to test their products in their homes or place of work and monitor them remotely. These **natural environments** can in some cases be more beneficial than artificial lab environments.

Read through these advantages and disadvantages of labs and natural remotely monitored environments, create a table with advantages and disadvantages of other UCD test strategies you have covered

7.5 Beyond usability: designing for pleasure & emotion

Essential Idea: Usability is not the only factor for a designer to consider; products can be designed to evoke pleasure and emotion.

Concepts and principles:
- The four-pleasure framework was identified by Professor Lionel Tiger from Rutgers University in New Jersey, USA and includes socio-pleasure, physio-pleasure, psycho-pleasure and ideo pleasure
- Design for emotion
- The attract/converse/transact (ACT) model

Essential Understanding:
- How designing for emotion can increase user engagement, loyalty and satisfaction with a product by incorporating emotion and personality
- How the ACT model can be used as a framework for creating designs that intentionally trigger positive emotional responses

Aim:
The ability to express emotion through a product can not only build appeal for the consumer, but also build affinity between a product and consumer. It can enable a product to communicate how one should interact with it.

Nature of Design:
A designer's ability to provide satisfaction through aesthetic appeal and pleasure can greatly influence the success of a product, service or system. Understanding attitudes, expectations and motivations of consumers plays a significant role in predicting product interaction. Designers need to be empathetic and sympathetic to user emotion, which acts as a critical component to determine how he or she interprets and interacts with a product, service or system.

Theory of Knowledge:
Are emotions purely physiological or are they culturally bound?

Four-pleasure framework: Socio-pleasure

Socio-pleasure can be derived from social interaction and are concerned with pleasures derived from social signifiers of belonging, social-enablers and other social self-identification factors. Products and services can facilitate social interaction in a number of ways. Email, internet and mobile phones, for example, facilitate communication between people.

Pleasure from relationships with others, for example, specific relationships with friends, loved ones, colleagues or like-minded people or with society as a whole when it is related to status and self-image.

Other products may promote social interaction by being conversation starters, for example, jewellery, artwork or furniture. Clothing can communicate social identity and indicate that a person belongs to a particular social group. Certain status can be conveyed by owning a product, others could be jealous of the ownership of the product.

Facebook is a tool that enables people to have a greater sense of community and involvement with one another. Often geographically disparate friends can still retain a foothold in one another's lives.

For most web designers, especially a few years ago, owning an iPhone was more or less de rigeur in the same way that a Blackberry is for crack dealers and bankers.

At school, wearing a pair of Adidas-like 'one stripe too many' trainers in PE would lead to mockery. No-one was suggesting that the shoes were of a lesser quality, simply that they said you were too poor or socially unaware to have the 'proper' ones.

Certain objects or features provide a talking point, a sense of identity, a way to differentiate and create a starting point for dialogue. This could be a Mohican, an audiophile sound system or a folly that you have built on your estate.

Pleasure that comes from a feeling of belonging to a social group, social enablers, and other ways that one can identify oneself with social groups

Four-pleasure framework: Physio-pleasure

Physio-pleasure is a sensual pleasure that is derived from touching, smelling, hearing and tasting something. It also conveyed by an objects effectiveness in enabling an action to be performed. Physio-pleasure can be derived from the feel of a product during use (for example, wearing a silk garment of the smooth feel of an iPod), its taste (for example, eating chocolate) or its smell (for example, the smell of leather, a new car, coffee or freshly baked bread).

Car interior: new leather smell and feel | Silk: touch and feel | Flat white coffee: taste and smell | High quality cook's knife: effectiveness

Some magazines (I'm thinking of Eye Magazine) have both a wonderful texture due to the quality of the paper stock combined with a fantastic smell as you open it's pages. Leather goods have a similar effect – more for some than others.

A refined and well engineered tool such as a Wüsthof cook's knife has a pleasing heft and balance that is noted immediately upon using the tool. It also conveys a pleasure to the user of being highly effective — making light work of the often mundane tasks for which it is employed.

When we close a car door and it makes a satisfying clunk we experience a certain pleasure. This is a combination of the acoustic feedback that the door is definitely closed, combined with an aesthetic enjoyment of the sound itself. The sound will have been engineered to produce this response.

A sensual pleasure that comes from touching, smelling hearing or tasting something. It can be derived from a feeling of satisfaction that comes from the effectiveness of an object in enabling an action to be performed.

Four-pleasure framework: Psycho-pleasure

Psycho-pleasures are pleasures that are derived from cognition, discovery, knowledge, and other things that satisfy the intellect. The cognitive demands of using a product or service and the emotional reactions engendered through the experience of using it. For example, it might be expected that a word processor that facilitated quick and easy accomplishment of tasks would provide a higher level of psycho-pleasure than one with which the user was likely to make many errors. The former word processor should enable the user to complete the task more easily than he or she would with the latter. The outcome may also be more emotionally satisfying and less stressful.

Graphic program: satisfying when mastered   Cube puzzle: cognitive challenge   NatGeo: discover new knowledge   iPad Air: discovering how it works

The first time that you pick up an iPod/iPhone/iPad and start playing with it you quickly get an idea of how it works. Even if you don't get it straight away, it is learnable, memorable and pretty consistent — you soon get to know the ropes. This leads to a certain sense of satisfaction because, largely, 'it just works'.

Games are enjoyable because they present challenges that we need to figure out. Whether finishing the Rubik's cube, or achieving checkmate in a few moves, there is a cognitive-emotional pleasure that is derived from such activities.

National Geographic Science is a popular TV programme and website and the reason people enjoy it so much is because they can discover new ideas and expand their mind with thoughts and new knowledge. People may not wholly, or indeed even partially, understand it but enjoy the act of thinking about it.

Psycho pleasure is the type of pleasure that is derived or comes from cognition, discovery and knowledge that satifies the intellect.

Four-pleasure framework: Ideo-pleasure

Ideo-pleasures are pleasures that are linked to our ideals, aesthetically, culturally and otherwise to satisfy people's tastes, values and aspirations. **Ideo-pleasures** can be derived from products that are aesthetically pleasing by appealing to the consumer's values. Values could be philosophical or religious or may relate to some particular issue such as the environment or a political movement. These values can be embodied in products. For example, a product made from biodegradable materials might be seen as embodying the value of environmental responsibility.

Products that are aesthetically pleasing can be a source of ideo-pleasure through appealing to the consumer's tastes. Values could be philosophical or religious or may relate to some particular issue such as the environment or a political movement. These values can be embodied in products. For example, a product made from biodegradable materials might be seen as embodying the value of environmental responsibility. Designs can be classed as "cool", for example an Iphone could appeal to consumer tastes though its minimalist design as it hides it's features.

The mug from Ikea is largely unremarkable and utilitarian and designed for ideo-pleasure when it is washed and placed on the draining rack with it's elegant design feature of grooves scored into the base so that all of the water on the base runs off when it is placed upside down. Lesser mugs pool this water, often leading to a surprise when the mug is taken from the draining rack. This reflects an ideological standpoint that everything can be made better, often through very small and elegant changes.

Aesthetic sensibilities are often closely linked to our ideological or cultural identity and determine to a great extent the pleasure a product may bring. Many people that get a great deal of pleasure from driving VW camper vans. They are often impractical, unreliable and relatively expensive in comparison to other vehicles that offer greater utility.

(a)   State which aspect of the "four pleasure framework" is triggered by the aroma of freshly-baked bread.   *[1]*

(b)   Outline **one** reason why technophiles would experience psycho-pleasure when using a newly-purchased mobile phone.   *[2]*

Design for emotion

Donald Norman breaks down emotional responses into three levels of design, applicable to everyone.

The three levels or characteristics come from: within our instincts, visceral, through use, behavioural and from outside influence and aspirations, reflective.

The DESIGN of EVERYDAY THINGS

"The Design of Everyday Things is even more relevant today than it was when first published"
-TIM BROWN, CEO of IDEO, author of Change by Design

DON NORMAN

Donald Norman- one of his books

Donald Norman- emotional design

Great Design	=	Visceral Design	+	Behavioral Design	+	Reflective Design
What the design...		makes you feel		helps you do		says about you

Three characteristic of good design:- visceral, behavourial & reflective design

Design for emotion

Designing for emotion can increase user engagement, loyalty and satisfaction with a product by incorporating emotion and personality into product design.

Aesthetically pleasing objects appear to the user to be more effective, by virtue of their sensual appeal. This is due to the affinity the user feels for an object that appeals to them, due to the formation of an emotional connection with the object. As markets become flooded with products, consumers are overwhelmed with choice. In order to maximize their market potential, companies have to satisfy the user's inner emotions to provide an increased likelihood of product purchase.

There is also a desire to re-establish and increase the consumer's emotional attachment to a product. This will hopefully decrease the wasteful nature of today's throwaway society.

Emotional design: Apple Mac versus PC machine

Comparing products- emotional level

Comparing Apple products with other computer manufacturers is a common example of how a company has integrated **design for emotion** into their products.

The three characteristics of visceral design, behavioural design and reflective design are quite clear and easy to understand.

A design strategy that focuses on increasing user engagement, loyalty and satisfaction with a product by incorporating emotion and personality into the product.

Designing for emotion

Visceral – At the visceral level, it is evoking our inner instincts, our human drives its at a foundation level of product emotions. When something triggers an emotion at a visceral level, it has an immediate, unknowing impact on a person. An example would be when a person takes one look at something and says 'I want it', before asking 'what does it do?' and 'how much does it cost?'. At the visceral level, physical features – look, feel and sounds dominate. Product movement can also be seen as a physical feature

Behavioural – At the behavioural level, its entirely about the use of the product, appearance is less relevant. However the appearance in context of the use is a contributing factor as the product appearance can imply an expectation of how the product should be operated. What matters here are function, usability, understandability and physical feel.

Reflective – At the reflective level, it points to our culture, any meaning in the product and its use. Its how we see the product reflecting our self image and aspirations to others. It can also evoke personal remembrance or a special memory. For example, choosing to buy a certain car because it is a hybrid and you want others to know you are conscious of the effects on the environment.

Designing for emotion

Visceral
- Unique design of body and time display
- Combination of retro and contemporary styles

Behavioural
- Time not instantly seen
- Unusual way of telling time would take a while to get used to

Reflective
- Expensive looking materials would give feeling of higher social status
- Unusual time display gives impression you are not afraid to try new things
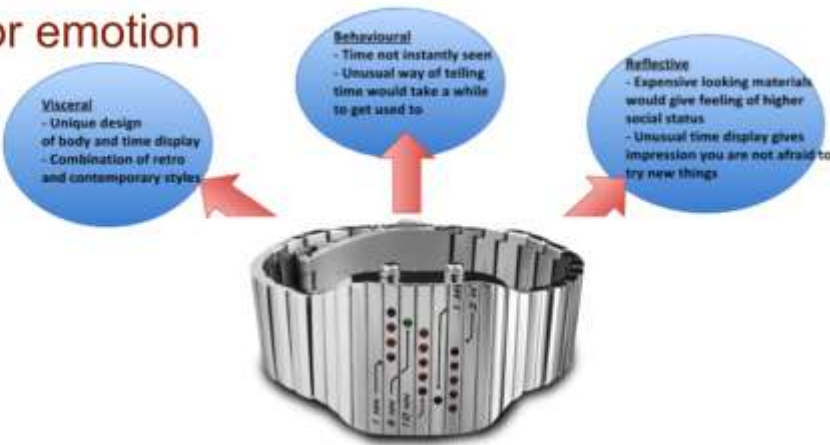
Products can bring about a number of these reactions at one time, think of the Alessi 'Juicy salif' above, its unusual design can create a visceral reaction and people wanted to own it to show others that they had a specific taste (reflective). However, most people agree that it is not very good at juicing, conflicting and creating a negative behavioural reaction.

Amusement parks have a good relation between reflection and visceral. The ride looks dangerous and scary, but the reflective level tells you that 'it's safe, there is nothing going to happen'; it's calming you down, whereas the visceral level is operating at full force. Here the visceral level wins, but afterwards the reflective level wins.

Attract-converse-transact (ACT) model

The ACT Model is the result of the work of Trevor van Gorp and Edie Adam in their book Design of Emotions.

The ACT model is a framework for creating designs that improve the relations of users with a product and intentionally trigger emotional responses.

-The **attract** part of the model is aesthetics oriented.
-The **converse** part of the model is interaction oriented.
-The **transact** part of the model is function oriented.

The ACT model is a framework for creating designs that improve the relations of users with a product and intentionally trigger emotional responses.

When all three elements are addressed, products can become **desirable, usable and useful.**

The premise is that, by designing products that conform to the social rules we have learned since childhood interacting with other people, we can help new and experienced technology users to form better relationships with products.

For products to be successful they must be *desirable* to **attract** the users' attention, The users then *approach* the product and **converse** with it. At this point it becomes important that your product is *usable*. After your product has consistently performed to the Users' expected standards, the Users will find it *useful* and will be willing to commit to **transact** with it.

Attract
-Processed unconsciously and automatically
-Aesthetics of the product - sight, sound, touch, movement, colour.
-Whether the user finds the aesthetics appealing.
-The pleasures and passions the aesthetics provide.

Converse
-Processed unconsciously and automatically
-How the product interacts and behaves - ease of use.
-Whether product meets up to users' standards.
-Benefits that come from use and the completion of tasks.
-Feeling of intimacy and connection.

Transact
-Processed consciously - can override the unconscious
-The product's contribution to our self-image and identity.
-Benefits that come from completion of goals.
-Feelings of trust leading to commitment.

Beyond usability: designing for pleasure & emotion

Describe the "four pleasure framework"
The "four pleasure framework" was identified by Professor Lionel Tiger from Rutgers University in New Jersey, US. It includes the four areas of physio pleasure, psycho-pleasure, socio-pleasure and ideo-pleasure.

Define physio-pleasure
Pleasure derived from the sensory organs, including pleasures connected with touch, taste, smell and sensual pleasure.

Define socio-pleasure
Pleasure from relationships with others, for example, specific relationships with friends, loved ones, colleagues or like-minded people or with society as a whole when it is related to status and self-image.

Define psycho-pleasure
Pleasure derived from people's mental and emotional reactions to a product.

Define ideo-pleasure
Pleasure derived from satisfying people's tastes, values and aspirations.

Identify ways in which products promote physio-pleasure
Physio-pleasure can be derived from the feel of a product during use (for example, from wearing a silk garment or the smooth feel of an iPod), its taste (for example, from eating chocolate) or its smell (for example, the smell of leather, a new car, coffee, fresh bread from a bread-making machine).

Identify ways in which products promote socio-pleasure
Products and services can facilitate social interaction in a number of ways. E-mail, internet and mobile phones, for example, facilitate communication between people. Other products may promote social interaction by being conversation starters, for example, jewellery, artwork or furniture. Clothing can communicate social identity and indicate that a person belongs to a particular social group.

Identify ways in which products promote psycho-pleasure
Issues relating to the cognitive demands of using the product or service and the emotional reactions engendered through the experience of using it. E.g. you expect that a word processor that facilitated quick and easy accomplishment of formatting tasks would provide a higher level of psycho-pleasure than one with which the user was likely to make many errors. The former word processor should enable the user to complete the task more easily than they would with the latter. The outcome may also be more emotionally satisfying and less stressful.

Identify ways in which products promote ideo-pleasure
Products that are aesthetically pleasing can be a source of ideo-pleasure through appealing to the consumer's tastes. Values could be philosophical or religious or may relate to some particular issue such as the environment or a political movement. These values can be embodied in products. For example, a product made from biodegradable materials might be seen as embodying the value of environmental responsibility.

Explain how the "four pleasure framework" promotes a holistic view of product design and marketing
The "four pleasure framework" is a useful tool for taking a structured approach to product design and marketing. It can act as a practical tool. Using the framework can help to make us more thorough and methodical in our approach than would be the case if we tried to approach the whole thing in an unstructured way.

Topic 7: User-centred design (UCD)

7.1 User-centred design (UCD)	The designer needs to have a deep understanding of the user, task and the environment. The process is iterative, led by the user and developed through user-centred evaluation. The product must address the whole user experience. UCD design teams are multidisciplinary. The five stages of UCD: research, concept, design, implementation, launch. Inclusive design	• UCD design teams may include anthropologists, ethnographers and psychologists. • Inclusive design requires designing universally accessible products for all users including those with physical, sensory, perceptual and other challenges and impairments.
7.2 Usability	Usability objectives Enhanced usability Characteristics of good user-product interfaces Population stereotypes	• Usability objectives include usefulness, effectiveness, learnability, attitude (likeability) • Benefits of enhanced usability include product acceptance, user experience, productivity, user error, training and support • Characteristics of good user-product interfaces include simplicity, ease of use, intuitive logic and organization, low memory burden, visibility, feedback, affordance, mapping and constraints. • Advantages and disadvantages of using population stereotypes for designers and users
7.3 Strategies for user research	User population Classification of users The use of personae, secondary personae and anti-personae in user research Scenarios provide physical and social context for different personae Use case	• Users can be classified by age, gender and physical condition. • Scenarios are based on best, worst and average case.

Higher Level
Topic 7

Topic 7: User-centred design (UCD) continued

7.4 Strategies for UCD	Field research Method of extremes Observation, interviews and focus groups Questionnaires Affinity diagramming Participatory design, prototype and usability testing sessions Natural environments and usability laboratories Testing houses versus usability laboratories	• Advantages and disadvantages of different UCD strategies
7.5 Beyond usability -designing for pleasure and emotion	The four-pleasure framework: socio-pleasure, physio-pleasure, psycho-pleasure and ideo- pleasure Design for emotion The attract/converse/transact (ACT) model	• How designing for emotion can increase user engagement, loyalty and satisfaction with a product by incorporating emotion and personality • How the ACT model can be used as a framework for creating designs that intentionally trigger positive emotional responses

User-Centred Design

- The ability to put aside one's own ideas and bias is essential for UCD.
- As a designer, you must act with integrity and not project your own ideas of what the user requirements are when trying to create technological solutions to their problems.

As a designer you need to take user input at each one of the points shown in this diagram – Research, Concept, Design, Implementation and Launch. A UCD project involves 'real' people who are actual or potential users of your product, and it involves people at each of these points, allowing you to check and iterate your design at each stage of the project.

User-centered design (UCD) is a process in which the needs, wants, and limitations of end users of a product, service or process are given extensive attention at each stage of the design process.

UCD is **NOT** thinking about users as this is very different to actually meeting them, talking to them, watching them interact with your product, or exist in the space for which your product is designed. UCD is more than just thinking about users.

UCD gurus including Jakob Nielsen and Deborah Mayhew both advocate getting as much as you can from each step, using the methods and means most appropriate to the project. They believe all life-cycle tasks will always apply, but they can be expanded and contracted depending on the requirements, characteristics, and resources of a particular project.

Approach to UCD

Higher Level
Topic 7.1

User-centered design (UCD) is a project approach that puts the intended users of a product or system at the centre of its design and development. It does this by talking directly to the user at key points in the project to make sure the site will deliver upon their requirements.

The stages are carried out in an iterative fashion, with the cycle being repeated until the project's usability objectives have been attained. This makes it critical that the participants in these methods accurately reflect the profile of your actual users.

ISO 13407 outlines four essential activities in a user-centered design project:
- Requirements gathering - Understanding and specifying the context of use and specifying the user and organisational requirements
- Design - Producing designs and prototypes
- Evaluation - Carrying out user-based assessment of the site
- Implement the product or system
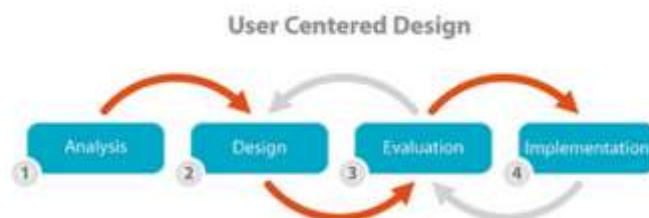
User, task and the environment

The designer needs to have a deep understanding of the user, task and the environment.

Look at the information on the link below on redesigning the school canteen. Explain how this task illustrates the above concept

http://www.designboom.com/art/a-cafeteria-designed-for-me-ideo-05-01-2014/

UCD principles

User-centered design (UCD) is a process (not restricted to interfaces or technologies) in which the needs, wants, and limitations of end users of a product, service or process are given extensive attention at each stage of the design process.

User-centered design can be characterized as a multi-stage problem solving process that not only requires designers to analyse and foresee how users are likely to use a product, but also to test the validity of their assumptions with regard to user behaviour in real world tests with actual users. Such testing is necessary as it is often very difficult for the designers of a product to understand intuitively what a first-time user of their design experiences, and what each user's learning curve may look like. The chief difference from other product design philosophies is that user-centered design tries to optimize the product around how users can, want, or need to use the product, rather than forcing the users to change their behavior to accommodate the product. The process is iterative led by the user and developed through user-centred evaluation. The diagram shows the four most important UCD principles:
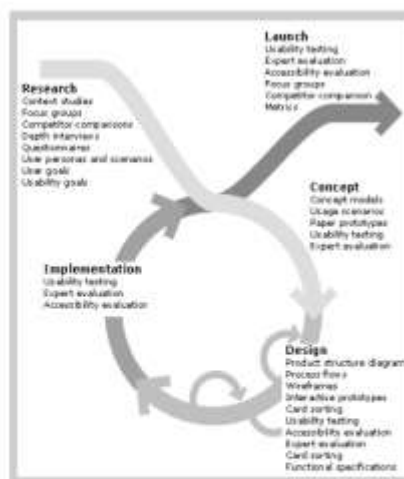
UCD design teams are **multidisciplinary.**

UCD principles are explained and their possible application in:

- Usage centred requirements analysis and specification
- Structured user interface design & natural interaction innovation
- Early and continuous usability assessment, evaluation & improvement
- Human centric project management & quality procedures

Notes / Activities

USER CENTERED DESIGN

KEY WORDS: EXPERIENCE, THINKING, OBSERVATION, HUMAN, INSIGHT

NAME:

1 EXPERIENCING CONTEXT

Why do you think these EXPERIENCES have such a high IMPACT?

LEARN

Why do you think actually EXPERIENCING in CONTEXT is so valuable?

How would these learning activities be different if you weren't IN THE CONTEXT?

2 USER CENTRED VIDEO ANALYSIS

2A// ALVIN – BURN SURVIVOR

A. What SPECIFIC CONDITION does this user have?

B. What TASKS/THINGS do they have DIFFICULTY with NOW compared to BEFORE?

C. How could DESIGN be used to HELP this person with THEIR LIFE?

2B// JOE – IED survivor

A. What SPECIFIC CONDITION does this user have?

B. What TASKS/THINGS do they have DIFFICULTY with NOW compared to BEFORE?

C. How could DESIGN be used to HELP this person with THEIR LIFE?

3 IMMERSIVE EXPERIENCES
UNDERSTANDING THROUGH DOING

3A// CONDITION: PARTIALLY SIGHTED
TASK: POURING WATER INTO A GLASS

A. List all the PROBLEMS YOU EXPERIENCE completing the task...

B. How did you FEEL emotionally doing it?

C. What INSIGHT have you gained from this activity?

3B// CONDITION: ARTHRITIC
TASK: USING CHOP STICKS

A. List all the PROBLEMS YOU EXPERIENCE completing the task...

B. How did you FEEL emotionally doing it?

C. What INSIGHT have you gained from this activity?

Population stereotypes

It is important to consider the intended User Population for any product (or system) you are designing. It can be defined as the range of users for a particular product or system. these can be defined by age, gender, physical condition, socio-economic class etc.

Incident involving logic of use

Population stereotypes are responses that are found to be widespread in a user population

In a situation of seemingly arbitrary choice, a particular option that is chosen by a large proportion of a given population, or an expectation, interpretation, or a manner of perceiving, thinking, or behaving that is statistically prominent within the population.

It is a concept relating to cultural expectations. It is the manner in which most people in the population expect something to be done. You might think of it as your intuition or your innate functional understanding of something. If you pick up an iPad you might say you have an intuitive understanding of the interface. You can operate it without having to learn how to operate it.

Notes / Activities

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User population

User populations are a range of users for a particular product or system. There may be particular user populations a product is designed for; however, many products are designed for use by different or multiple populations.

Many products are successful because they are only aimed at a **narrow user population**. For example the cockpit of A380 aircraft are only successful because the physical and cognitive characteristics of the user population are know as exact and narrow qualities, therefore the product can be optimised specifically for that user.
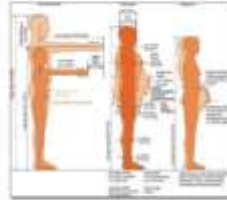
Classification of user

Designers can also classify users into groups by considering criteria such as **interests, habits, nuances, emotional responses to specific stimuli etc.** The criteria about which a product will be designed will be defined by the classification of the user population.

IDEO have worked on a project designing homes for 'Wounded Warriors'. For the end product to be successful the had to fully understand their users' needs in order to be able to design the perfect home layout for them. To do this they had to identify and fully understand the criteria by which they should group their users. Watch the video below and write down what criteria IDEO might have considered in order to classify their users to produce the ideal product.

A Look at the Patriot Home

Personae

Personae development supports the design process by identifying and prioritizing the roles and user characteristics of key audiences for a product, system, or website, then creating composite individuals to represent the key audiences. The product team forms a unified vision of the intended uses of a design through reference to agreed-on personas.

Personae development begins with assumptions about user profiles, based on data from initial market research. Through interviews and observation, researchers expand and validate the profiles by identifying goals, motivations, contextual influences, and typical user stories for each profile. Having a fictional person (personae) representing a profile grounds the design effort in "real users."

Essential Details for Defining Personas
- A name (a real name like Greg or Madeline, etc.)
- Age
- A photo
- Personal information, including family and home life
- Work environment (the tools used and the conditions worked under, rather than a job description)
- Computer proficiency and comfort level with using the Web
- Pet peeves and technical frustrations
- Attitudes
- Motivation or "trigger" for using a high-tech product (not just tasks, but end results)
- Information-seeking habits and favorite resources
- Personal and professional goals
- Candid quotes

Personae

Designers can observe and interview members of a user population in order to create fictional characters known as personae, secondary personae and anti-personae.

• **Personae** are typical stakeholders and people whose needs must be satisfied. Multiple primary personas require separate interfaces.

• **Secondary personae** are those who are not the primary target audience for a product, but whose needs the product should meet. They are able to provide valuable alternative insights to the development of a product.

• **Anti-personae** are those for whom the product is not designed.

Scenario

As an example, the Hanna Reed-Smith, Human Resources Specialist, persona includes (in addition to the user profile data, such as age, frequency of use, and Web experience) details such as:

Hanna is moving up the corporate ladder. Her goal is to replace the current HR manager when he retires in three years. Hanna prides herself on being fast, efficient, and precise. She stakes her reputation on the month-end reports that show how many transactions she has completed in comparison to her colleagues. Hanna struggles with balancing work life and family life. She works from home on Tuesdays and Thursdays so that she can be with her kids. Her computer setup at home is much older and slower than the one at work and she sometimes gets frustrated because she feels limited when working at home.
Hanna views her computer as a helpful and (mostly) enjoyable tool to help her climb to the top. She changes her display colors based on the upcoming holidays. Hanna has one big hang-up related to using the computer — she hates to ask for help. She will spend a lot of time trying to figure something out on her own, rather than admit that she doesn't know what to do.

Personas that are created are often put into scenarios to predict how they would react, based on that persona. Look at the scenarios on the website below

http://www.uiaccess.com/accessucd/scenarios_eg.html

Task: Discuss how will this help the design team?
Task: Personas are often put into categories. Primary, secondary and anti (negative) personas. Discuss how they are defined and why are they used? How do they affect scenarios?

Participatory design

An example would be a participatory design workshop in which developers, designers and users work together to design an initial prototype. This initial prototype would then feed into a more traditional design process.
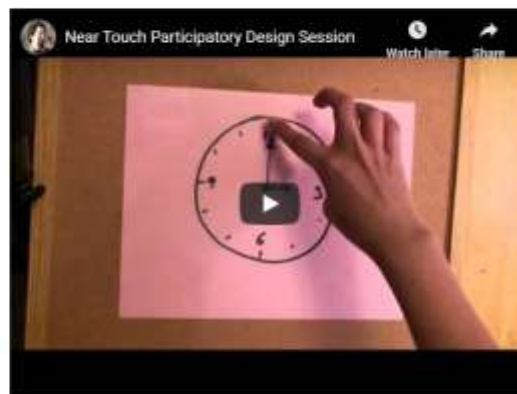
Projects which only utilise participatory design are very rare.

A disadvantage of participatory design sessions is that they require an experienced moderator with thorough knowledge of the domain to guide them.

Summary Notes
Q&A

Topic 7. User-Centered Design

Products should not only be useful, they should be usable and desirable. <mark>**Usefulness, usability and desirability**</mark> have been described as the <mark>***three-legged stool of design***</mark>—take one leg away and the whole thing falls over! User-centred design (UCD) is particularly useful when a new product is to be introduced. User-centred designers engage actively with users to gather insights that drive design from the earliest stages of product development right through the design process, setting the agenda for projects and feeding directly into the product brief. Designers/companies have shifted from conventional market research techniques to greater emphasis on the user experience. UCD involves smaller numbers of people than conventional market research and it can lead to unexpected insights that stimulate innovation. Conventional market research may be flawed as users often do not tell researchers the true facts about a product or they cannot identify how and why they use products—particularly for radical designs. Awareness of the experience of end-users can lead designers to question established practices and assumptions. UCD enables user feedback to inform product redevelopment even after launch, sometimes in quite a radical way.

User-centred design

UCD is a design process paying particular attention to the needs of potential users of a product through involvement of users at all stages of the design process. It considers how users are likely to use the product and tests products with actual users. Sometimes called "empathic design", the user-centred approach puts the design team in direct contact with the people they are designing for, that is, to empathize with potential users and so gain a better understanding of users' thoughts, needs, values and beliefs. The design team often includes anthropologists, ethnographers and psychologists to advise the creative designers.

Students should be able to apply the following principles of UCD to the design process.

- *A design is based upon an explicit understanding of users, tasks and environments.*
- *Users are involved throughout design and development.*
- *The design is driven and refined by user-centred evaluation.*
- *The process is iterative.*
- *The design addresses the whole user experience.*
- *The design team includ*

User-centred design model

UCD answers questions about users and their tasks and goals, then uses the findings to make decisions about development and design.

- Who are the users of the product?
- What are the users' tasks and goals?
- What are the users' experiences and expertise with the product and products like it?
- What functionality do the users require of the product?
- What other stakeholders will be impacted by the product?
- Why is the product being developed?
- What are the overall objectives?
- How will the product be used?
- How will it be judged a success?
- What are the technical and environmental constraints?
- What functionality is needed by users?
- What are the typical scenarios of how and why users will use the product?
- What are the usability goals?
- How important is ease of use and ease of learning?
- How long should it take users to complete their tasks?
- Is it important to minimize user errors?
- Are there any initial design concepts?

User-centred design has a focus on **inclusive design**. Students need to consider how designers try to create products that are suitable for users with disabilities and other users. This ensures that there is a sufficient market for their products and increases their feasibility as an innovation.

Usability

Usability is the extent to which a product can be used by specified users to achieve specified goals effectively (completely and accurately) and efficiently (fast and with minimum effort) while functioning in a predictable and consistent manner. If so, the product can be considered intuitive, pleasant, satisfying to use and tolerant of user errors (that is, it prevents and enables users to recover from errors).

Usability objectives include:

- usefulness
- effectiveness
- learnability (how easy it is to learn to use a product or how intuitive a product is to use)
- attitude (likeability).

Strategies for user research

When considering strategies for user research, designers need to consider their appropriateness in relation to user populations. *User populations are a range of users for a particular product or system.* There may be particular user populations a product is designed for; however,

Note: many products are designed for use by different or multiple populations.

When carrying out user research, user populations can be classified into groups depending on *age, gender* and *physical condition.* This can allow the designer to gather detailed feedback to generate insights for design development that are particular to each group.

For example, a group of users who suffer from arthritis in their wrists would have different concerns with the design of a new kettle and give different feedback than a population of students.

Designers can observe and interview members of a user population in order to create fictional characters known as *personae, secondary personae* and *anti-personae.*

- **Personae** are typical stakeholders.
- **Secondary personae** are those who are not the primary target audience for a product, but whose needs the product should meet. They are able to provide valuable alternative insights to the development of a product.
- **Anti-personae** are those for whom the product is not designed.

Scenario is an imagined sequence of events in the daily life of a *persona* based on assumptions by researchers and designers. Students need to be able to consider best-, worst- and average-case scenarios that provide a physical and social context for different personae.

Strategies for UCD

When considering strategies for UCD, students need to develop an understanding of:

- field research
- method of extremes
- observation, interviews and focus groups
- questionnaires
- affinity diagramming *- a business tool used to organize ideas and data – eg:*

·   *When you are confronted with many facts or ideas in apparent chaos*

·   *When issues seem too large and complex to grasp*

·   *When group consensus is necessary*

Typical situations are:

·   *After a brainstorming exercise*

·   *When analyzing verbal data, such as survey results.*

- participatory design, prototype and usability testing session.

An example of **participatory design** is when users representing the target market for a product perform realistic tasks by interacting with a paper version of the user-product interface manipulated by a person acting as a computer who does not explain how the interface works.

Usability testing is carried out in a **usability laboratory**. Typically, users are seated with an instructor who observes them performing a particular task with the product. Another group of observers is behind a one-way mirror, where they can record the activity and note insights. Often the tests are recorded for later reference and analysis.

There are many advantages and disadvantages between using natural environments and usability laboratories and between using usability laboratories and testing houses for design companies. Students will need to consider these.

Beyond usability—designing for pleasure and emotion

The four-pleasure framework was identified by Professor Lionel Tiger from Rutgers University in New Jersey, USA. It includes the following areas.

- **Socio-pleasure** can be derived from social interaction. Products and services can facilitate social interaction in a number of ways. Email, internet and mobile phones, for example, facilitate communication between people. Other products may promote social interaction by being conversation starters, for example, jewelry, artwork or furniture. Clothing can communicate social identity and indicate that a person belongs to a particular social group.

- **Physio-pleasure** can be derived from the feel of a product during use (for example, wearing a silk garment or the smooth feel of an iPod), its taste (for example, eating chocolate) or its smell (for example, the smell of leather, a new car, coffee or freshly baked bread).
- **Psycho-pleasure** can be derived from the cognitive demands of using a product or service and the emotional reactions engendered through the experience of using it. For example, it might be expected that a word processor that facilitated quick and easy accomplishment of tasks would provide a higher level of psycho-pleasure than one with which the user was likely to make many errors. The former word processor should enable the user to complete the task more easily than he or she would with the latter. The outcome may also be more emotionally satisfying and less stressful.
- **Ideo-pleasure** can be derived from products that are aesthetically pleasing by appealing to the consumer's values. Values could be philosophical or religious or may relate to some particular issue such as the environment or a political movement. These values can be embodied in products. For example, a product made from biodegradable materials might be seen as embodying the value of environmental responsibility.

Designing for emotion can increase user engagement, loyalty and satisfaction with a product by incorporating emotion and personality into product design.

Students need to be familiar with the Attract/Converse/Transact (ACT) model (Van Gorp, Adams 2012)* as a framework for creating designs that improve the relations of users with a product and intentionally trigger emotional responses.

- The **attract** part of the model is aesthetics oriented.
- The **converse** part of the model is interaction oriented.
- The **transact** part of the model is function oriented.

When all three elements are addressed, products can become desirable, usable and useful.

*Van Gorp, T and Adams, E. 2012. *Design for Emotion*. Waltham, Massachusetts, USA. Morgan Kaufman.

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Topic Questions & Exam Practice

End of Topic Questions

Answer the questions in this section as best as you can. The marks are shown in brackets next to each question. All multiple-choice questions hold 1 mark each.

1. Match the following headings with the explanations below:

   Headings - Passion, Intimacy, Commitment

   Explanations;

   A   Interaction orientated……………………………………….1

   B   Function orientated ………………………………………….1

   C   Aesthetics Orientated ……………………………………….1

1. Match the following words with the descriptions below:
   Desirability, Usability, Usefulness (3)

   ……………………………………is connected to how well the product functions

   ……………………………………is connected to product aesthetics

   ……………………………………is connected to the quality of interaction

1. What 3 words can be used to define the '3 legged stool of design'?

   i…… 1
   ii……1
   iii……1

1. Describe why UCD is particularly useful when a new product is to be introduced.
   ………
   ………
   ………
   ……………………………………………………………………………………3

1. Explain how UCD differs from conventional market research methods
   ………
   ………
   ………
   ……………………………………………………………………………………3

1. Outline how UCD questions users about their tasks and goals

   ………
   ………
   ………
   ……………………………………………………………………………………2

7. Outline how designers can use UCD to ensure there is a market for their products

....
....
....
....2

8. Describe what is meant by 'Usability'

....
....
....
....3

9. List 4 usability objectives

....1
....1
....1
....1
....1

10. State the meaning of 'User Population'

....
....
....
....1

11. Define the following *fictional* characters used in UCD evaluations:
Personae

....
....1

Secondary Personae

....
....
....
....
....1

Anti Personae

....
....1

Scenario

....
....
....
....
....1

11.   List 6 strategies that could be employed for UCD

....1
....1
....1
....1
....1
....1

12.   Explain what is meant by 'Participatory Design'

....
....
....
....
....3

13.   State 2 advantages and 2 disadvantages of using natural environments and usability laboratories

....
....
....
....
....4

14.   Explain the following terms:

Socio Pleasure

....
....
....
....
....3

Physio Pleasure

....
....
....
....
....3

          Psycho Pleasure

....
....
....
....
....3

15.   Explain how the 4 pleasure framework can influence and affect designers understanding of user needs when evaluating new or existing products.

....
....
....
....
....6

16.   Explain what is meant by the ACT model framework for creating design ideas

....
....
....
....3

17.   Describe the term 'Target Audience'

....
....
....
....3

183.   Describe the purpose of 'designing for emotion'

....
....
....
....3

Total Marks   **/ 69**

Exam Practice Questions

Figure E1 shows a remote control handset used for use with a television set connected to a satellite receiver.

Figure E1: Remote control handset

[Source: Image courtesy of suphakit73/FreeDigitalPhotos.net.]

(a) State **one** reason why the control buttons on the handset are not all the same size. *[1]*

(b) Outline **one** reason for the shape (profile) of the handset in **Figure E1**. *[2]*

(c) Explain **one** reason for using a colour scheme for the buttons on the handset shown in **Figure E1**. *[3]*

(a) State which aspect of the "four pleasure framework" is triggered by the aroma of freshly-baked bread. [1]

(b) Outline **one** reason why technophiles would experience psycho-pleasure when using a newly-purchased mobile phone. [2]

(b) Outline **one** method that designers could use to research human factors for the design of a wheelchair to be used by disabled athletes. [2]

(c) Outline **one** way in which the use of digital humans would increase the speed of the product development process for the new wheelchair design. [2]

E7. Explain why feedback, mapping and affordance are important in human factors design. *[9]*

4.   **Figure 6** shows the Biolite camp stove, an award-winning camping stove which also provides electricity to charge small devices, such as mobile (cell) phones or LED lights. The stove uses biomass fuel such as twigs or pine cones with 46 g of wood required to boil 1 litre of water which takes 4.5 minutes to boil. The stove can also be used with recycled wood pellets. The stove provides 3.4 kW at low power up to 5.5 kW at high power with 20 minutes of charging sufficient for 60 minutes of talk time on a phone. It weighs 935 g (33 oz) and the packed size is 21 cm × 12.7 cm.

Figure 6: Biolite stove

[Source: http://www.biolitestove.com/. Used with permission]

(a) State **one** type of feedback that could be used in the design of a microwave oven to alert the user that the cooking cycle is complete. [1]

. . . .

. . . .

(b) Describe why affordance is an important consideration in relation to the design of a product. [2]

(a) Outline which aspect of the "four pleasure framework" relates to the success of a new type of perfume. [2]

Describe why the purchase of a fashionable (trendy) item of clothing may promote a combination of socio-pleasure and psycho-pleasure. [2]

. . . .

. . . .

. . . .

. . . .

Outline **one** way in which ideo-pleasure may contribute to a company's corporate social responsibility for promoting green design. [2]

7. **Figure 12** shows the Tandem Sling Chair. It was originally designed by husband and wife design team Charles and Ray Eames for airports in Washington and Chicago. It is now widely used in airports and other public buildings around the world. The brief was to develop a multiple-seating system which facilitated security checks, looked good (aesthetics) and was easy to maintain (see **Figure 13**). The aluminium frame is produced by high-pressure die casting.

Figure 12: Tandem Sling Chair   **Figure 13: The chair is widely used in airports and other public access areas**

(c) (i) Outline **one** way in which consumer feedback could be collected to inform the development of the design.   *[2]*

    (ii) Explain how the designers have met **three** potentially conflicting aspects of the specification for the Tandem Sling Chair: security; aesthetics; ease of maintenance. *[9]*

E2. A student continues to wear his "favourite" pair of training shoes despite them being worn out and he has been given a new pair.

(a) State **one** aspect of the "four pleasure framework" that this is an example of. [1]

(b) Outline **one** reason why the "four pleasure framework" is considered part of human factors design. [2]

Discuss the value of the use of the evaluation strategies of user trial, user research and expert appraisal to a car company when placing a concept car in an auto show. [9]

(a) State which aspect of the "four pleasure framework" involves values in design. [1]

. . . .

. . . .

(b) Outline **one** way in which mobile phone design incorporates aspects of the "four pleasure framework". [2]

Explain **three** advantages of paper prototyping in the design of the controls for electronic products. [9]

Figure E3 shows a storage unit for a computer printer used as part of the integrated home office shown in Figure E4.

Figure E3: Printer storage unit

Figure E4: Prima Integrated Home Office

[Strachan Furniture Makers Ltd. Used with permission.]

(a) Describe how the designer has combined ease-of-use with aesthetics for the printer storage unit in Figure E3. [2]

(b) Outline one limitation of using the storage unit in relation to bodily tolerance. [2]

E5. (a) Outline which aspect of the *four pleasure framework* is experienced by an employee wearing a uniform. [2]

(b) Describe one way in which the design of a mobile phone may promote psycho-pleasure. [2]

(c)   Describe the relationship between ideo-pleasure and being an eco-fan.   [2]

E7.   Discuss **three** issues relating to displacing population stereotypes in the design of controls
       for products.   [9]

Exam questions and Sub-topic Links

Table demonstrating the times each sub-topic has appeared in exam papers and at which question.

TOPIC	P1 Nov-09	P1 Nov-10	P1 May-10	P1 NOV 11	P1 May-11	P1 May-12	P2 Nov-09	P2 Nov-10	P2 May-10	P2 Nov-11	P2 May-11	P2 May-12
7.1	27		24		1							
7.2	24,	19, 30			23	29		3a, 5c2,	6c2,	4b1,		
7.3					24			3b,				
7.4	25	25	25	26, 30		25			6c2,			1c1,
7.5												

Glossary of Terms

Glossary of Terms

Topic 7: User-centred design (UCD)

Term	Definition
Affinity diagramming	A tool used to organise ideas and information.
Affordance	Property of an object that indicates how it can be used. Buttons afford pushing, knobs afford turning.
Anti-personae	A profile of those for whom a product is not designed.
Attitude	The perceptions, feelings and opinions about a product by a user.
Behavioural design	Focussed on use and understanding, this considers how people will use a product, focussing on functionality.
Characteristics of a good user-product interface	These include: simplicity and ease of use; intuitive logic, organization and low memory burden; visibility; feedback; affordance; mapping; and constraints.
Constraints	Limitations on how the product can be used.
Design for emotion	A design strategy that focusses on increasing user engagement, loyalty and satisfaction with a product by incorporating emotion and personality into product design.
Dominant design	The design contains those implicit features of a product that are recognized as essential by a majority of manufacturers and purchasers.
Effectiveness	A measure of the speed of performance or error rate and its relation to the capabilities of a product.
Empathetic	When the designer takes the place of the user to see who potentially could use the product and the object could be better suited for the consumer.
Enhanced usability	Enhanced usability increases product acceptance, user experience, and productivity while decreasing user error and required training and support.
Environment	The place where a product is likely to be used.
Feedback	The provision of information as a result of an action. This can be a audio, visual or aesthetic response.
Field research	A first hand observation of customer's user experience. It is essential for the research to be conducted in the user's environment.
Ideo-pleasure	Pleasures linked to our ideal, aesthetically, culturally and otherwise.
Inclusive design	The design of mainstream products and/or services so that they are accessible and usable by as many people as possible without the need for adaptation or specialised design.
Iterative	Act of repeating a process with the aim of approaching a desired goal, target or result. Each repetition of the process is also called an iteration, and the results of one iteration are used as the starting point for the next iteration.
Iterative design	Developed through user centred evaluation and based upon the six principles of iterative design.
Learnability	The extent to which a user can operate a product or system at a defined level of competence after a pre-determined period of

	training.
Mapping	Relates to the correspondence between the layout of the controls and their required action
Method of extremes	A common sampling method where users are selected to represent the extremes of a user population, typically the 2.5th and 97.5th percentile. Products are then designed and/or tested to ensure that they function efficiently for those users.
Natural environment	The monitoring of the user interacting with the product in their homes, place of work or other natural product usage environments.
Observation	A collection of responses from users, a trail of observation of users interacting with the product
Participatory design	When users representing the target market for a product perform realistic tasks by interacting with a paper version of the user-product interface manipulated by a person acting as a computer who does not explain how the interface works.
Personae	A profile of the primary target audience for a product.
Physio-pleasure	A sensual pleasure that comes from touching, smelling, hearing or tasting something. It can also be derived from a feeling of satisfaction that comes from the effectiveness of an object in enabling an action to be performed
Population stereotype	Responses that are found to be widespread in a user population.
Product acceptance	The knowledge that a product or service paid for will meet up to its defined expectations
Productivity	Developing products and services with the user in mind so that they can reduce time wasting and simplify complex aspects of the product
Prototype testing session	A session where a test product is made and tested - all experiments are conducted before making the final product, making all changes necessary that can be seen when the prototypes are used.
Psycho-pleasure	Types of pleasure that comes from cognition, discovery, knowledge and other things that satisfy the intellect.
Reflective design	Design that evokes personal memory focussing on the message, culture and the meaning of a product or its use.
Scenario	An imagined sequence of events in the daily life of a persona based on assumptions.
Secondary personae	A profile of those who are not the primary target audience for a product, but whose needs the product should meet.
Socio-pleasure	Pleasures that come from a feeling of belonging to a social group, social-enablers, and other ways that one can identify oneself with social groups.
Sympathetic	The decisions required for the product to be the most helpful for the user given certain conditions.
Task	The thing that the product is supposed to do, however the user may have several sub uses for the product

Testing house	Typically a company that will test products on their site.
The attract/ converse/ transact (ACT) model	A framework for creating designs that improve the relations of users with a product and intentionally trigger emotional responses.
The four-pleasure framework	A framework devised by Professor Lionel Tiger that encourages design for pleasure and emotion. It comprises of four areas: Socio-pleasure; Physio-pleasure; Psycho-pleasure; and Ideo-pleasure.
Training and support	Help and guidance such as tutorials or instructions on how to use the product
Usability	The extent to which a product can be used by specified users to achieve specified goals effectively and efficiently, while functioning in a predictable and consistent manner.
Usability laboratory	A lab in which usability testing is carried out, and test users are monitored by another group of observers in a different room.
Usability objectives	Usability objective include usefulness, effectiveness, learnability and likeability.
Usability testing session	The testing of a product with potential users to find out how usable the product is.
Use case	A set of possible sequences of interactions or event steps between a user and a product to achieve a particular action.
Usefulness	The extent to which a product enables the user to achieve their goals.
User	Person utilising the product, person who is being affected by the product or who is reaping benefits/drawbacks
User error	Mistakes and slips when using the product due aspects such as complexity or inefficiency
User experience	A person's perceptions and responses that result from the use or anticipated use of a product, system or service, this can modify over time due to changing usage circumstances
User population	The range of users for a particular product or system.
User-centred design	A design process that pays particular attention to the needs of potential users of a product by involving them in all stages of the design process.
Visceral design	Design that speaks to people's nature in terms of how they expect products and systems to function and how they expect to interact with them.
Visibility	Controls should be easily accessible to the human eye

DP DESIGN TECHNOLOGY

WITH

Mr Moneeb

TOPIC 7: Guidance and Notes Booklet
2020 - 2022