

HUMAN - COMPUTER INTERACTION

CT273

Chapter 2: Conceptual Model

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- Interaction Types

Conceptual Model

- What is a Conceptual Model
- What is a Mental Model
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- Exploring the Design Space

What is a Conceptual Model

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

(Johnson and Henderson, 2002)

- A conceptual model is the mental model that people carry of how something should be done.

(Interaction Design Association – IxDA)

What is a Mental Model

- The understanding and knowledge that we possess of something is often referred to as a mental model

(Norman, 1998)

- Mental models are used
 - to reason about a system
 - to try to fathom out what to do when something unexpected happens with the system or when encountering unfamiliar systems

(Preece, Sharp and Rogers, 2015)

What is a Mental Model

- The more someone learns about a system and how it functions, the more their mental model develops

(Preece, Sharp and Rogers, 2015)

- If people do not have a good mental model of something they can only perform actions by rote => they will not know why and will not be able to recover if something goes wrong

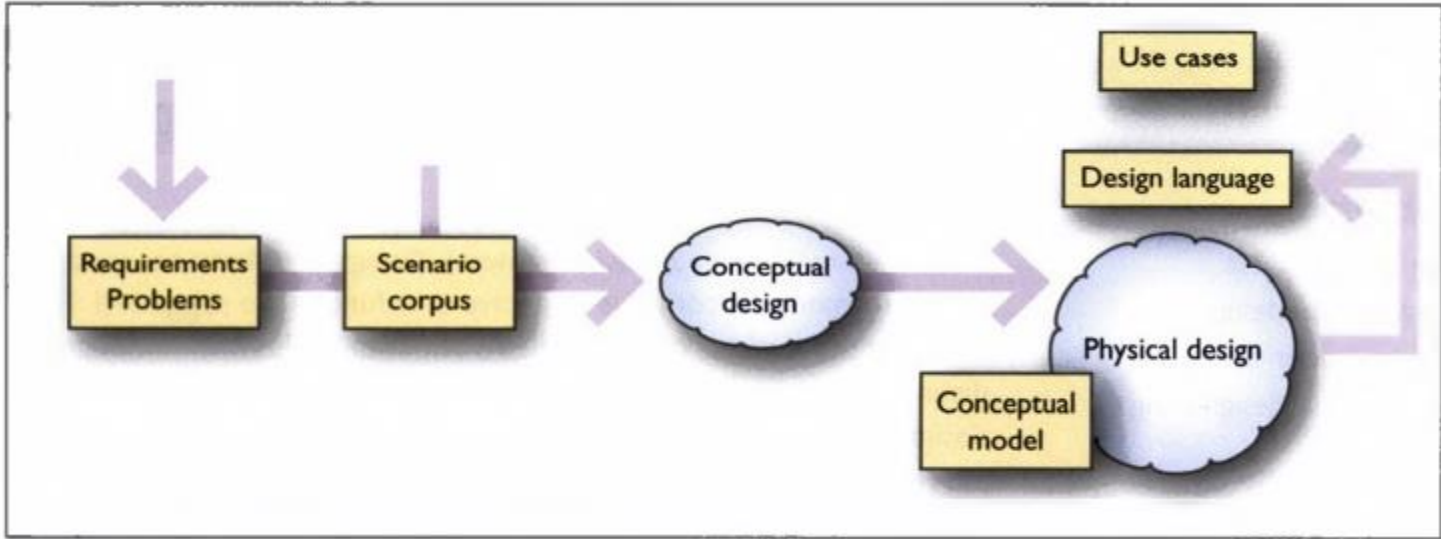
(Benyon, 2014)

The Core Components of Conceptual Model

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

(Preece, Sharp and Rogers, 2015)

Conceptual and Physical Design



(Benyon, 2014)

Exploring Design Concepts

- Interaction design is design for human use and focuses on three main things:
 - *How do you do?* is concerned with the ways in which we affect the world.
 - *How do you feel?* concerns how we make sense of the world and the sensory qualities that shape media.
 - *How do you know?* concerns the ways that people learn and plan; how designers want people to think about their system.

(Verplank, 2007)

Exploring the Design Space

- A design space constrains a design in some dimensions whilst allowing exploration of alternatives in others.

(Beaudouin-Lafon and Mackay, 2012)

Metaphors in Design

- What is a Metaphor
- Metaphor Examples
- Benefits of Metaphors
- Problems with Metaphors

What is a Metaphor

- Metaphor is a device for seeing something in terms of something else. It brings out the thisness of a that or the thatness of a this.

(Kenneth Burke, 1945)

What is a Metaphor

- Metaphors are used in three main ways:
 - As a way of conceptualizing what we are doing (e.g. surfing the web)
 - As a conceptual model instantiated at the interface (e.g. the card metaphor)
 - As a way of visualizing an operation (e.g. an icon of a shopping cart into which we place items we wish to purchase on an online shopping site)

(Preece, Sharp and Rogers, 2015)

Metaphor Examples

- The desktop metaphor



Google Now Card



Benefits of Metaphors

- Makes learning new systems easier
- Helps users understand the underlying conceptual model
- Can be very innovative and enable the realm of computers and their applications to be made more accessible to a greater diversity of use

Source: <https://www.academia.edu/>

Problems with Metaphors

- Break conventional and cultural rules e.g. recycle bin placed on desktop
- Can constrain designers in the way they conceptualise a problem space
- Conflict with design principles
- Forces users to only understand the system in terms of the metaphor
- Limits designers' imagination in coming up with new conceptual models

Source: <https://www.academia.edu/>

Mental Models and Icons

- We look at icons and our neural nets unconsciously map them to what we know already about the image or components of the image.



Source: <https://www.lifechallenge.top/>

Icons

- Horton's icon checklist (Benyon, 2014) for icon design

Understandable	Does the image spontaneously suggest the intended concept to the viewer?
Familiar	Are the objects in the icon ones familiar to the user?
Unambiguous	Are additional cues (label, other icons, documentation) available to resolve any ambiguity?
Memorable	Where possible, does the icon feature concrete objects in action? Are actions shown as operations on concrete objects?
Informative	Why is the concept important?
Few	Is the number of arbitrary symbols less than 20?

Icons

- Horton's icon checklist (Benyon, 2014) for icon design

Distinct	Is every icon distinct from all others?
Attractive	Does the image use smooth edges and lines?
Legible	Have you tested all combinations of colour and size in which the icon will be displayed?
Compact	Is every object, every line, every pixel in the icon necessary?
Coherent	Is it clear where one icon ends and another begins?
Extensible	Can I draw the image smaller? Will users still recognise it?

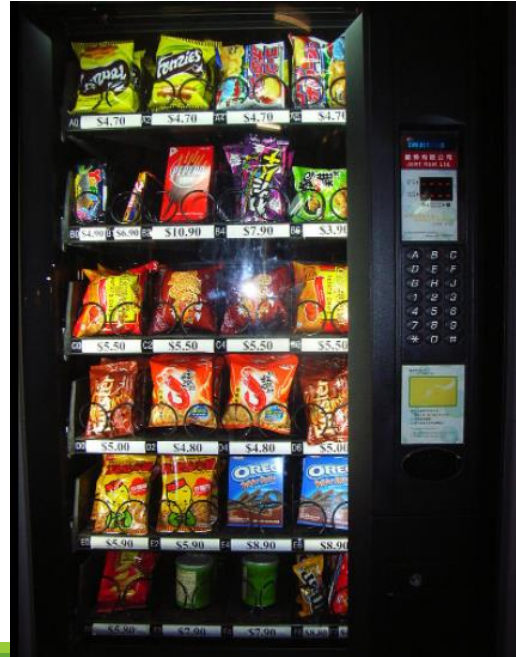
Interaction Types

- Another way of conceptualizing the design space is in terms of the interaction types that will underlie the user experience.
- Essentially, these are the ways a person interacts with a product or application.
- The four main types of interaction are:
 - Instructing
 - Conversing
 - Manipulating
 - Exploring

(Preece, Sharp and Rogers, 2015)

Instructing

- This type of interaction describes how users carry out their tasks by telling the system what to do.



Conversing

- This form of interaction is based on the idea of a person having a conversation with a system, where the system acts as a dialog partner.



Manipulating

- This form of interaction involves manipulating objects and capitalizes on users' knowledge of how they do so in the physical world.



Exploring

- This mode of interaction involves users moving through virtual or physical environments.



Which type of interaction is best?

- Issuing instructions is good for repetitive tasks, e.g. spell-checking, file management
- Having a conversation is good for children, computer-phobic, disabled users and specialised applications (e.g. phone services)
- Direct manipulation is good for ‘doing’ types of tasks, e.g. designing, drawing, flying, driving, sizing windows
- Hybrid conceptual models are often employed, where different ways of carrying out the same actions is supported at the interface - but can take longer to learn

Source: <https://www.academia.edu/>

Summary

- A conceptual model is a high-level description of a product in terms of what users can do with it and the concepts they need in order to understand how to interact with it.
- Metaphors are commonly used as part of a conceptual model.
- Interaction types provide a way of thinking about how best to support the activities users will be doing when using a product.

Additional resources

- Designing Interactive Systems: A comprehensive guide to HCI, UX and interaction design, 3rd Edition (David Benyon, 2014)
- Interaction Design: Beyond Human-Computer Interaction, 4th Edition (Jennifer Preece, Helen Sharp, Yvonne Rogers, 2015)