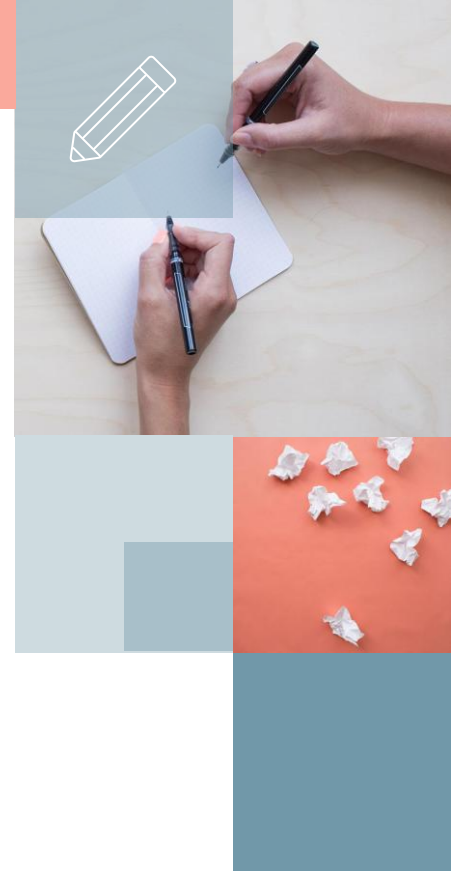


# Understanding and Conceptualizing Interaction

# Objectives

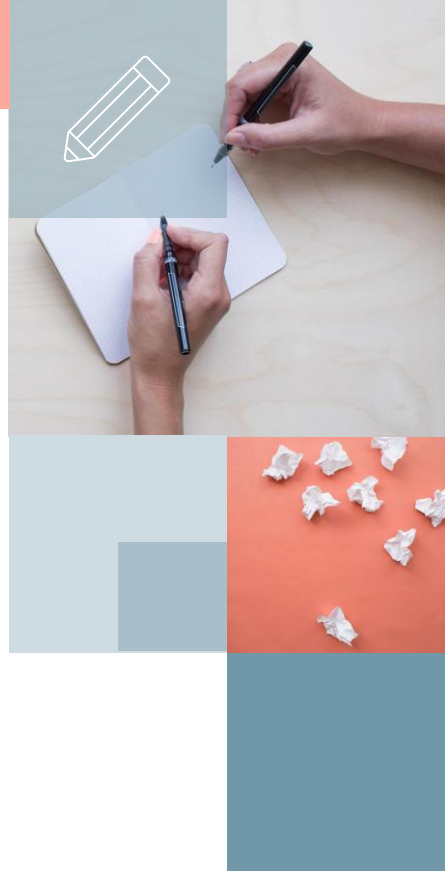
The main aims of this chapter are to:

- Explain what is meant by the problem space.
- Explain how to conceptualize interaction.
- Describe what a conceptual model is and how to begin to formulate one..



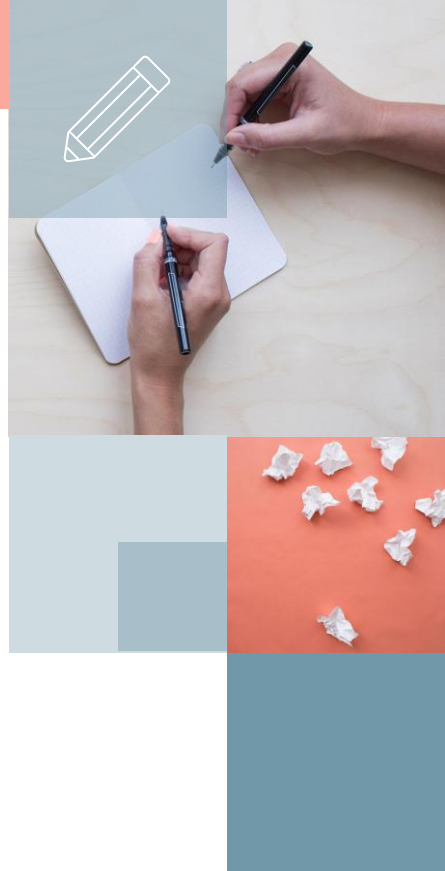
# Objectives

- Discuss the use of interface metaphors as part of a conceptual model.
- Outline the core interaction types for informing the development of a conceptual model.
- Introduce paradigms, visions, theories, models, and frameworks informing interaction design.



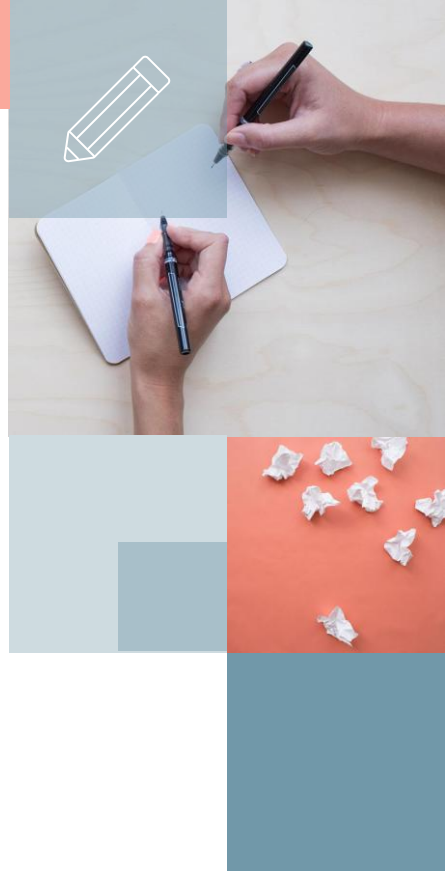
# Recap

- HCI has moved beyond designing interfaces for desktop machines
- About extending and supporting all manner of human activities in all manner of places
- Facilitating user experiences through designing interactions:
  - Make work effective, efficient and safer
  - Improve and enhance learning and training
  - Provide enjoyable and exciting entertainment
  - Enhance communication and understanding
  - Support new forms of creativity and expression



# Understanding the problem space

- What do you want to create?
- What are your assumptions?
- Will it achieve what you hope it will?



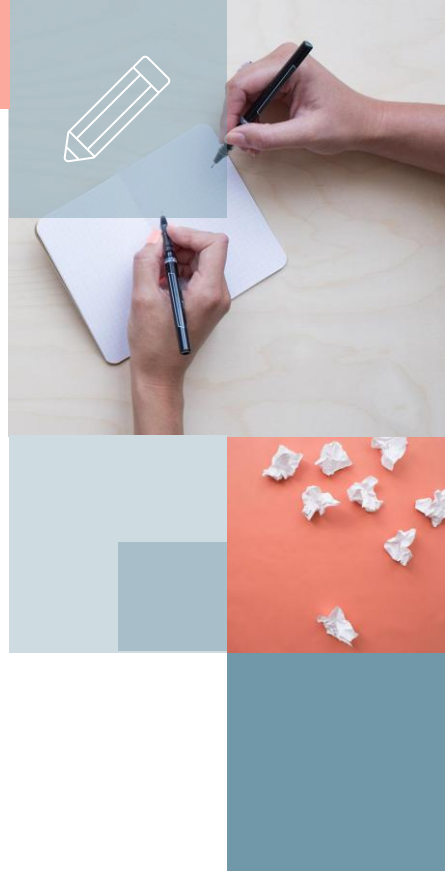
# What is an assumption?

- taking something for granted when it needs further investigation
  - e.g. people will want to watch TV while driving



# What is a claim?

- stating something to be true when it is still open to question
  - e.g. a multimodal style of interaction for controlling GPS — one that involves speaking while driving — is safe





# Understanding the Problem Space and Conceptualizing Interaction

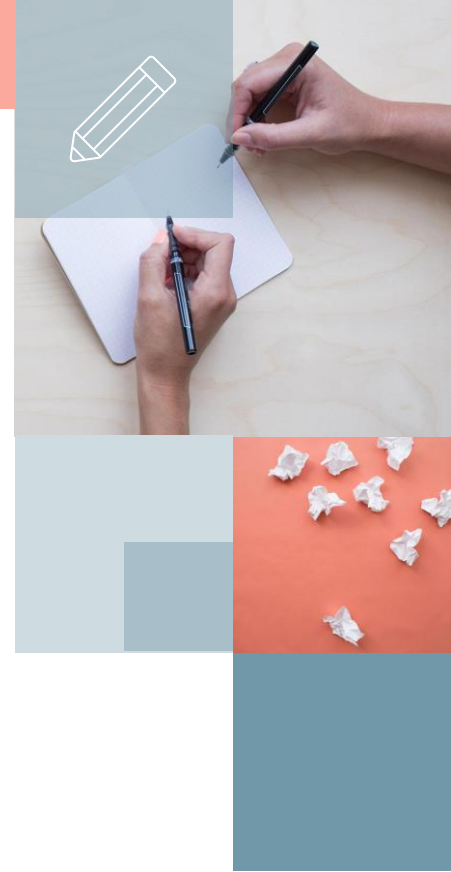
- The problem with starting here is that usability and user experience goals can be overlooked.





# Understanding the Problem Space and Conceptualizing Interaction

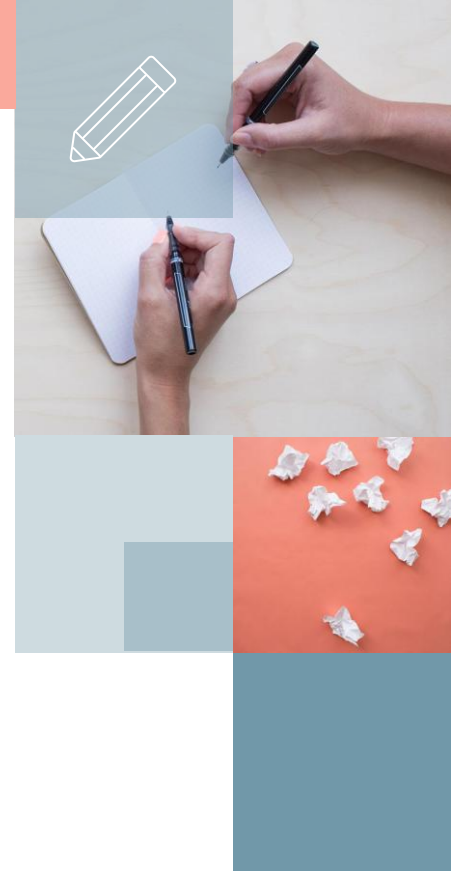
- **Identifying usability and user experience goals** is a *prerequisite* to understanding the problem space.
- **Explicit underlying assumptions and claims**
- **Team effort**



# Understanding the Problem Space and Conceptualizing Interaction

The following framework is intended to provide a set of core questions to aid design teams in this process:

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



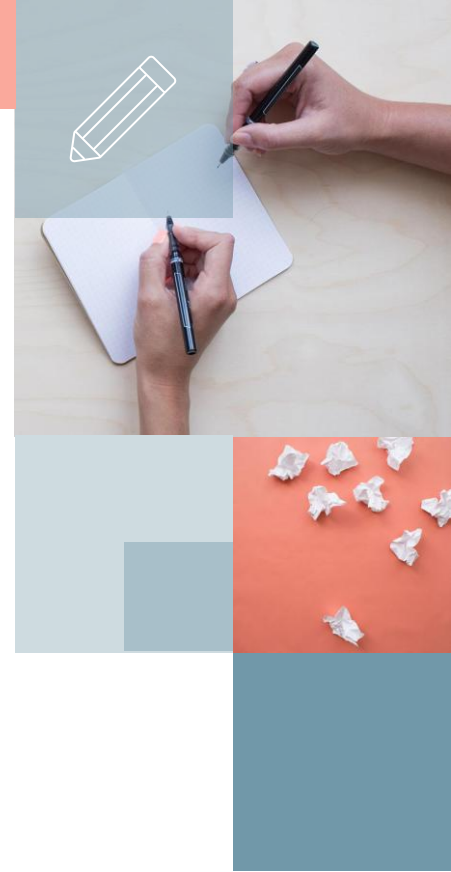
# Understanding the Problem Space and Conceptualizing Interaction



# Understanding the Problem Space and Conceptualizing Interaction

The benefits of conceptualizing the design space early on are:

- Orientation
- Open-mindedness
- Common ground



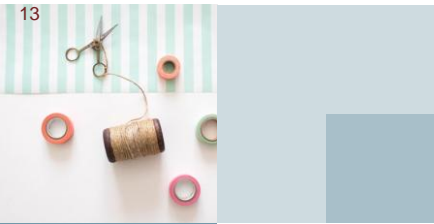
# Conceptual Model

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

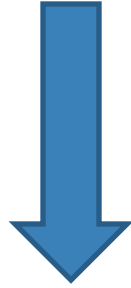
*(Johnson and Henderson, 2002, p26)*

“...designers to straighten out their thinking before they start laying out their widgets”

*(Johnson and Henderson, 2002, p28)*



# CONCEPTUAL MODEL



# SHARED BLUEPRINT

- used by the design team as the basis from which to develop more detailed and concrete aspects of the design

- represented as a textual description and/or in a diagrammatic form

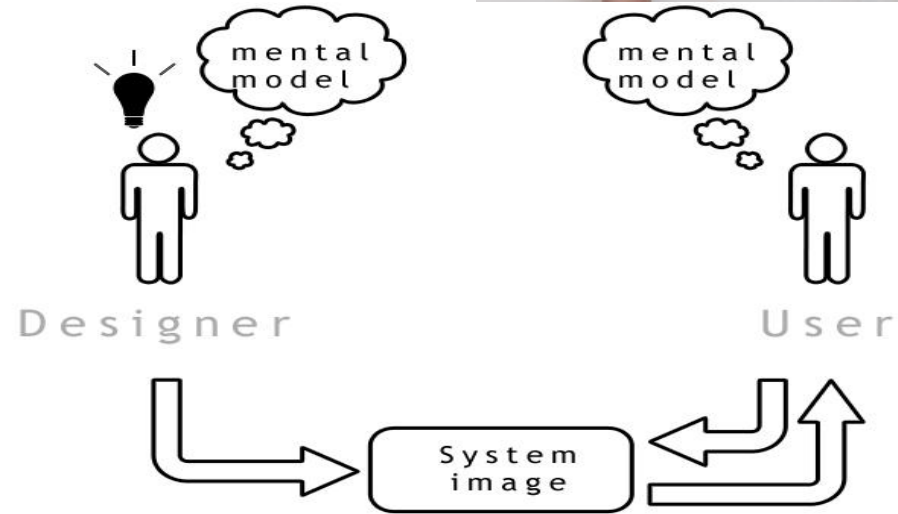


# Core Components of Conceptual Models

The core components are:

**Metaphors & Analogies**  
convey to people how to  
understand what a  
product is for and how to  
use it for an activity

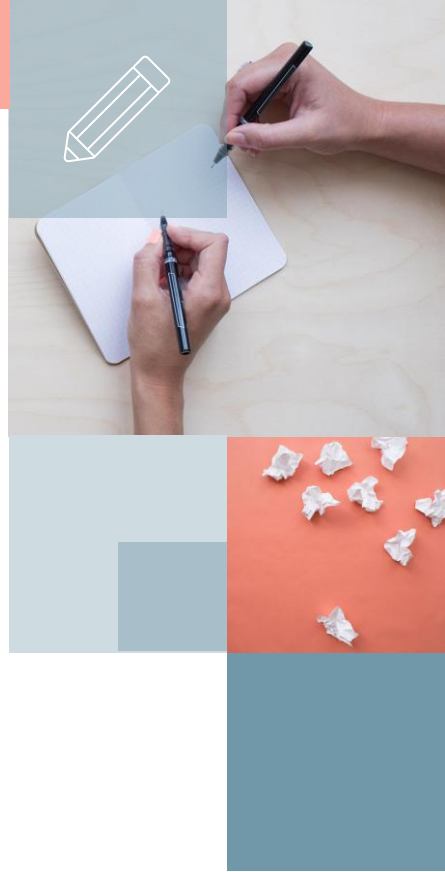
(e.g. browsing, bookmarking).





# Core Components of Conceptual Models

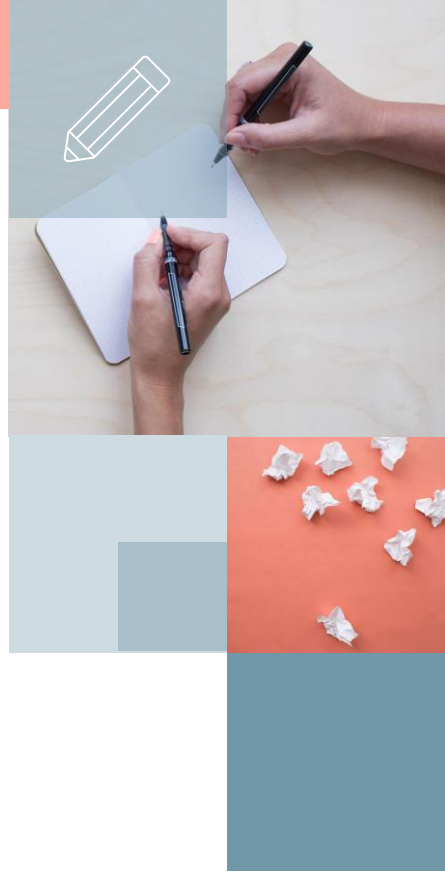
- The **concepts** that people are exposed to through the product, including the task-domain objects they create and manipulate, their attributes, and the operations that can be performed on them  
*(e.g. saving, revisiting, organizing).*



# Core Components of Conceptual Models

The core components are....

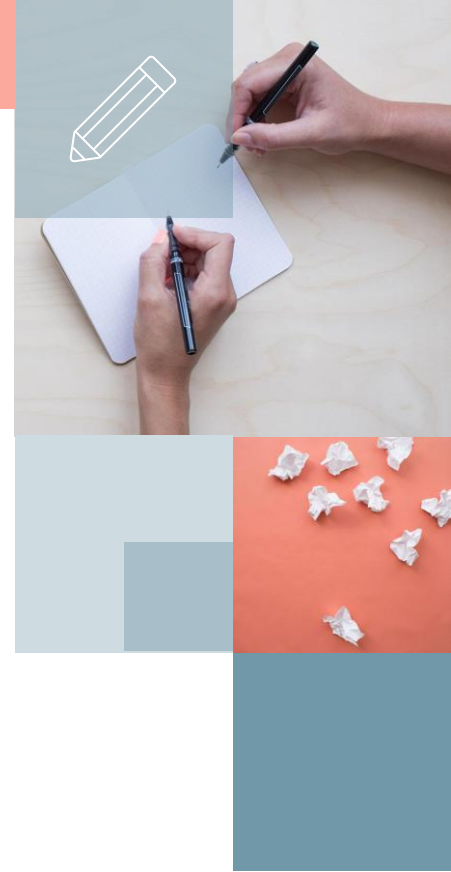
- The **relationships** between those concepts (e.g. whether one object contains another, the relative importance of actions to others, and whether an object is part of another).
- The **mappings** between the concepts and the user experience the product is designed to support or invoke (e.g. one can revisit through looking at a list of visited sites, most-frequently visited, or saved websites).



# Conceptual Models

## THE BEST CONCEPTUAL MODEL?

- Those that appear obvious
- The operations they support being intuitive to use



# A Classic Conceptual Model: The Star

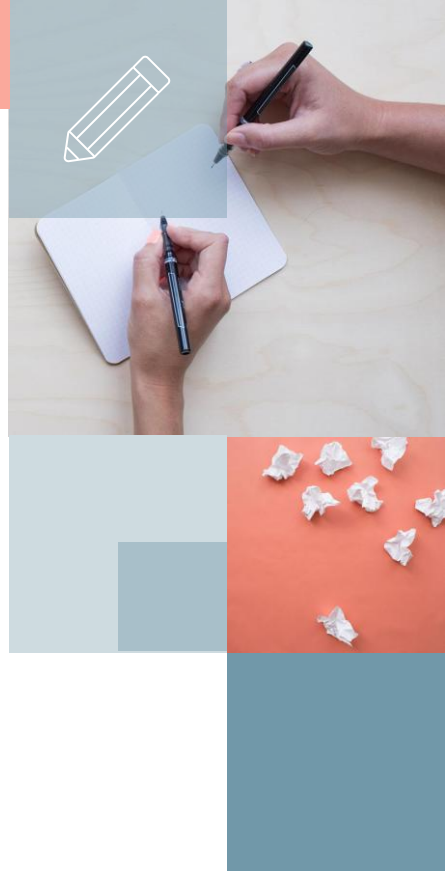


The Star interface,  
developed by Xerox  
back in 1981.



# INTERFACE METAPHORS

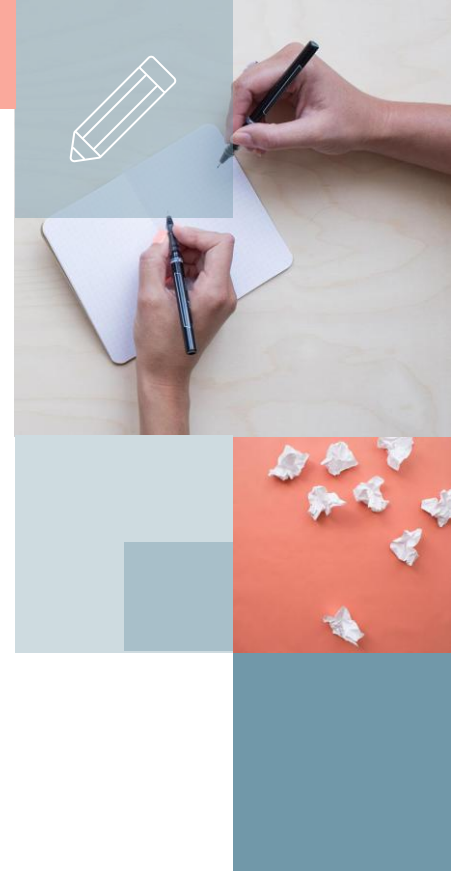
- a central component of a conceptual model
- intended to provide familiar entities that enable people to readily understand the underlying conceptual model and know what to do at an interface.





# Benefits of Interface Metaphors

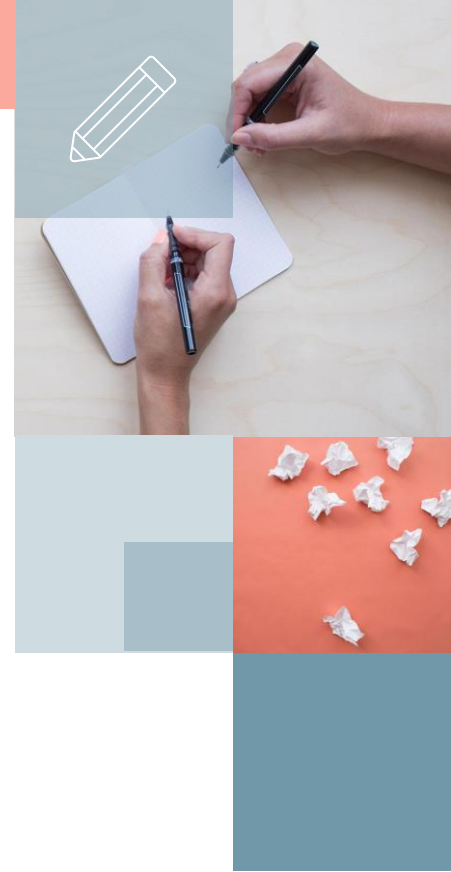
- Makes learning new systems easier
- Helps users understand the underlying conceptual model
- Can be very innovative and enable the realm of computers and their applications to be made more accessible to a greater diversity of users





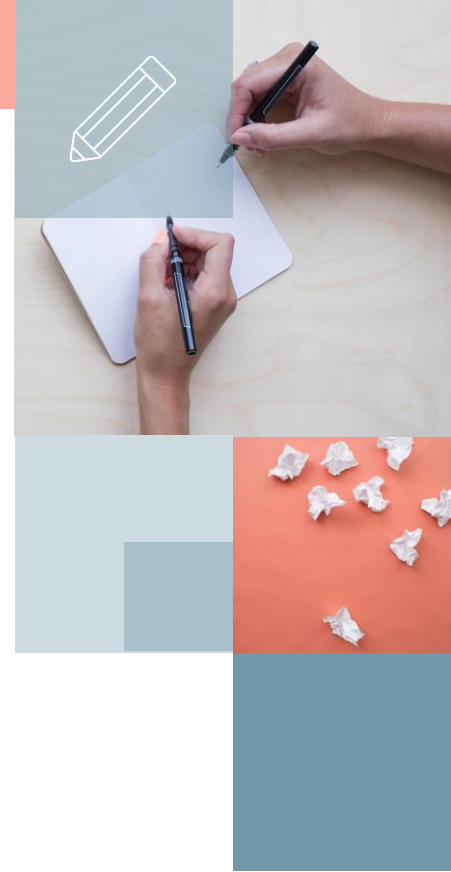
# Problems with interface metaphors

- Break conventional and cultural rules
  - e.g. recycle bin placed on desktop
- Can constrain designers in the way they conceptualize a problem space
- Conflict with design principles



# Problems with Interface Metaphors

- Forces users to only understand the system in terms of the metaphor
- Designers can inadvertently use bad existing designs and transfer the bad parts over
- Limits designers' imagination in coming up with new conceptual models





# 4 Main Types User Interaction

Instructing, Conversing, Manipulating & Exploring

# INSTRUCTING

- users carry out their tasks by telling the system what to do.

Ex.

Giving instruction to a system to perform operations such as tell the time, print a file and appointment reminder.

Benefit: Quick and Efficient

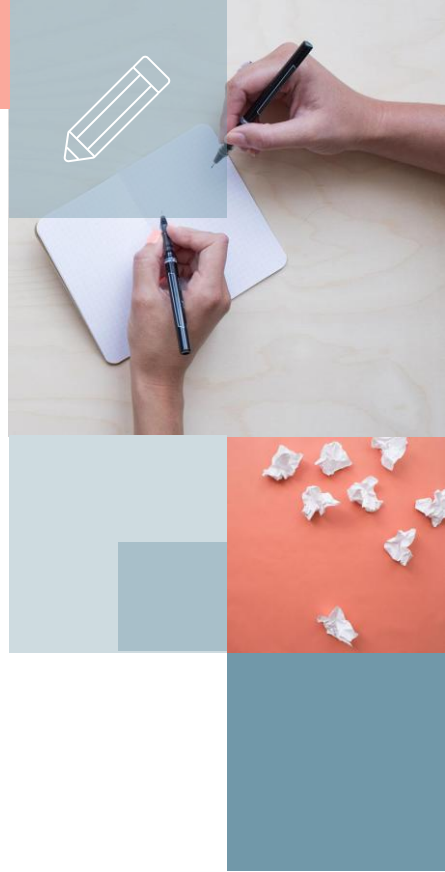




# CONVERSING

- based on the idea of a person having a conversation with a system, where the system acts as a dialog partner.
- simple voice-recognition, menu-driven systems, more complex natural language-based systems

Benefit: allows people to interact with a system in a way that is familiar to them





Siri's response to the question  
“Do I need an umbrella?”

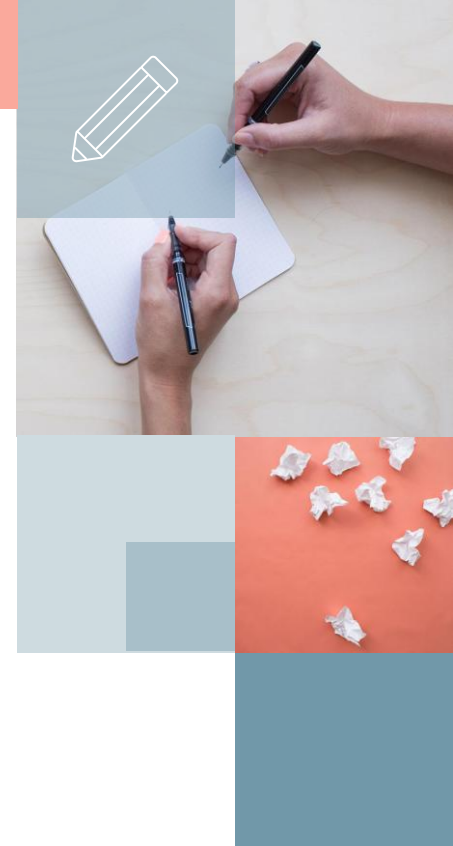


**“If you’d like to press 1, press 3.  
If you’d like to press 3, press 8.  
If you’d like to press 8, press 5...”**





# Would you talk with Anna?

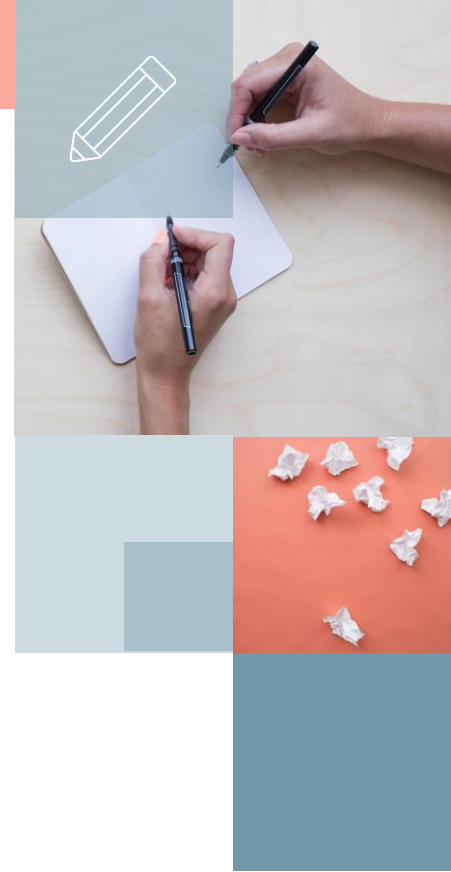


**Figure 1.7** Anna the online sales agent, designed to be subtly different for UK and US customers. What are the differences and which is which? What should Anna's appearance be like for other countries, like India, South Africa, or China?

*Source:* Reproduced with permission from IKEA Ltd.

# Pros and Cons of conversational model

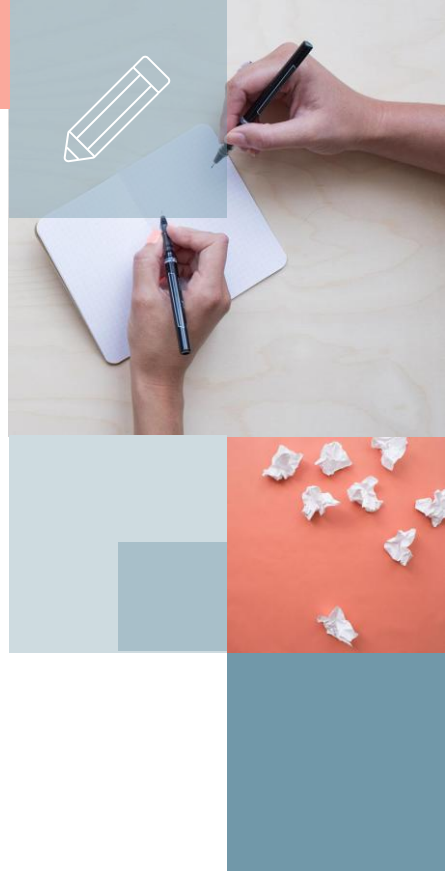
- Allows users, especially novices and technophobes, to interact with the system in a way that is familiar
  - makes them feel comfortable, at ease and less scared
- Misunderstandings can arise when the system does not know how to parse what the user says



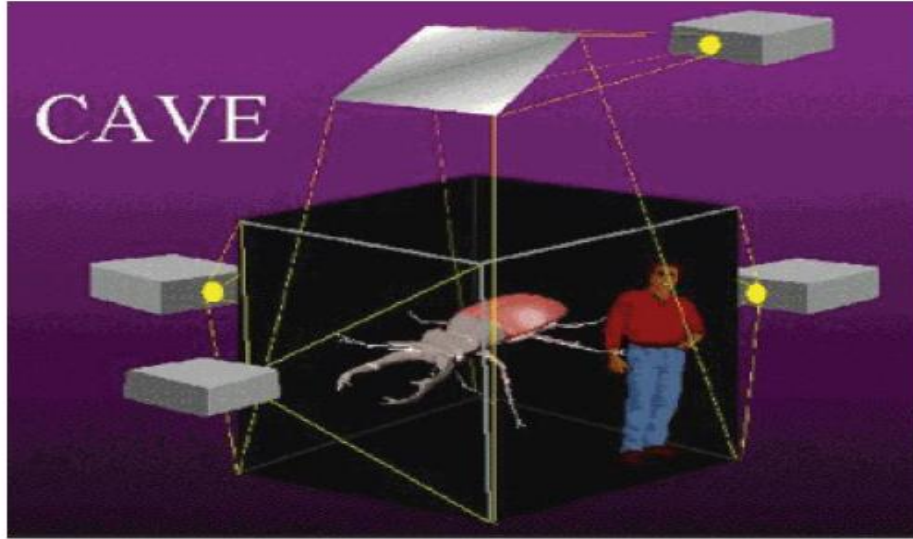
# MANIPULATING

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

Ex: Wii, Kinect



# EXPLORING



(a)

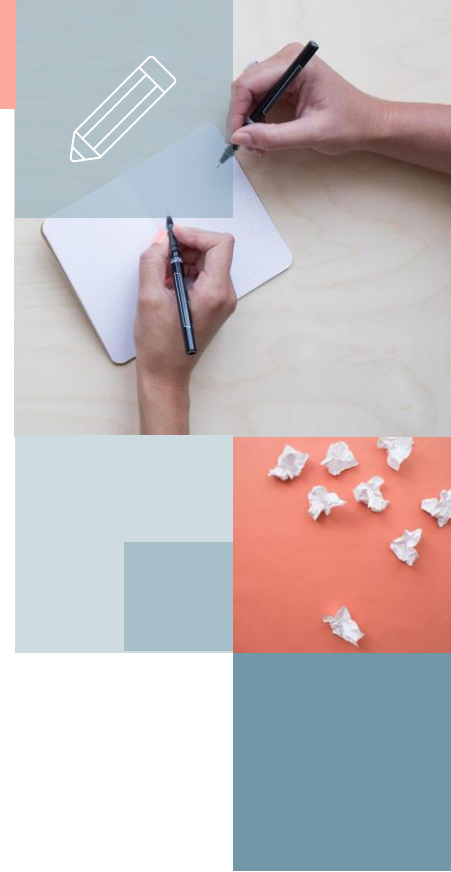


(b)

**Figure 2.8** (a) A CAVE that enables the user to stand near a huge insect, e.g. a beetle, be swallowed, and end up in its abdomen; and (b) NCSA's CAVE being used by a scientist to move through 3D visualizations of the datasets

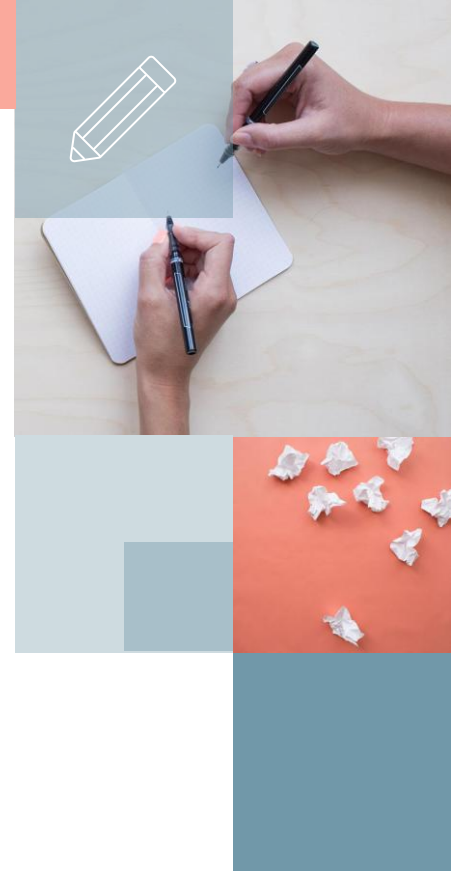
# Direct Manipulation

- Shneiderman (1983) coined the term DM, came from his fascination with computer games at the time
  - Continuous representation of objects and actions of interest
  - Physical actions and button pressing instead of issuing commands with complex syntax
  - Rapid reversible actions with immediate feedback on object of interest{



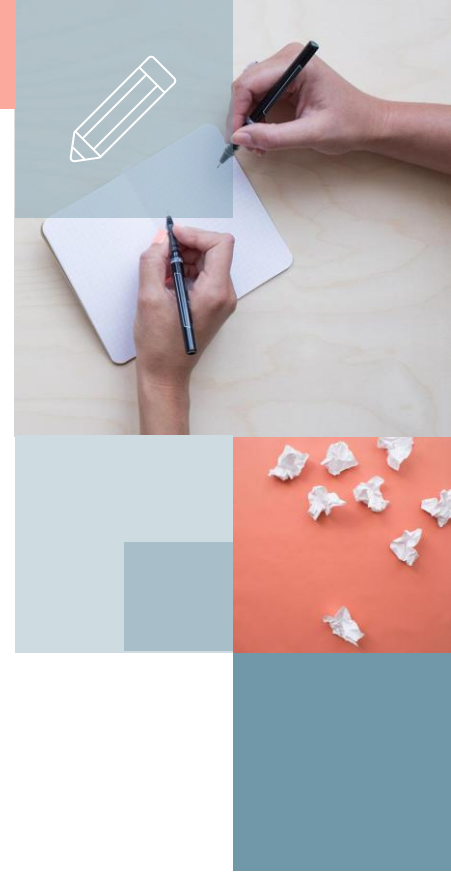
# Why are Direct Manipulation interfaces so enjoyable?

- Novices can learn the basic functionality quickly
- Experienced users can work extremely rapidly to carry out a wide range of tasks, even defining new functions
- Intermittent users can retain operational concepts over time



# Why are Direct Manipulation interfaces so enjoyable?

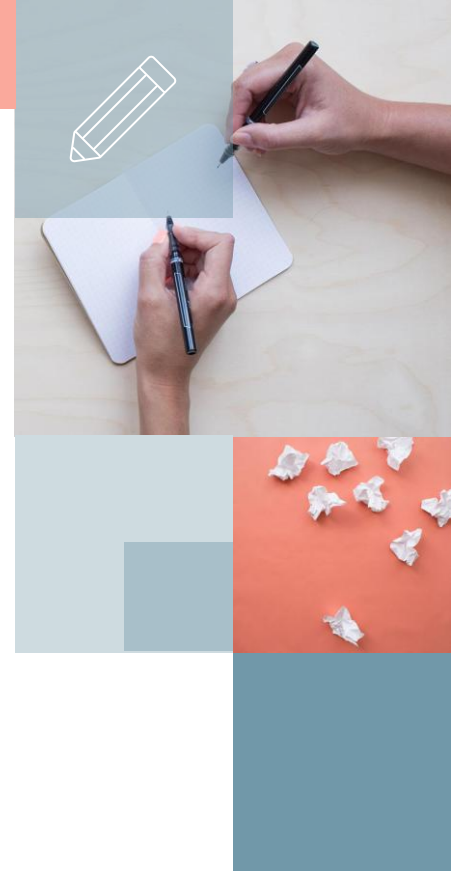
- Error messages rarely needed
- Users can immediately see if their actions are furthering their goals and if not do something else
- Users experience less anxiety
- Users gain confidence and mastery and feel in control





## 4. Exploring

- Involves users moving through virtual or physical environments
- Physical environments with embedded sensor technologies



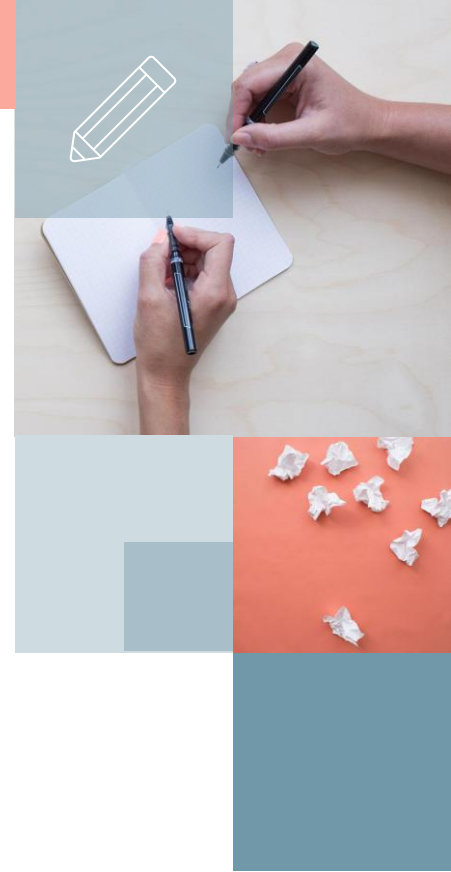
# Many kinds of interface types available including...

- Command
- Speech
- Data-entry
- Form fill-in
- Query
- Graphical
- Web
- Pen
- Augmented reality
- Gesture



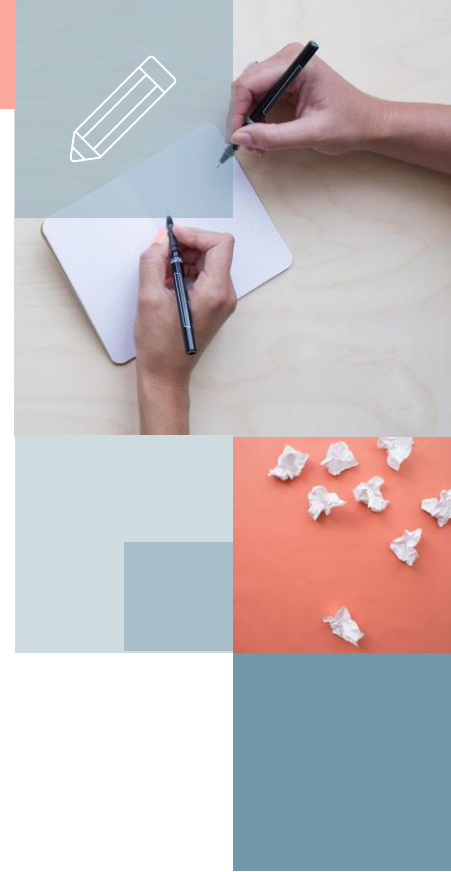
# Which interaction type to choose?

- Need to determine requirements and user needs
- Take budget and other constraints into account
- Also will depend on suitability of technology for activity being supported
- This is covered in course when designing conceptual models



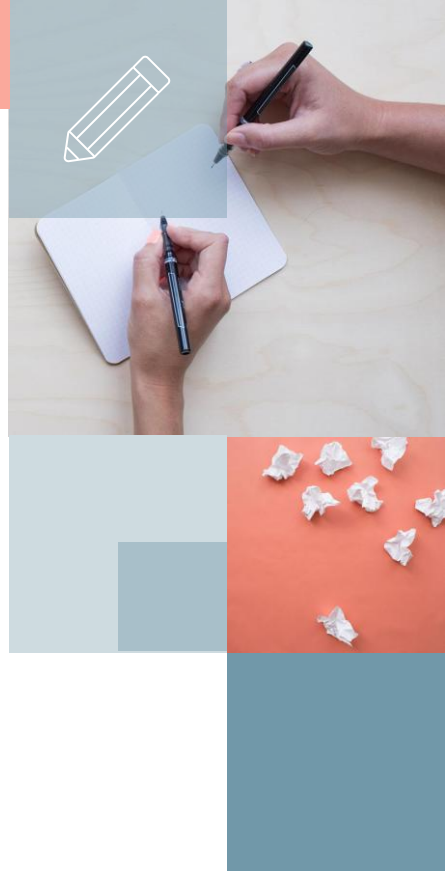
# Paradigms, Visions, Theories, Models, and Frameworks

- A paradigm refers to a general approach that has been adopted by a community of researchers and designers for carrying out their work, in terms of shared assumptions, concepts, values, and practices.



# Paradigms, Visions, Theories, Models, and Frameworks

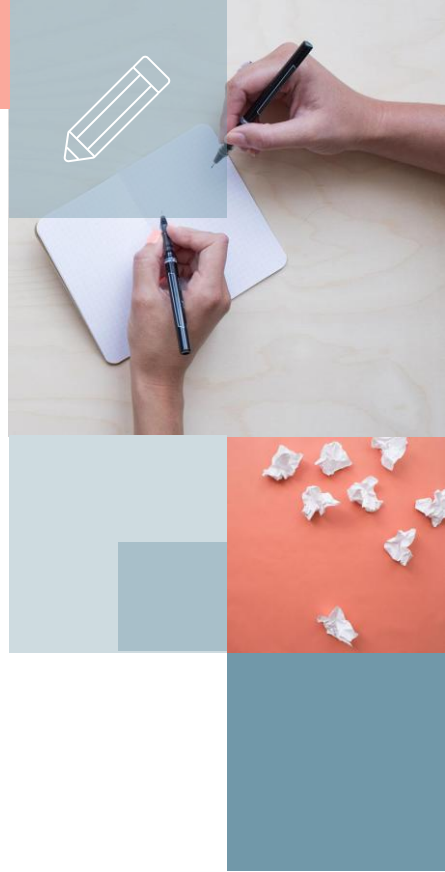
- A vision is a future scenario that frames research and development in interaction design – often depicted in the form of a film or a narrative.



# Paradigms, Visions, Theories, Models, and Frameworks

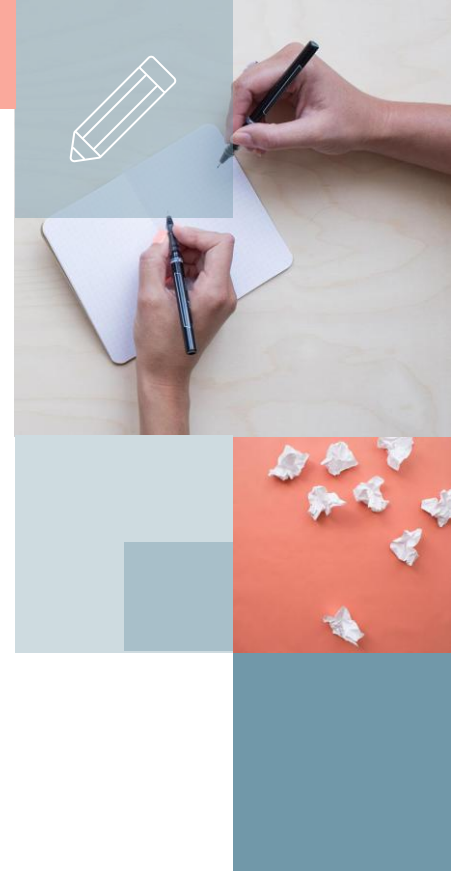
- A theory is a well-substantiated explanation of some aspect of a phenomenon;

*for example, the theory of information processing that explains how the mind, or some aspect of it, is assumed to work.*



# Paradigms, Visions, Theories, Models, and Frameworks

- A model is a simplification of some aspect of human–computer interaction intended to make it easier for designers to predict and evaluate alternative designs.

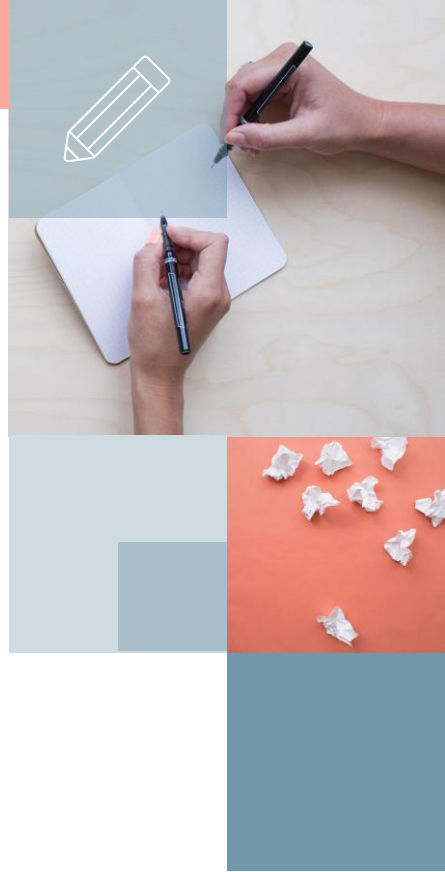




# Paradigms, Visions, Theories, Models, and Frameworks

- A **framework** is a set of interrelated concepts and/or a set of specific questions that are intended to inform a particular domain area

(e.g. collaborative learning), online communities, or an analytic method (e.g. ethnographic studies).



# PARADIGMS

- adopting a set of practices that a community has agreed upon

1980 – UX app for Desktop Application, WIMP, GUI

1990 – start of beyond desktop

1991 – Ubiquitous Technology (Weiser)

- AI to environment
- sensors



# VISIONS

- driving force that frame research and development in interaction design

Apple's 1987 Knowledge Navigator (25 years)

2011 – Speech System (Siri)

Internet of Things (IoT)

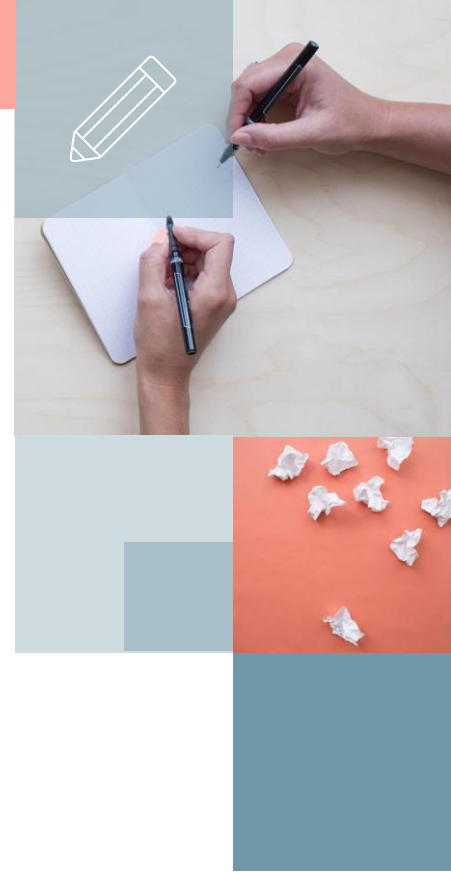


# THEORIES

- primarily cognitive, social, and organizational in origin

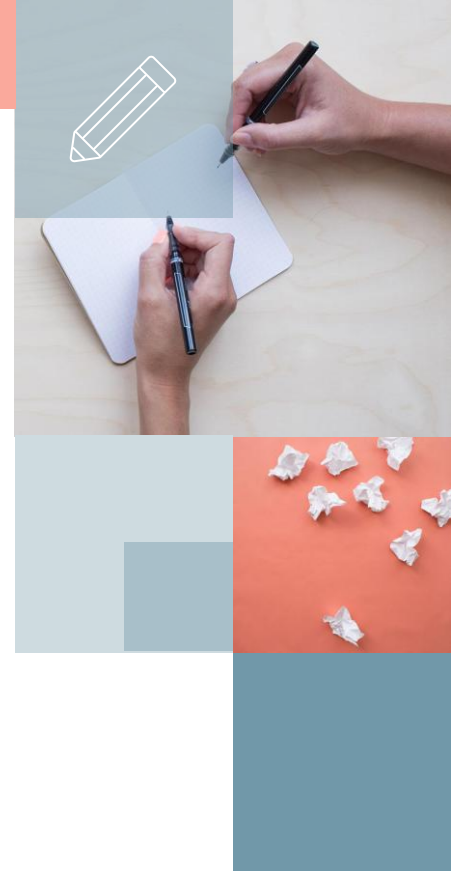
means of analyzing and predicting the performance of users carrying out tasks for specific kinds of computer interfaces and systems

(Rogers, 2012)



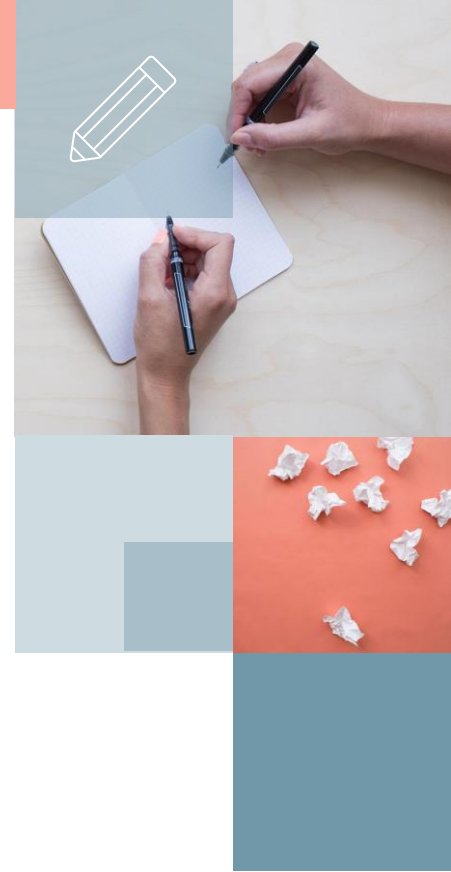
# MODELS

- typically abstracted from a theory coming from a contributing discipline, like psychology, that can be directly applied to interaction design.
- 1988 – Norman (developed a number of models of user interaction based on theories of cognitive processing, arising out of cognitive science)  
2005 – Modelled emotional design



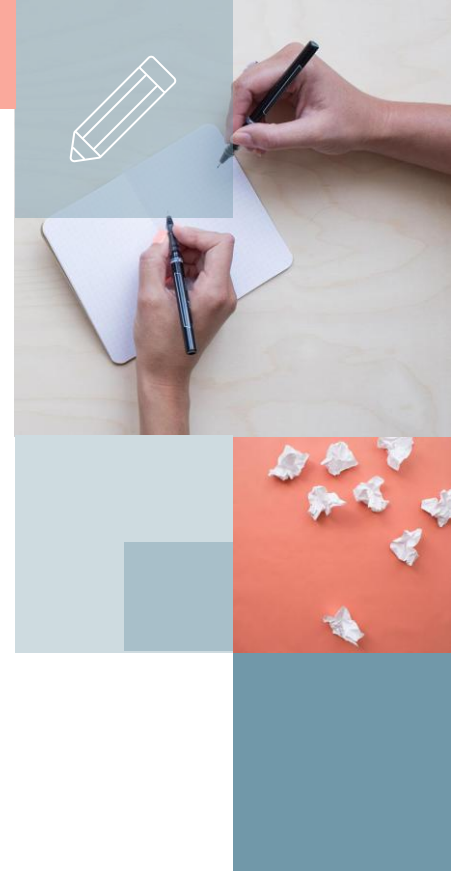
# FRAMEWORKS

- help designers constrain and scope the user experience for which they are designing
- *offers advice to designers as to what to design or look for, helping designers think about how to conceptualize learning, working, socializing, fun, emotion, and so on and others that focus on how to design particular kinds of technologies to evoke certain responses*



# 3 Framework's Interacting Components

- The designer's model
- The system image
- The user's model

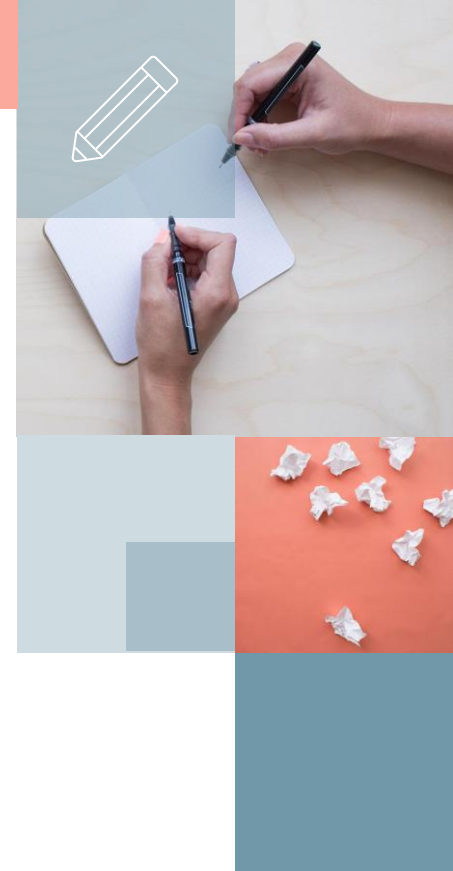




# Summary

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- Developing a conceptual model involves good understanding of the problem space, specifying what it is you are doing, why, and how it will support users
- 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 to understand how to interact with it
- Interaction types (e.g. conversing, instructing) provide a way of thinking about how best to support user's activities
- Paradigms, visions, theories, models, and frameworks provide different ways of framing and informing design and research



# SEATWORK (1/4 sheet)

*The aim of this activity is for you to think about the appropriateness of different kinds of conceptual models that have been designed for similar physical and digital information artifacts;*

Compare the following

- A.) a paperback book and an ebook;
- B.) a paper-based map and a smartphone map.

