**Honeycomb:**

**Usable:** The system in which the product or

service is delivered needs to be simple and easy to use. Systems should be designed in a way that is familiar and easy to understand. The learning curve a user must go through should be as short and painless as possible.

**Useful:** A business’s product or service needs to

be useful and fill a need. If the product or service is not useful or fulfilling user’s wants or needs, then there is no real purpose for the product itself.

**Desirable:** The visual aesthetics of the product, service, or system need to be attractive and easy to translate. Design should be minimal and to the point.

**Findable:** Information needs to be findable and easy to navigate. If the user has a problem, they should be able to quickly find a solution. The navigational structure should also be set up in a way that makes sense.

**Accessible:** The product or services should

designed so that even users with a disability can have the same user experience others.

**Credible:** The company and its products or services need to be trustworthy.

**7 Fundamental Principles of Design:**

* **Discoverability**: It is possible to determine what actions are possible and the

current state of the device.

* **Feedback:** Full and continuous information about the results of actions and the current state of the product or service. After an action has

been executed, it is easy to determine the new state.

* **Conceptual Model:** The design projects all the information needed to create a good conceptual model of the system, leading to understanding and a feeling of control. The conceptual model

enhances both discoverability and evaluation of results.

* **Affordances**: The proper affordances exist to make the desired actions

possible.

* **Signifiers**: Effective use of signifiers ensures discoverability and that the feedback is well communicated and intelligible.
* **Mappings:** The relationship between controls and their actions follows the principles of good mapping, enhanced as much as possible through spatial layout and temporal contiguity.
* **Constraints**: Providing physical, logical,

semantic, and constraints guides actions and eases interpretation.

**Mental Models:**

People’s model (thoughts) about:

how to interact with a system; and, how that system works.

Based on their existing experiences with what people perceive as similar interactions or systems.

They allow people to reason about a system to determine how it works. They allow a user to predict the behaviour of a system or application including how to recover from errors. Sometimes mental models are also referred to as conceptual models. BUT conceptual models can also be referred to as something else (see later). **Conceptual design is:**

The manifestation or abstraction of the designer’s mental

model of the system, encompassing a theme, notion, or idea with the purpose of communicating a design vision about a system or product; and, The process used to transform user needs and requirements (aims, desires and functionality) into that manifestation or abstraction.

**Cognition**

* “The mental action or process of acquiring knowledge and understanding through thought, experience, and the senses” – Oxford Dictionary
* May also be described in terms of specific processes: Attention, Perception and Recognition, Memory, Learning, Reading, Speaking, and listening, Problem solving, planning, reasoning and decision making, **Attention**
* Processes by which we focus our minds and our senses on one thing/set of things from all the possibilities around us
* Visual attention (usually works serially), Auditory attention (eyes-free, time-shared), Focal/focused attention, Divided attention, Pre- attentive processes (not in full focal attention), Peripheral awareness (background awareness) **Multitasking and Distractions**

Much research has been conducted on the

effects of multitasking on memory and attention It depends on the task itself, how much attention it demands and the individual

* Considering attention can lead to implications for your design
* Avoiding cluttering the interface
* Simple and clean interfaces are easier to use

# Perception and Recognition

* How information is acquired from the world through our senses and transformed into experience
* Involves complex processes
* Implications for design include:
* Presenting information in a manner that can be easily perceived for the purpose it was intended
* White space and borders are visual ways to group information to make it easier to locate and perceive items

# Memory

* We *encode, store,* and then *retrieve* knowledge
* We remember what we have *attended* to
* *Context* is an important cue to memory retrieval
* We *recognize* things better than we *recall*

things

Design implications to be aware of include:

* Do not overload users’ memories with

complicated procedures

* Interfaces should promote recognition rather than recall (e.g. menus, icons, and consistently placed objects)
* Digital information (e.g. files, emails, images) should be encoded in several ways to promote easy access (e.g. categories, colour, tagging, time stamping, icons, etc.)

# Learning

* Graphical user interfaces (GUIs) are a good way to support active learning through exploratory interaction
* Web-based learning, e-Learning, multimedia, virtual reality, etc.

# Reading, Speaking and Listening

* The easiness that people can read, listen, or speak is different and depends on the person, task, and context
* Technology can support this through:
* Interactive books and web-based materials

Speech-recognition systems

* Speech-output systems
* Auditory navigation and tactile diagrams

# Reading, Speaking and Listening

* Design implications for reading, speaking, and listening include:
* The length of speech-based menus and instructions should be kept to a minimum
* Artificially generated speech voices are harder to understand than human voices and so pitch should be emphasized
* Text should be large on a screen, without affecting the formatting
* Alternate text descriptions to allow people with visual impairments to hear descriptions of content

# Problem Solving and Decision Making

Involves conscious processing, discussion with others (sometimes), and artefacts (e.g. maps, books, pen, and paper)

Such decision making is now often offloaded onto technology

* Design implications include:

-Provide additional hidden information that is easily accessible for those who want to go

deeper

- Simple and memorable functions on the

interface can support rapid decision making and planning that takes place while on the move **Nudging and Dark Patterns – ethical issue**

Dark patterns are deceptive aspects of an interface that have been designed carefully to deliberately trick people

* Persuasion is unethical if it relies on *deception*

**Interaction Modes**

# Giving instructions

* Issuing commands using keyboard and selecting options via menus

# Conversing

* Interacting with the system as if having a conversation

# Manipulating and navigating

* Acting on objects and interacting with virtual objects

# Exploring and browsing

* Finding out and learning things

**TAM** – acceptance of a technology for a certain group

1-4，4 == agree, 1 == disagree

**Perspectives of Usability**

# Discoverability

* The more visible functions are, the more likely users will be able to know what to do next **Feedback**
* Sending information about what action has been done and what has been accomplished

allowing the person to continue with the activity.

# Consistency

* Interfaces should be designed to have similar operations and use similar elements for

achieving similar tasks

# Affordances & Signifiers

* Affordance: determine how it can be used
* Signifier: an indicator that can be interpreted meaningfully

# Mappings

* Relationship between controls and their effects in the world.

# Constraints

* Creating restrictions on how a user can interact at any point in time can improve

usability (Hicks Law) **Interface Metaphors**

Interface metaphors help the user understand the interface by combining recognizable knowledge with new knowledge

Interface Metaphors:

Are intended to provide familiar entities that enable people to readily understand the

underlying conceptual model and know what to do at an interface

Purpose is to give the user immediate knowledge about how to interact with the user interface

New interface metaphors are rapidly being integrated into everyday life

# e.g. Card-Based Metaphors

* ‘Cards’ serves as a good metaphor because

they look like real-world cards within an interface

* Multiple pieces of content can be brought together
* The user experience of an app can be greatly improved

**Benefits** of Card-Based Metaphors

* Content is chunked
* Helps users to scan information by

dividing content into sections • Easy to Process

Information can be communicated and digested quickly

* Visually Attractive

Relies on images, which are attractive and immediately catches the eye **Cognitive Load**

* Cognitive overload can occur when the amount of information for a task is too much for working memory to process

# Reducing Cognitive Overload

* The best user experiences are easy and simple and occur without the user noticing
* The goal is to reduce the amount of mental effort the user must process when using your software
* Several laws and principles can be drawn upon from cognitive science to increase the usability of software
* Gestalt’s Theory
* Hicks Law
* Fitts Law
* Design patterns and consistency **Gestalt Principles**

# Proximity

* Things that are close together go together
* Similar information should be grouped together to simplify layouts and vice versa **Similarity**

Objects that look similar are perceived to be more related and are often are put together

Can help to organise and categorise objects within a group (colour, size, shape, etc.) **Continuity**

Items in a line or curve are thought to be

When lines intersect, we see two lines rather than four lines that join at a point

# Closure

* Humans prefer complete shapes

This includes extending lines to form an unbroken object

# Symmetry

* When humans see symmetrical items there is an assumption that a connection exists to form a whole
* Complexity is reduced by parsing complex images into the simplest one

# Figure/Ground

* Our minds separate images into a foreground (figure) and a background (ground)
* This results in one view becoming more overriding, while the other one will be harder to see

# Common Fate

* Concerned with moving object (like proximity and similarity)
* Things that move with similar patterns are being grouped

**Hicks Law**

* The time it takes for a person to make a

decision is a result of the possible choices he or she has. Increasing the number of choices will increase the decision time logarithmically

* Important for designers to not overcomplicate and build too much functionality into an application

**Fitts Law**

Related to the amount of time required to move a pointer (e.g., mouse cursor) to a target

* The longer the distance and the smaller the

target’s size, the longer it takes

Widely applied in user experience and user

interface design

* The distance between the user’s task/attention area and the task-related button should be kept as short as possible

**S.M.A.R.T. User Goals** Applied

**Specific:** State exactly what the user needs to accomplish. Help us maintain scope and focus on content and functionality that is critical to the user

**Measurable:** (UG1)—can measure clicks to see how users engage with content; or

interviews/surveys to check relevance of content. (UG2)—percentage of visitors who click “add to cart”

**Actionable:** Specific goal allows us to identify content and functionality to meet user’s goals.

E.g. need for large product images

**Relevant:** Appropriate for a product detail page (but not for pages on returns policy or terms & conditions)

**Trackable:** Measures can be tracked over time to determine immediate, short-term, and long-term success of design

**SUS** ranges from 0 to 4 (4 is the most positive response).

**Heuristic Evaluation**

Experts analyse the interface with respect to a set of criteria and Determine whether an application/interface meets a (minimum) standard of usability Stages of doing a Heuristic Evaluation

* Briefing session to tell experts what to do
* Evaluation period of 1-2 hours:
* Each expert works separately, referring to Nielsen usability principles list
* First pass to get a feel for the product
* Second pass to focus on specific features
* Evaluators work through selected evaluation scenarios

•Use scenarios to walkthrough the user interface

* Mark usability issues on a form
* Categorise usability issues using a checklist
* Rate severity of usability issues.
* Debriefing session in which experts work together to priorities problems for

designers and developers to solve.

# Advantages

Using *experts*, so few ethical and practical issues to consider

Best experts have knowledge of application domain *and* usability Can be performed at any stage during the design process

It is a detailed, technically sound process that assesses the product against very clear criteria. Because it is done by several people there is a better chance of getting a range of views and picking up more potential problem areas.

The very act of setting up the heuristic evaluation is a useful exercise as it forces you to identify the root elements of the product and focuses development on the main issues.

There are fewer practical and ethical issues attached to heuristic evaluation as testers are testing in a virtual space.

Heuristic evaluation tends to focus on fewer, more relevant areas so the problems it identifies tend to be important ones.

**Rubric**

**Breath –** Demonstrates a very broad approach to identifying issues and problems; Issues and problems are **clearly linked to** information in the **brief**; clearly acknowledges where the **information provided is incomplete or missing** detail and identifies the type of information that is missing or required; The **most significant diagnoses are identified with a brief justification** of why they are most significant

3 sentences, no need to link with theory

"If people are quitting after this menu, then they will be unable to utilise the application for its intended purpose. Since 90% of users are doing this, it could be said that 90% of users are unable to utilise the application properly. That makes this a severe issue that needs to be addressed."

For example: we apply Gestalt Principles because they reduce cognitive load AND we use interface metaphors because they help to communicate the designer's conceptual model and then support the user applying a mental model that matches this conceptual design.

“- X because users’ mental model does not match teams conceptual design

* user expected z but got y
* interface doesn't show q until user does r” **Depth –**Where the information provided is **incomplete or missing detail**；The **type of information that is missing or require**d; **HCI theory** and principles

e.g. Conceptual models are ...User’s mental models are ...Alignment of the two are important as it assists with learnability of the interaction ... draws on user’s existing experience ... assists with understanding what to do next and how to recover from errors. Here, the logs indicate that people are trying to ...

**Design** – An innovative and creative design is proposed as **a solution a**nd is **simply explained using the specific information in the brief.**

Design demonstrates an informed and insightful understanding of where **information provided is incomplete or missing detail**; supported by a

detailed explanation involving an application of relevant **HCI theory** and principles.

e.g. Key element of conceptual models are interface and interaction metaphors as these help ...Propose a change to the UI elements to provide signifiers of the nature of the

interaction ... an example would be ... **Activities** –The **type of people** that would be involved; The specific **types of methods** and/or evaluations that would be used; The nature of **information that would be expected** from those methods/evaluations including **recommendations for the analysis** of that information.

e.g. Conduct a user evaluation focusing on understanding the user’s mental model. Do this

by conducting an evaluation that includes that

involves collecting information through

observations and interviews. Also go back to contextual inquiry ...

**Examples:**

e.g. maybe that’s the only place in the whole appendix that mentions user’s emotional distress from using the machine - perhaps you could say "there is **insufficient information** on the emotional reactions of users to using machines while in public, observations can help to address this by allowing us to xyz""perhaps users feel extreme pain from repetitive motion, to confirm this, we should **conduct activity** q, which will let us find out r"

e.g. **if complex to use-** Problem with interface, interact flow: from SUS, data

# if Feature not completed (like Button too small)

* cognitive overload, insufficient contextual inquiry; when there is too many people waiting it become issue; interaction mode switch

between conversational and instructing

* gulf of EX, Gestalt Theory, design principle, UX Goal

**Evaluation Feedback -** honeycomb(desirable), Design principle, mental model(learnability), usability

**Error count** – consider diversity of people