

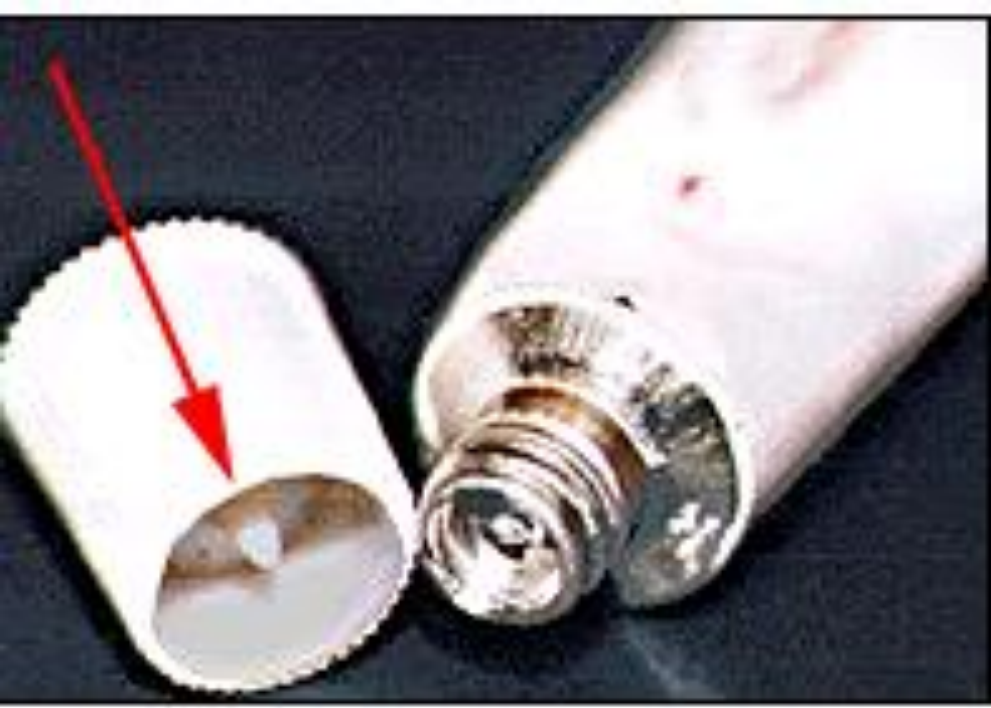
# Lecture 2: Interaction Design

# Bad designs

- Elevator controls and labels on the bottom row all look the same, so it is easy to push a label by mistake instead of a control button



- People do not make same mistake for the labels and buttons on the top row. Why not?



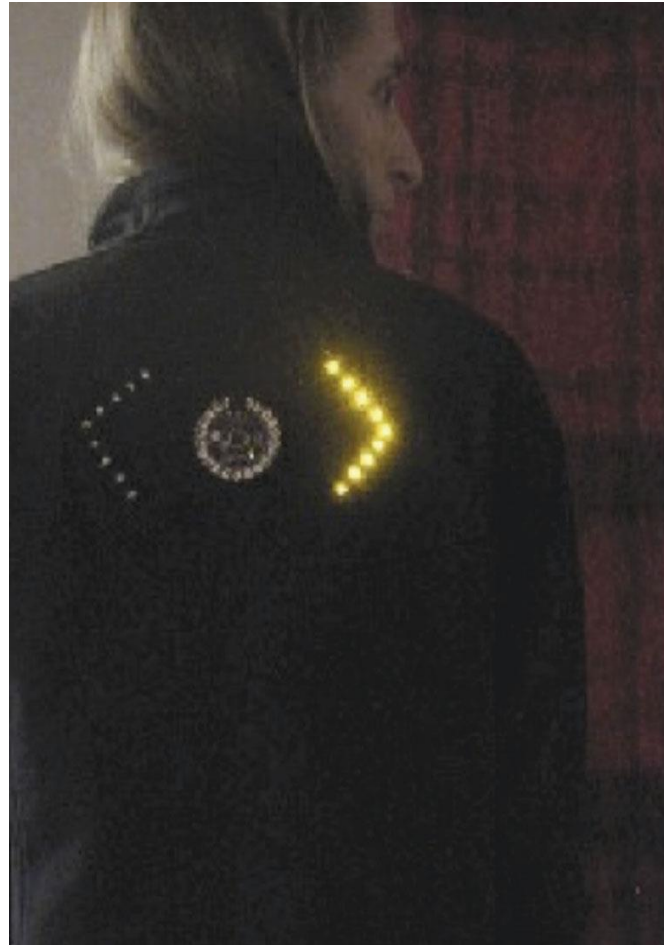
# Good and bad design



- What is wrong with the remote on the right?
- Why is the left remote so much better designed?
  - Peanut shaped to fit in hand
  - Logical layout and color-coded, distinctive buttons
  - Easy to locate buttons



# Novel interface



# **Designer's Fallacy:**

A designer can design into a technology, its purposes and uses.

## **Reality:**

no control, hope for the best

## **Strategy:**

try to understand people and how they already use the technology or similar technologies

# Why is Design Hard?

We've never "seen" it before

We aren't the people using it

We can't anticipate how people will use it

# Why is Design Hard?

Judging/predicting which designs will be successful is difficult

Way more is possible than what is good

Design involves making trade-offs

Good designs are non-obvious



# What to design

- Need to take into account:
  - Who the users are
  - What activities are being carried out
  - Where the interaction is taking place
- Need to optimize the interactions users have with a product
  - So that they match the users' activities and needs

# Core Design Skills

- Need to take into account what people are good and bad at
- Consider what might help people in the way they currently do things
- Think through what might provide quality user experiences
- Listen to what people want and get them involved
- Use tried and tested user-centered methods

# What is interaction design?

- Designing interactive products to support the way people communicate and interact in their everyday and working lives
  - Sharp, Rogers and Preece (2011)
- The design of spaces for human communication and interaction
  - Winograd (1997)

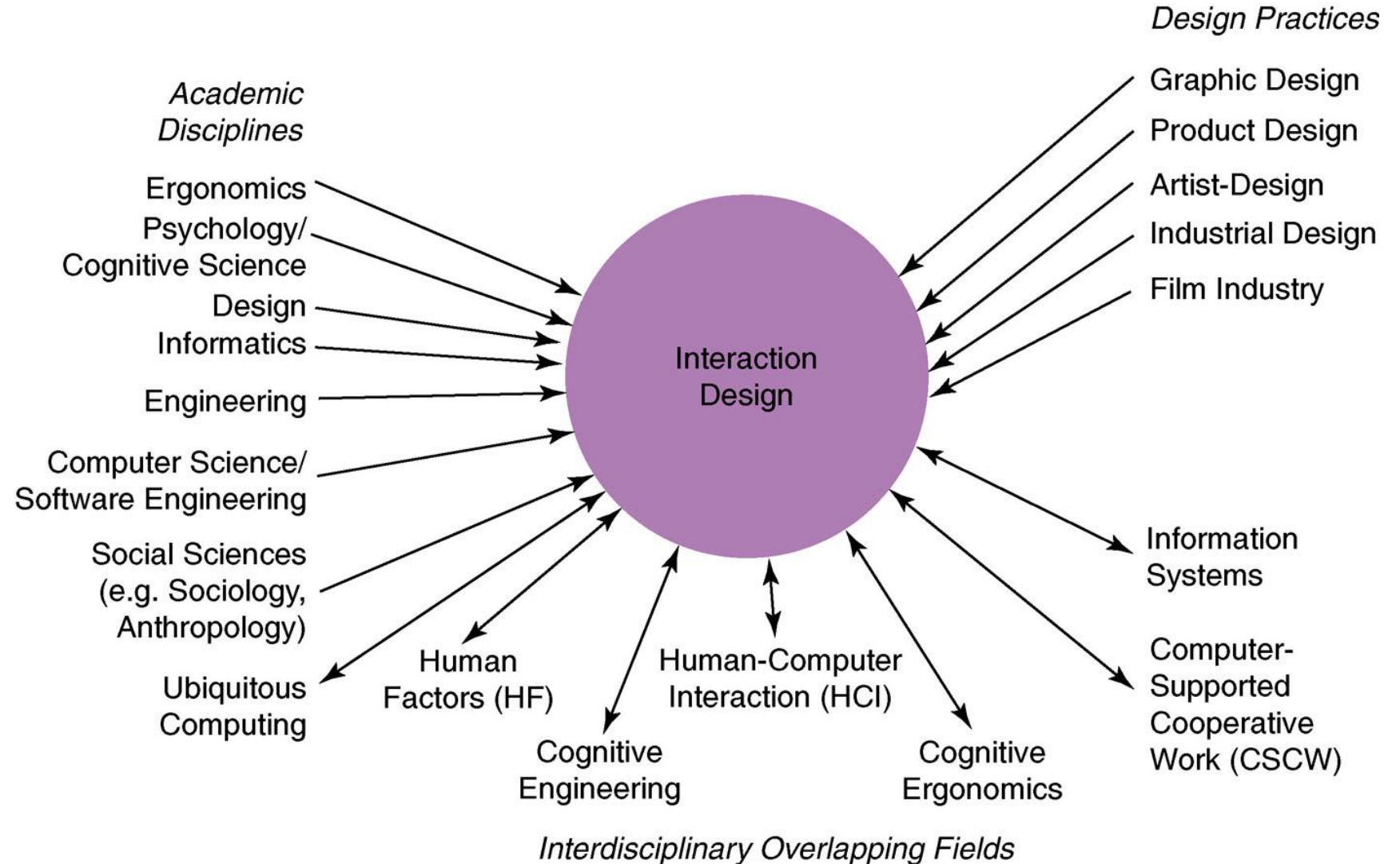
# Goals of interaction design

- Develop usable products
  - Usability means easy to learn, effective to use and provide an enjoyable experience
- Involve users in the design process

# Which kind of design?

- Number of other terms used emphasizing what is being designed, e.g.
  - user interface design, software design, user-centered design, product design, web design, experience design (UX)
- Interaction design is the umbrella term covering all of these aspects
  - fundamental to all disciplines, fields, and approaches concerned with researching and designing computer-based systems for people

# HCI and interaction design



# Relationship between ID, HCI and other fields

- Academic disciplines contributing to ID:
  - Psychology
  - Social Sciences
  - Computing Sciences
  - Engineering
  - Ergonomics
  - Informatics



# Relationship between ID, HCI and other fields

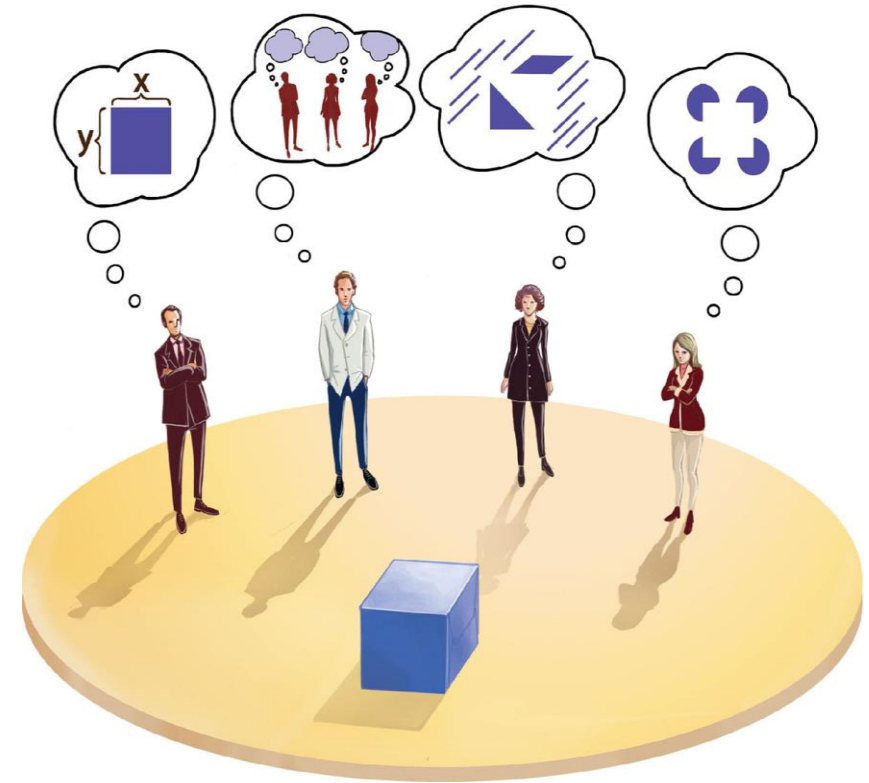
- Design practices contributing to ID:
  - Graphic design
  - Product design
  - Artist-design
  - Industrial design
  - Film industry

# Relationship between ID, HCI and other fields

- Interdisciplinary fields in interaction design:
  - HCI
  - Ubiquitous Computing
  - Human Factors
  - Cognitive Engineering
  - Cognitive Ergonomics
  - Computer Supported Co-operative Work
  - Information Systems

# Working in multidisciplinary teams

- Many people from different backgrounds involved
- Different perspectives and ways of seeing and talking about things
- Benefits
  - more ideas and designs generated
- Disadvantages
  - difficult to communicate and progress forward the designs being created



# Interaction design in business

- Increasing number of ID consultancies, examples of well known ones include:
  - **Nielsen Norman Group**: “help companies enter the age of the consumer, designing human-centered products and services”
  - **Cooper**: “From research and product to goal-related design”
  - **Swim**: “provides a wide range of design services, in each case targeted to address the product development needs at hand”
  - **IDEO**: “creates products, services and environments for companies pioneering new ways to provide value to their customers”



**cooper**

**IDEO**



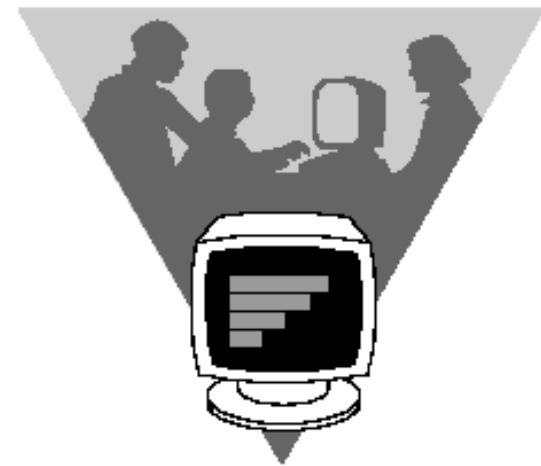
# *USER CENTERED DESIGN*

## System Centered Design

What can be built easily on this platform?

What can I create from the available tools?

What do I as a programmer find interesting to work on?



## User Centered System Design

Design is based upon a user's

- abilities and real needs
- context
- work
- tasks



Golden rule of interface design: ***“Know The User”***

# HCI and Design

- An appropriate allocation of function between user and system:
  - Determining which aspects of a task should be handled by people and which can be handled by software and hardware is of critical importance. (Task Allocation)
  - The allocation of function should be based on an appreciation of human capabilities, and their limitations
  - This allocation benefits from the input of end-users which will also help to ensure that the results are acceptable to the people who will be affected



# Defining User-Centered Design (UCD)

- UCD is also referred to as the *user-centered methodology* or *human-centered design or human-centered methodology*
- *"UCD is an iterative process whose goal is the development of usable systems, achieved through involvement of potential users of a system in system design."* (Karat, 1996)
- UCD is an approach to design that grounds the process in information about the people who will use the product and the quality of interaction between these people and the product is the primary goal of UCD

# Defining UCD

There is an international standard that forms the basis for UCD (ISO 13407: Human centred design process for interactive systems)

- *“Human-centred design is an approach to interactive system development that focuses specifically on making systems usable. It is a multi-disciplinary activity which incorporates human factors and ergonomics knowledge and techniques. The application of human factors and ergonomics to interactive systems design enhances effectiveness and efficiency, improves human working conditions, and counteracts possible adverse effects of use on human health, safety and performance. Applying ergonomics to the design of systems involves taking account of human capabilities, skills, limitations and needs.”*

# Defining UCD

- Note that the ISO 13407 standard defines a general process for including human-centered activities throughout a development life-cycle, but does not dictate the specific methods
- UCD intends to ensure that the user is at the center during the design process in order to realize products that meet usability requirements
- User-centered systems empower users and motivate them to learn and explore new system solutions

# Characteristics of UCD

- Key aspects of user-centered design:
  - Know your users
    - ☐ Characteristics, tasks, context/organization/environment in which they use the system
  - Actively involve users early and continuously
    - ☐ There are a number of ways in which user participation can be facilitated throughout the design process: Focus groups, Questionnaires and Interviews, Observation, User testing, and many more ...

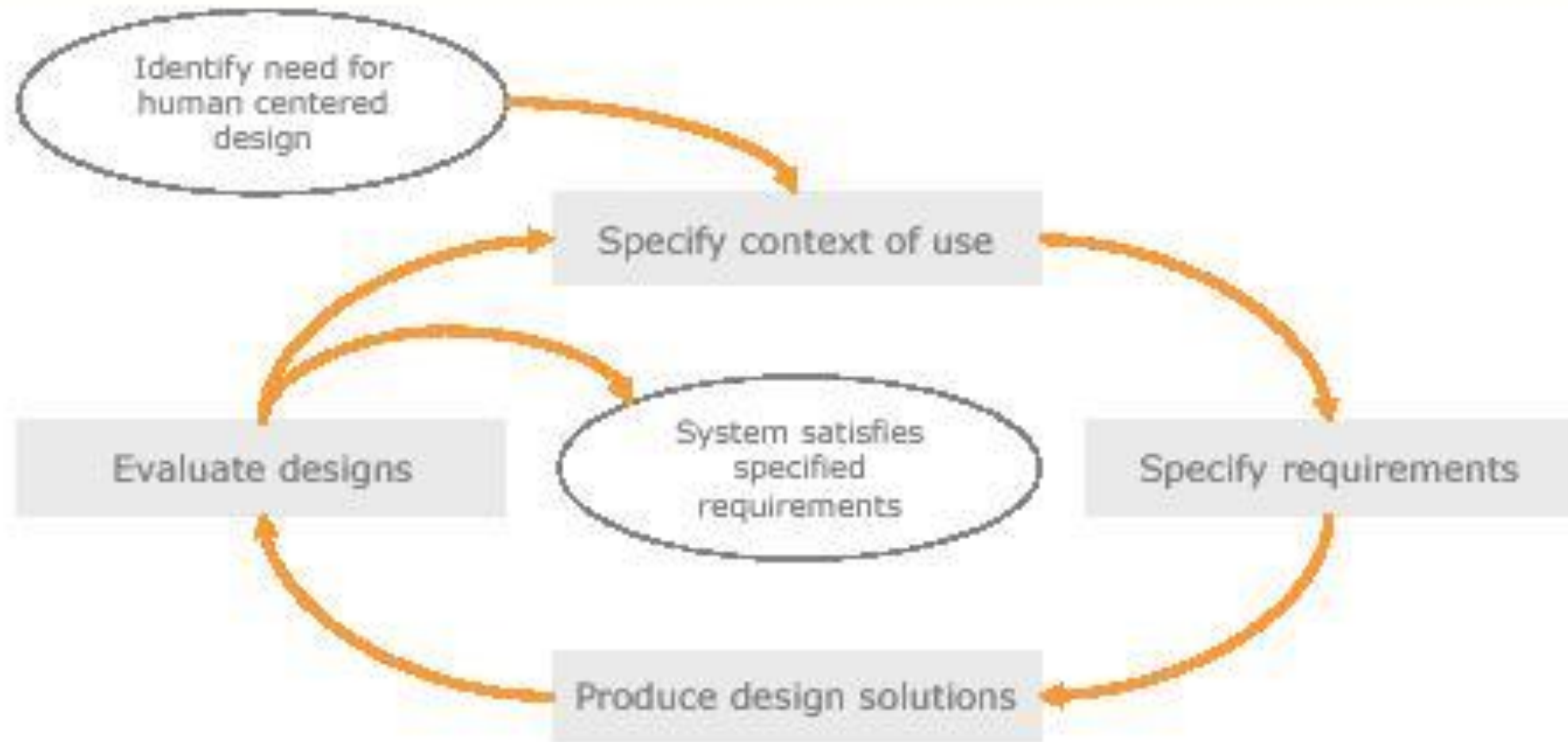
# Characteristics of UCD

- Key aspects of user-centered design:
  - Rapid and frequent iteration of designs with usability assessments
    - ☐ Iterative design is a process where an interface is progressively developed and improved over a series of iterations, each the result of user testing and feedback
    - ☐ In its simplest form, the iterative design is a continual cycle that can be said to have three phases: design, test, redesign
- Multidisciplinary team
  - ☐ Development team is made up from representatives of all the groups who have a 'stake' in the proposed software (stakeholders) e.g. managers, domain experts, usability specialists, training and support staff, software engineers, and of course the end user themselves

# UCD Activities

- According to the ISO 13407 standard, there are **four** essential user-centered design activities which should be undertaken to incorporate usability requirements into the software development process
  - understand and specify the *context of use*
  - specify the user and organizational *requirements*
  - produce *designs and prototypes*
  - carry out *assessments/evaluations*

# UCD Activities



(based on ISO 13407: Human centred design process for interactive systems)



# UCD Activities

## 1. Understand and specify the context of use

- ☐ The quality of use of a system depends very much upon the context in which a system will be used therefore it is necessary that the relevant contextual information is collected
- ☐ At the end the following aspects are understood:
  - ☐ the characteristics of the intended users
  - ☐ the tasks the users will perform , and allocation of activities between users and system
  - ☐ constraints and characteristics of the socio-organizational and technological environment in which the users will use the system
- ☐ The results of this initial activity are embodied in a document which describes the context of use for the proposed software
- ☐ The document:
  - ☐ should be validated by users
  - ☐ should be revised cyclically
  - ☐ influences the design

# UCD Activities

## 2. Specify the user and organizational requirements

- ☐ Building on the context of use description obtained previously, an explicit statement of the user-centered requirements for the new software should be formulated
- ☐ There are various methods which can help define these requirements, but according to ISO 13407 some elements to be covered in the specification include:
  - ☐ identification of the range of relevant users and other personnel in the design
  - ☐ provision of a clear statement of design goals
  - ☐ an indication of appropriate priorities for the different requirements
  - ☐ evidence of acceptance of the requirements by the stakeholders or their representatives
  - ☐ acknowledgement of any statutory or legislative requirements, for example for health and safety

# UCD Activities

## 3. Produce designs and prototypes

- ☐ The key goal is to simulate the design solution(s) using paper or computer-based mock-ups
- ☐ Explore design solutions by through mock-ups, and prototypes in general, of the proposed system and then later presenting them to a representative sample of users
- ☐ Involve users early in order to explore and refine design choices in light of feedback
- ☐ Iterate design solutions until the design/usability goals or requirements are met

# UCD Activities

## 4. Carry out evaluations

- ☐ The usability evaluation of design decisions is crucial
- ☐ Develop an evaluation plan for the current stage
- ☐ Do an assessment each of system lifecycle stages (with or without users)
  - ☐ identify anomalies and defects most relevant at this stage
  - ☐ select the best solution for the system in light of the requirements at this stage
  - ☐ report the results and recommendation for refining the design at this stage; the refined design becomes the design in the next stage
- ☐ This evaluation process is iterated at each stage until design/usability goals or requirements are met

# UCD Activities

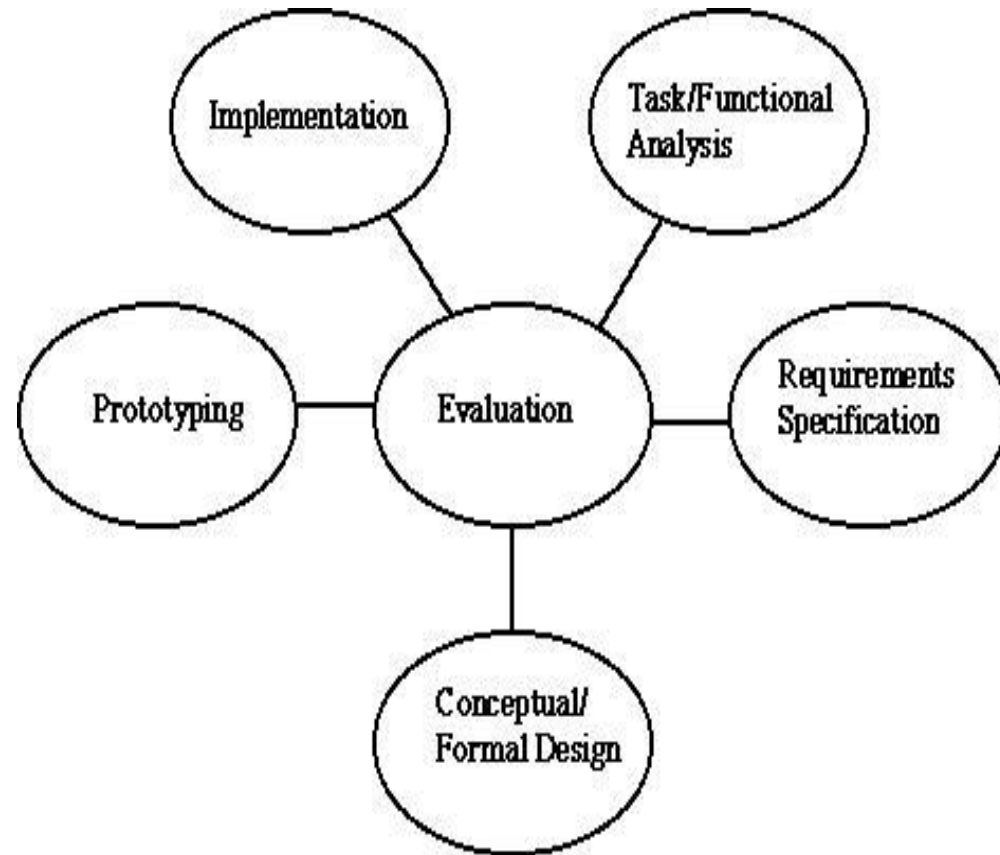
- There are many methods which can be used to achieve the goals of user-centered design (and will be covered later in the course)
  - ☐ Requirements gathering techniques: characteristics of users, etc.
  - ☐ Task analysis: analysis of user tasks/activities
  - ☐ Evaluation techniques: expert-based, user-based, etc.
  - ☐ Etc.

# HCI Design Models

1. The Star Life Cycle (Hix and Hartson, 1993)
2. The LUCID Design Framework (Cognetics Interactive – [www.cognetics.com](http://www.cognetics.com))
3. Interface Design and Usability Engineering (Saul Greenberg)
4. Discover, Design, Use (John Cato)
5. Iterative Design Process (Design, Implementation, Evaluation)

# The Star Life-Cycle

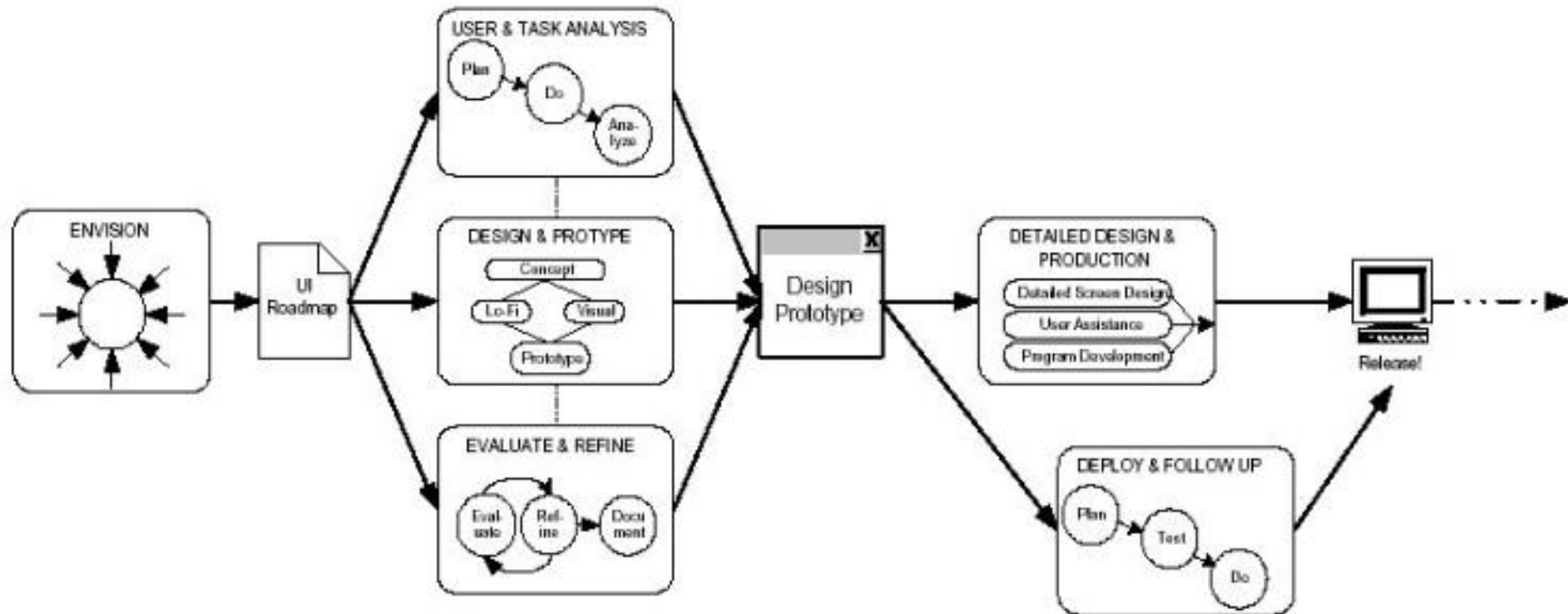
- At the center of the star life cycle is the very important evaluation stage
- After every iteration, there is an evaluation process to determine the outcome of the last stage
- Progress can be measured throughout the process
- A range of evaluation strategies is needed to support this model





# The LUCID Design Framework

- The Logical User Centered Interaction Design Framework

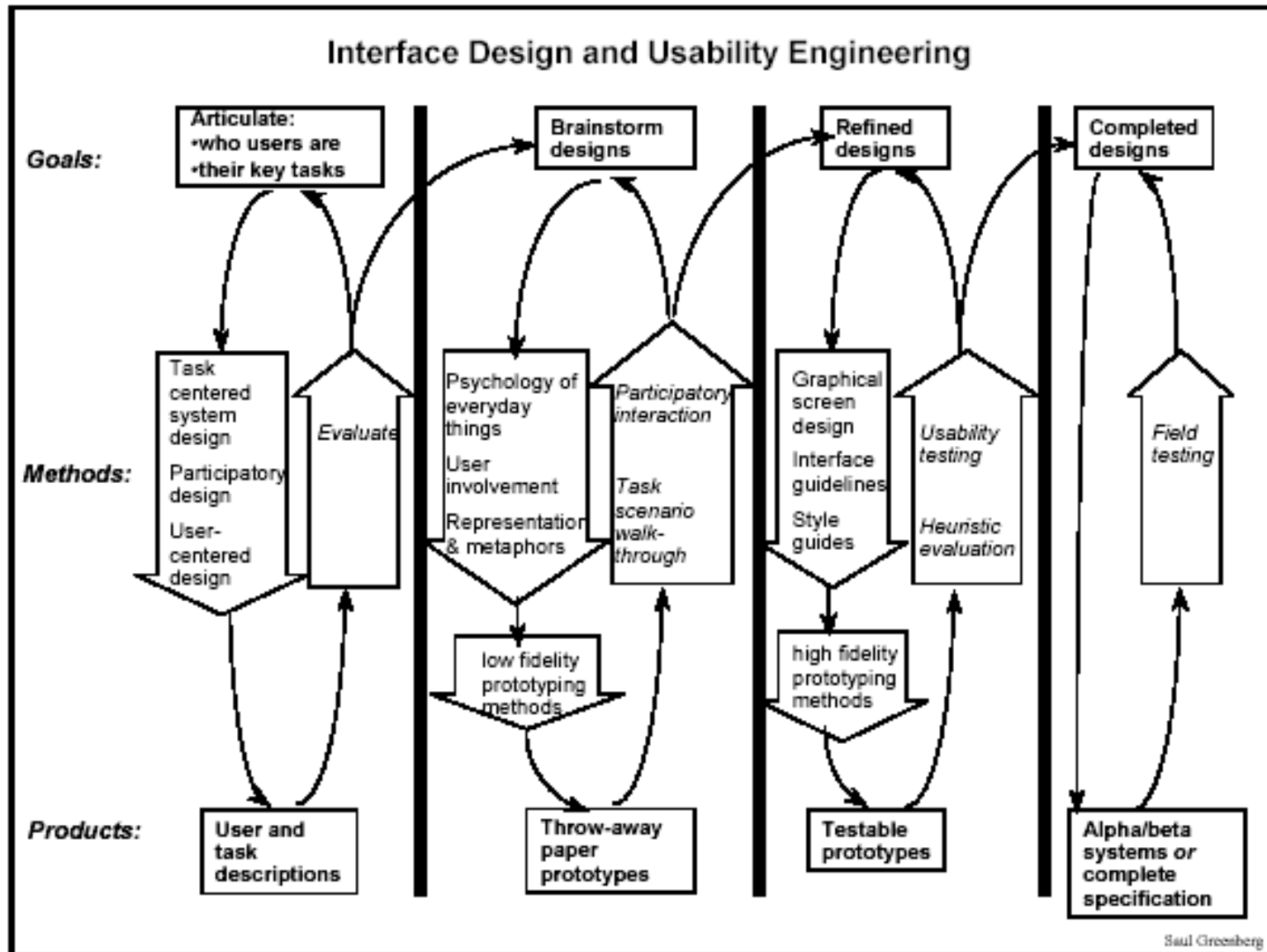


# The LUCID Design Framework

- LUCID is organized into six stages:

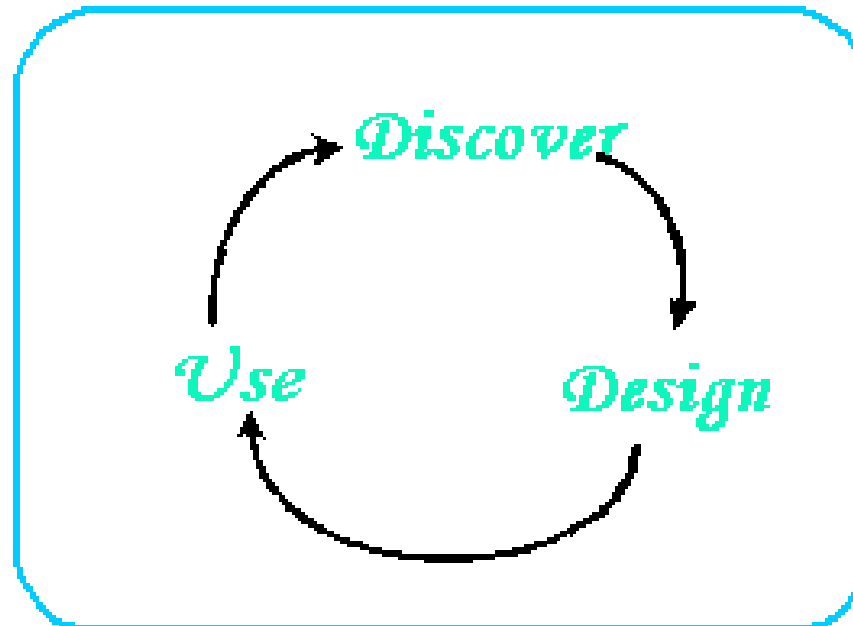
Stage 1: <b>Envision</b>	Develop UI Roadmap which defines the product concept, rationale, constraints and design objectives.
Stage 2: <b>Analyze</b>	Analyze the user needs and develop requirements.
Stage 3: <b>Design</b>	Create a design concept and implement a key screen prototype.
Stage 4: <b>Refine</b>	Test the prototype for design problems and iteratively refine and expand the design.
Stage 5: <b>Implement</b>	Support implementation of the product making late stage design changes where required. Develop user support components.
Stage 6: <b>Support</b>	Provide roll-out support as the product is deployed and gather data for next version.

# Interface Design and Usability Engineering

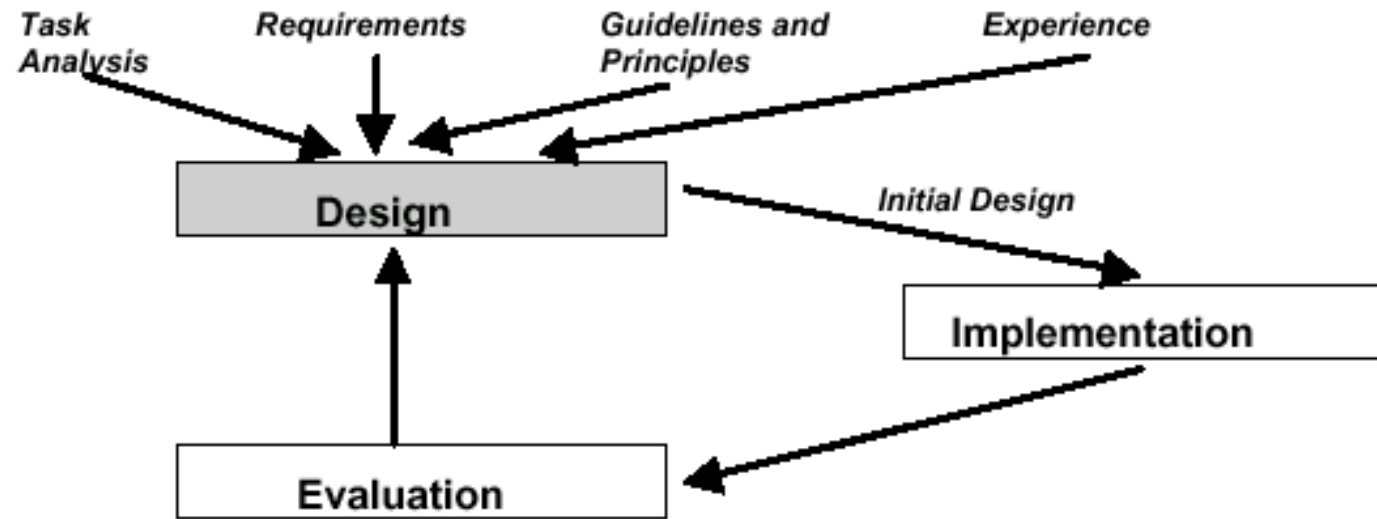


# Discover, Design, Use

- A user-centered web design model used for the design of web interfaces. It involves:
  - Discover - Scope, research, synthesize
  - Design - ideate, prototype, validate
  - Use - deliver, test



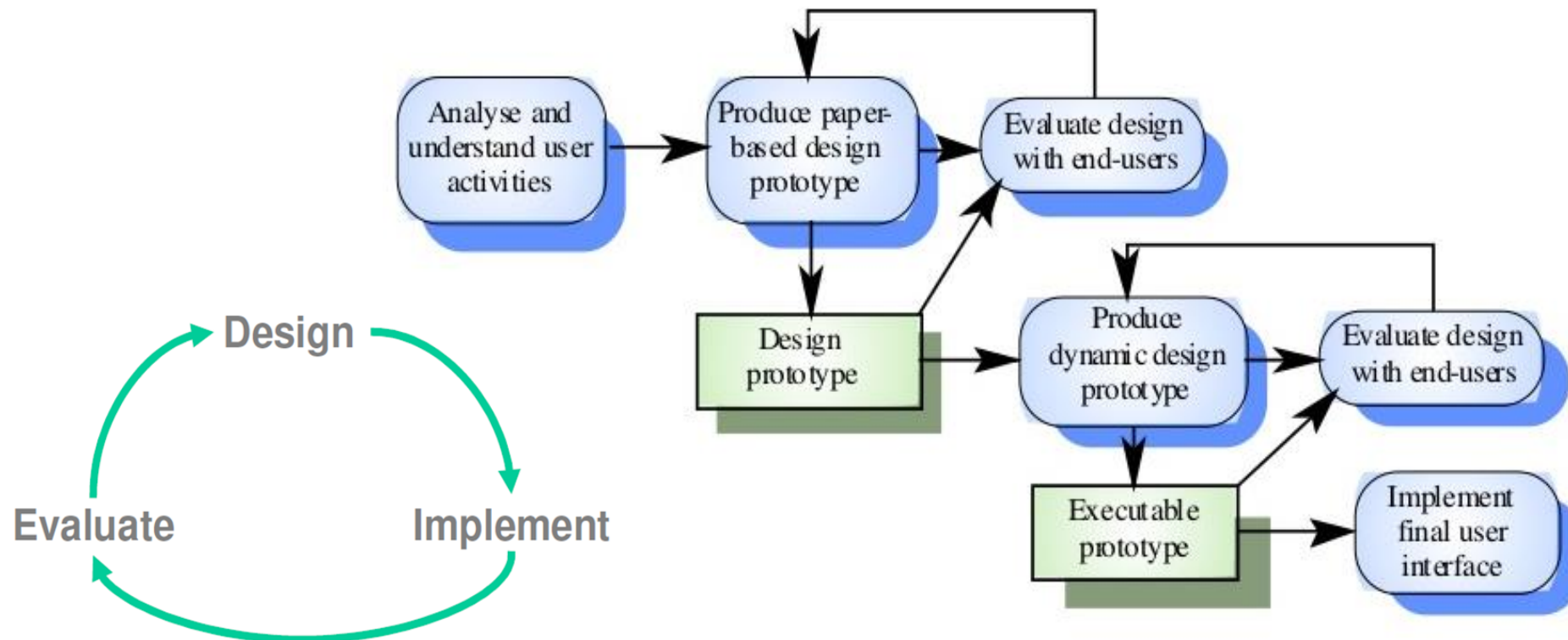
# Iterative Design Using Prototypes



- Involves:
  - Generating a prototype of the design e.g. initial design from guidelines and principles
  - Evaluate the design
  - Redesign to correct any errors
  - Build new prototype

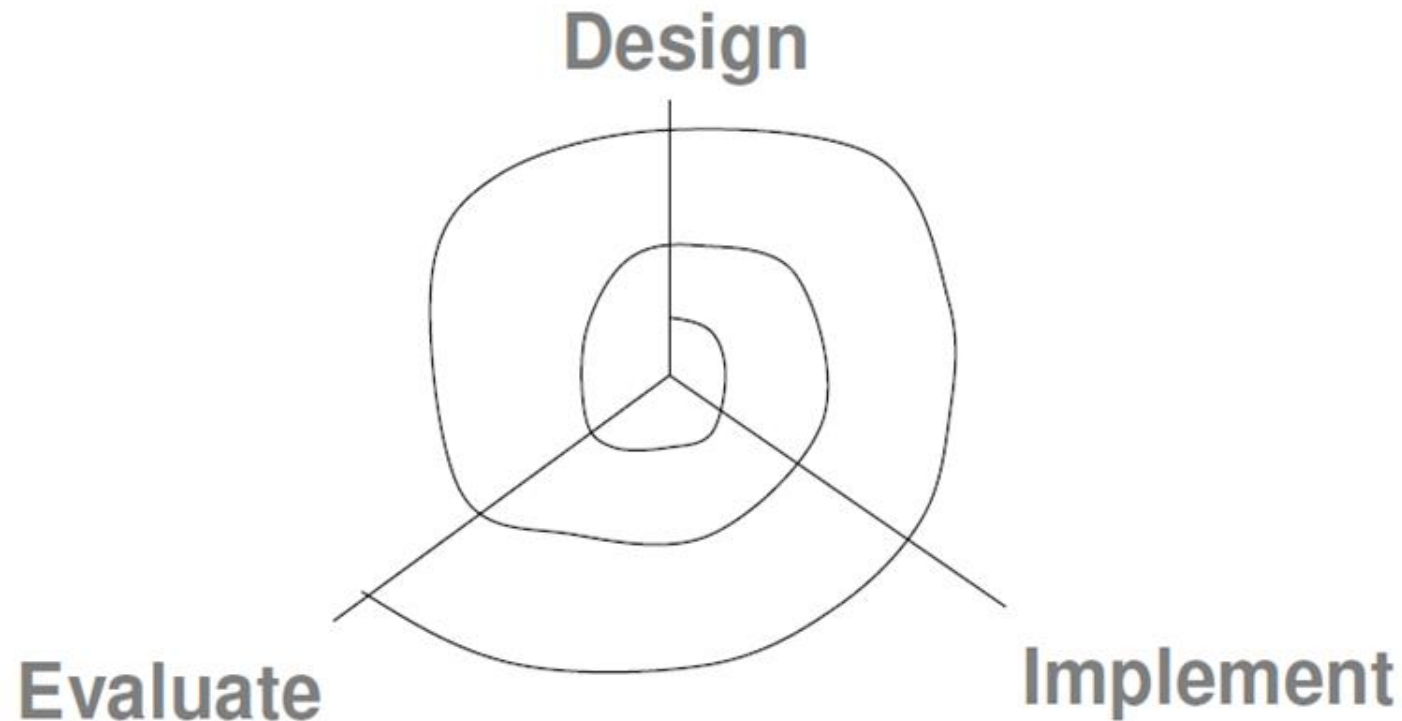
# User Interface Design Process

- For this class we shall work with the **Iterative Design Using Prototypes**
- We shall keep in mind the **User Interface Design Process**

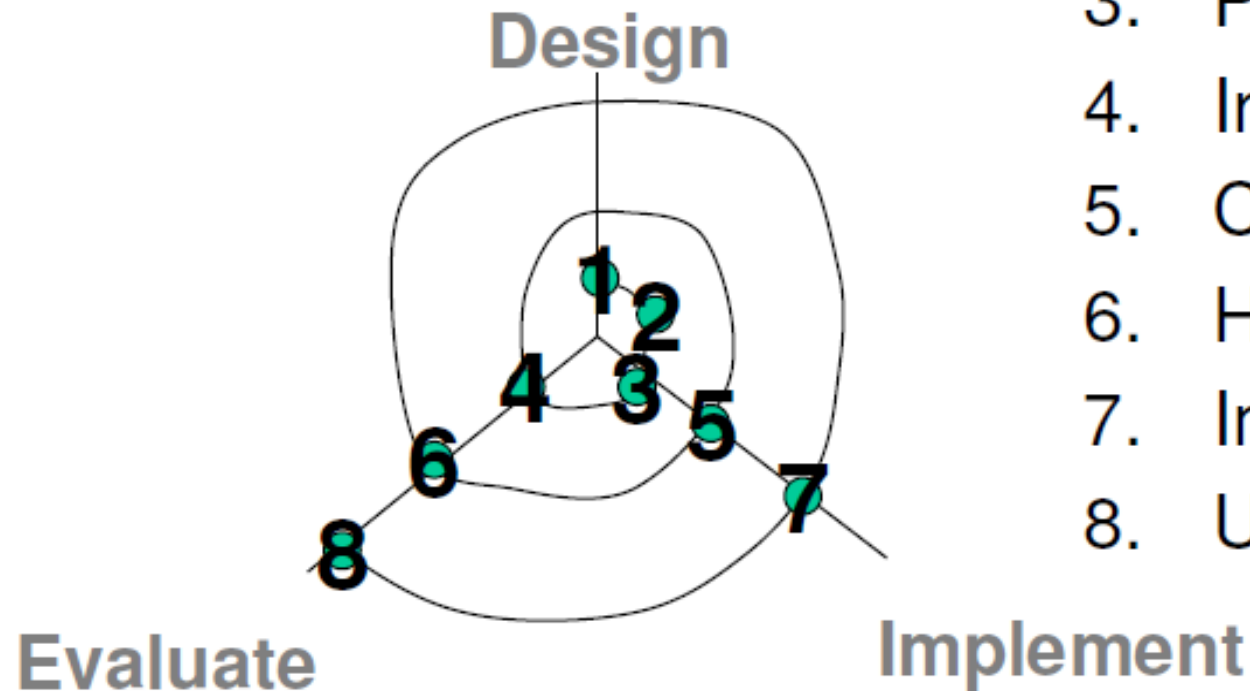


# User Interface Design With the Iterative Design Model

- We shall use the Spiral Model to ensure that we effectively apply the Iterative Design Model to the User Interface Design Process



# User Interface Design With the Iterative Design Model



1. Task analysis
2. Design sketches
3. Paper prototype
4. In-class user testing
5. Computer prototype
6. Heuristic evaluation
7. Implementation
8. User testing