

HCI Design Process: An Overview

- What is HCI Design Process?
- Practical Issues in HCI Design Process
- Examples of Lifecycle Models

HCI Design Process

What is HCI Design?

- It is a **process**:
 - A **goal**-directed problem solving activity informed by intended use, target domain, materials, cost, and feasibility
 - A **creative** activity
 - A decision-making activity to **balance** trade-offs (e.g., requirements of product compatibility and ease of use may be contradicting)
- It is a **representation**:
 - A plan for development
 - A set of alternatives and successive elaborations

HCI Design Process

Four basic **activities** of interaction design:

1. Identifying **needs** and establishing **requirements**

- Who our target users are?
- What kind of support an interactive product can provide?

2. Developing **alternative designs**

- Suggest ideas for meeting the requirements
- Two subactivities –
 - **Conceptual** design: produce the **conceptual model** for the product, e.g., what the product should do, behave and look like
 - **Physical** design: consider **detail** of the product including the colors, sounds, images to use, menu design, icon design, etc.

HCI Design Process

3. Building **interactive** versions of the designs

- Not necessarily build a software version, other possible simple prototypes include paper-based storyboard, wood, etc.
- e.g., When the idea for the PalmPilot was being developed, Jeff Hawkin carved up a piece of wood about the size and shape of the device he had imagined. He used to carry this piece of wood around with him and pretend to enter information into it, just to see what it would be like to own such a device

4. **Evaluating** designs

- Determine usability & acceptability of product or design
- Require user involvement throughout development

HCI Design Process

Three **principles** for user-centered approach

1. **Early** focus on **users** and **tasks**

- First understand the users by studying their cognitive, behavioural and attitudinal characteristics
- Require observing users doing their normal tasks, studying the nature of those tasks, and then involving users in the design process
- Can be expanded and clarified further:
 - Users' tasks and goals are the driving force behind the development
 - Users' behaviour and context of use are studied and the system is designed to support them
 - Users' characteristics are captured and designed for
 - All design decisions are taken within the context of the users, their work, and their environment

HCI Design Process

- Users are consulted throughout development from earliest phases to the latest and their input is seriously taken into account

2. Empirical Measurement

- Users' reactions & performance to manuals, simulations, prototypes, etc. are observed, recorded & analysed
- Identify, document and agree specific usability and user experience goals at the beginning of the project
- Help designers to choose between different alternative designs & to check on progress as the product is developed

3. Iterative Design

- When problems are found in user testing, fix them and carry out more tests

HCI Design Process

Example:

Assume that you are involved in developing a new e-commerce site for selling garden plants. Suggest ways of applying the principle of “**Early** focus on **users** and **tasks**”.

- Tasks and goals, behaviours, and characteristics of **potential** users can be identified by investigating how people shop in existing online and physical shopping situations. For example in physical shops, we can know how people choose plants, what criteria are important, their buying habits, etc. While in existing online shops, we can determine the contexts of use for the new site.
- We can recruit people we believe to be representative of the user group and ask them to evaluate the new site during its development

Practical Issues

Who are the users?

- Many interpretations of user
 - Most obvious definition:
 - Who interact directly with the product to achieve task
 - Wider definition:
 - Who manage direct users
 - Who receive output from the product
 - Who make the purchasing decision
 - Who use competitor's products

Practical Issues

- Three categories in the broader user definition:
 - Primary: The person who uses the design directly
 - Secondary: The person who either supplies input or receives output from the design
 - Tertiary: Those affected by the introduction of the system or who will influence its purchase
- Another user definition is **stakeholder**:
 - People or organizations who will be affected by the system and who have a direct or indirect influence on the system requirements
 - A broad user definition, e.g., direct users and their managers, people who may lose their job because of the introduction of the new product, etc.

Practical Issues

What are the stakeholders for the check-out system of a large supermarket, say, Taste?



Practical Issues

- Check-out operators who sit in front of the machine and pass the customers' purchases over the bar code reader, receive payment, hand over receipts, etc.
- Customers who want the system to work properly so that they are charged the right amount of goods, receive the correct receipt, are served quickly and efficiently
- Supermarket managers and supermarket owners who want the operators to be happy and efficient and the customers to be satisfied and not complaining; They also do not want to lose because the system cannot handle the payments correctly
- Warehouse staff, supermarket suppliers, supermarket owners' families, other shop owners whose business would be affected by the success or failure of the system

Practical Issues

What do we mean by needs?

- Not simply ask “What do you need”? because people do not necessarily know what is possible
- We need to understand:
 - Characteristics and capabilities of users
 - What they are trying to achieve
 - How they achieve it currently
 - Whether they would achieve their goals more effectively if they were supported differently
 - e.g., in designing a child’s toy – a toy should not require too much strength to operate, but may require greater strength to change battery

Practical Issues

- For new invention, the “future” needs can be indicated from **similar** behaviour that is already established
 - e.g., need identification of cell phones can be started from investigating behaviour in standard telephones: call making, phone book services, voice mail services, the number of the last person to ring, etc.
 - e.g., e-commerce developers have found that referring back to customers’ non-electronic habits and behaviours can be a good basis for enhancing e-commerce activity

蘋果全球最具創見

專家：不斷創新 企業生存之道

各行業「一哥」		
消費產品		蘋果公司 (Apple Inc)
科技電訊業		蘋果公司 (Apple Inc)
金融業		高盛 (Goldman Sachs)
醫藥業		輝瑞 (Pfizer)
娛樂及媒體		迪士尼 (Disney)
汽車生產商		豐田汽車 (Toyota Motor)
製造業		通用電氣 (General Electric)
零售業		沃爾瑪 (Wal-Mart)
能源業		英國石油 (BP)
酒店及旅遊業		萬豪國際 (Marriott International)

資料來源：美國《商業周刊》

蘋果公司 (Apple Inc) 行政總裁喬布斯 (Steve Jobs) 曾經表示，他從不依靠市場調查制定公司方針，因為「假如產品還未出現，消費者根本不會知道他們期望甚麼。」喬布斯對創意的執着，不但使 iPod、iPhone 等產品叫好叫座，蘋果公司亦因此獲選美國《商業周刊》全球 50 大最有創見企業第一位。專家認為，面對經濟轉差的逆境，只有不斷創新，才是企業未來生存之道。 ■本報記者 黎卓賢

《商業周刊》表示，蘋果公司成功將創新意念貫注整個企業王國，不但擁有先進與時尚兼備的電子產品，銷售門市 Apple Store 亦能為顧客帶來與別不同的購物體驗，iTunes 更推動多媒體下載新潮流。

無論作為科技企業、消費品生產商、零售商抑或媒體公司，蘋果公司均是業界先驅，獲得全球最有創見企業頭銜，亦是當之無愧。

創意產品 先進時尚兼備

在按行業歸類的排行榜中，亦不乏亞洲企業名字，例如滙豐控股、豐田汽車、新加坡航空等，分別於金融業、汽車製造業及酒店旅遊業中打入十大。

環球經濟備受考驗，企業亦要為前途打拚。顧問公司 Innosight 總裁 Scott Anthony 認為，企業現時出現兩種主流方向：「一些企業認為，艱難時期是他們最需要改革的時候；一些企業面對逆境，則不敢冒險推行甚麼創新計劃。兩者的結果，將會顯而易見。」

巨企願出錢 培訓員工創意

創新意念顧問 Rowan Gibson 指出，這亦是大企業例如 IBM、福士汽車 (Volkswagen) 等願意花費數萬美元，為員工舉辦一連數天的創意訓練課程的原因。他說：「小企業面對當前困難，或許無暇策劃自己的路向，可是，這正是他們日後生存的關鍵。」

(Hong Kong Economics Times, Apr. 08)

Practical Issues

How to generate alternative designs?

- Do not stick with a solution that works
- e.g., $S=1+2+3+4+5$ can be computed directly but Gauss found that $S=[(1+2+3+4+5)+(5+4+3+2+1)]/2$, which can be generalized as $(\text{first-term}+\text{last-term}) \times \text{no.of term}/2$
- Designers are trained to consider alternatives, software people are generally not
- Come from the individual designer's flair (natural ability), creativity & experience
- Also come from inspiration from similar or different products and applications
- e.g., word processor was inspired by typewriter??
- Creative thinking techniques can be learned, e.g., Thinkertoys : a handbook of creative-thinking techniques

Practical Issues

How do you choose among alternative designs?

- Via communication using documentation and evaluation using prototypes
 - **Documentation**: a detailed report which describes all possible designs, including their advantages and disadvantages, and design tradeoff according to specifications
 - **Prototyping**: Producing a limited version of the product with the purpose of answering specific questions about the design or appropriateness
 - **Usability engineering**: specifying quantifiable measures of product performance, documenting them in a usability specification, and assessing the product against them

Lifecycle Models

Show how activities are **related** to each other

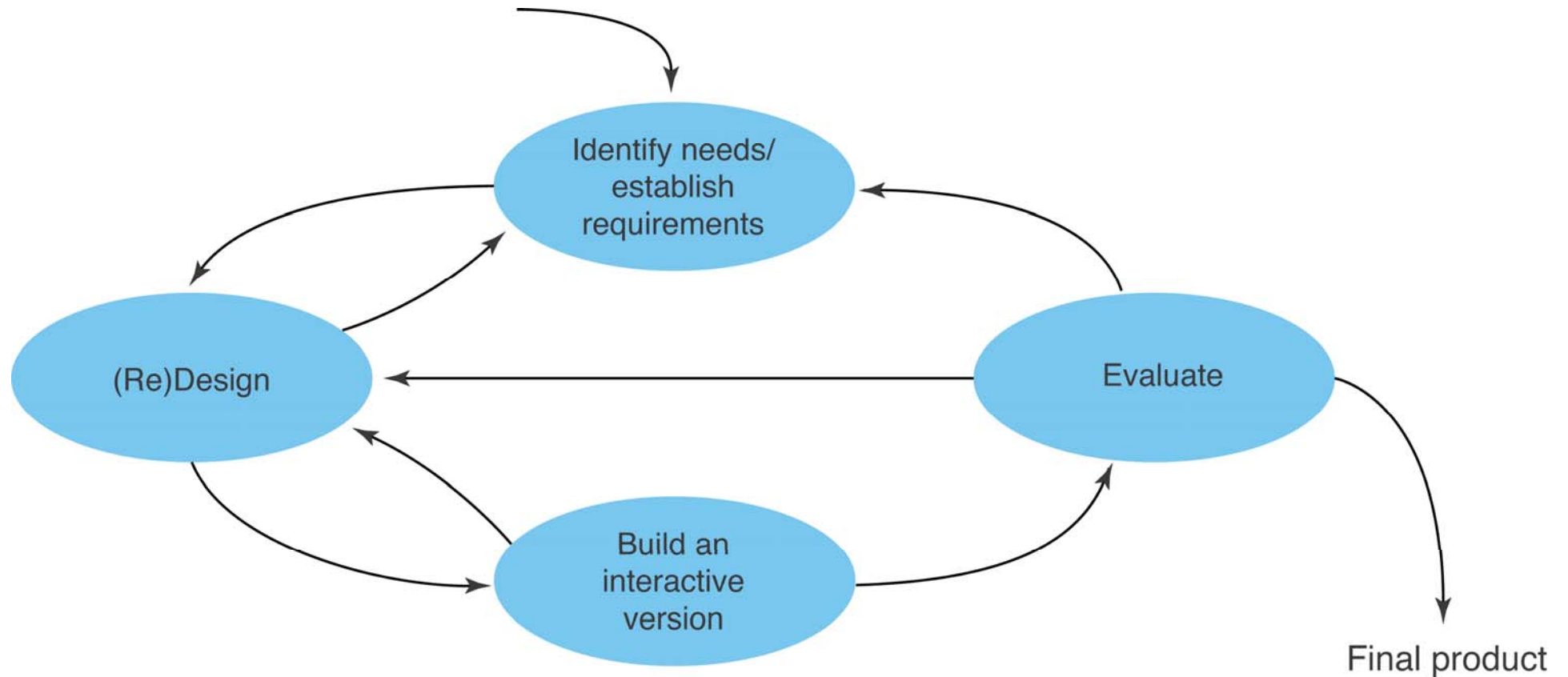
Lifecycle models are:

- Management tools
- Simplified versions of reality

Many lifecycle models exist, e.g., waterfall model for software engineering, Star model for HCI and ISO 13407

Lifecycle Models

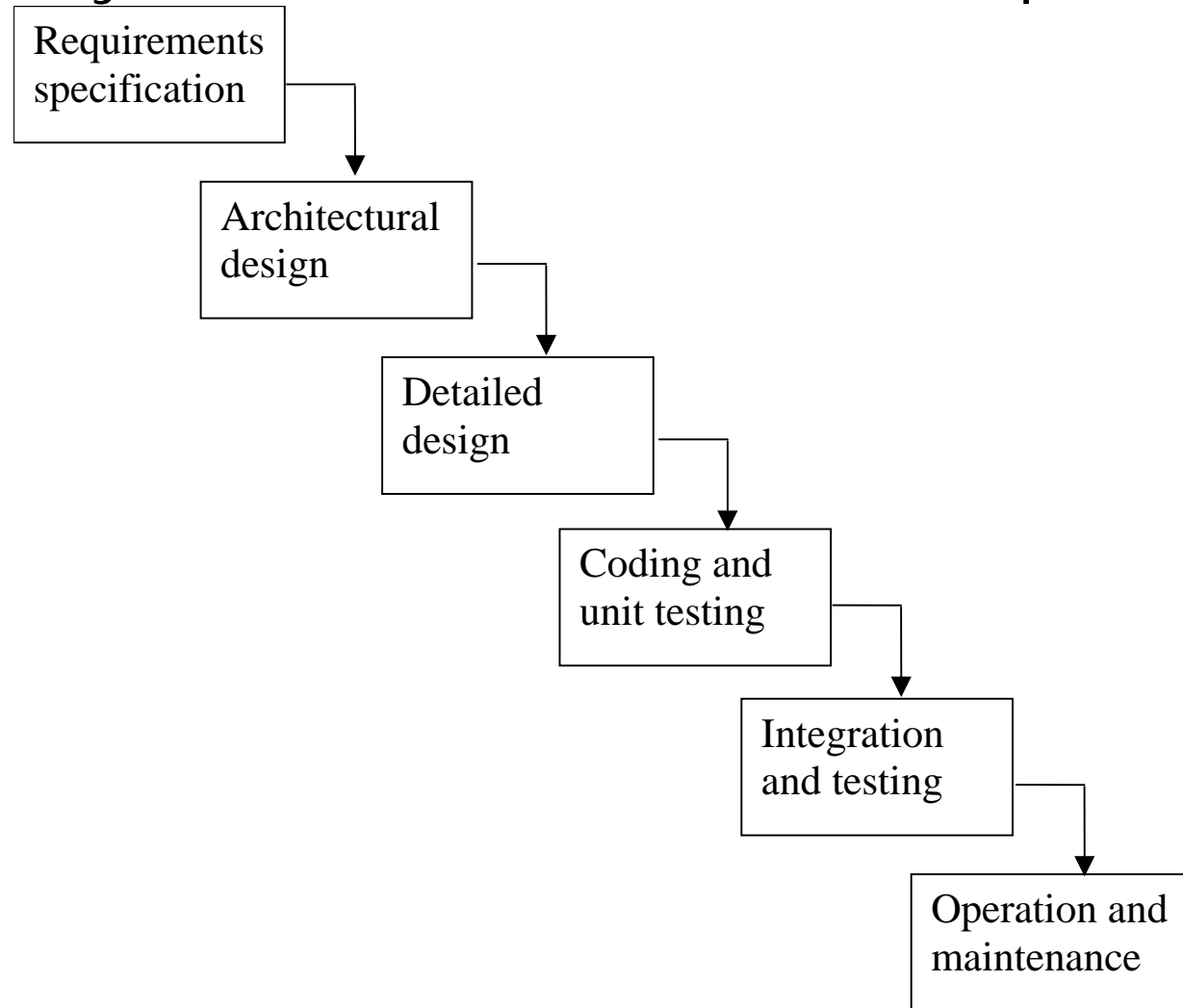
A simple HCI lifecycle model:



End with evaluation that ensures the final product meets the prescribed usability criteria

Lifecycle Models

Waterfall lifecycle model of software development

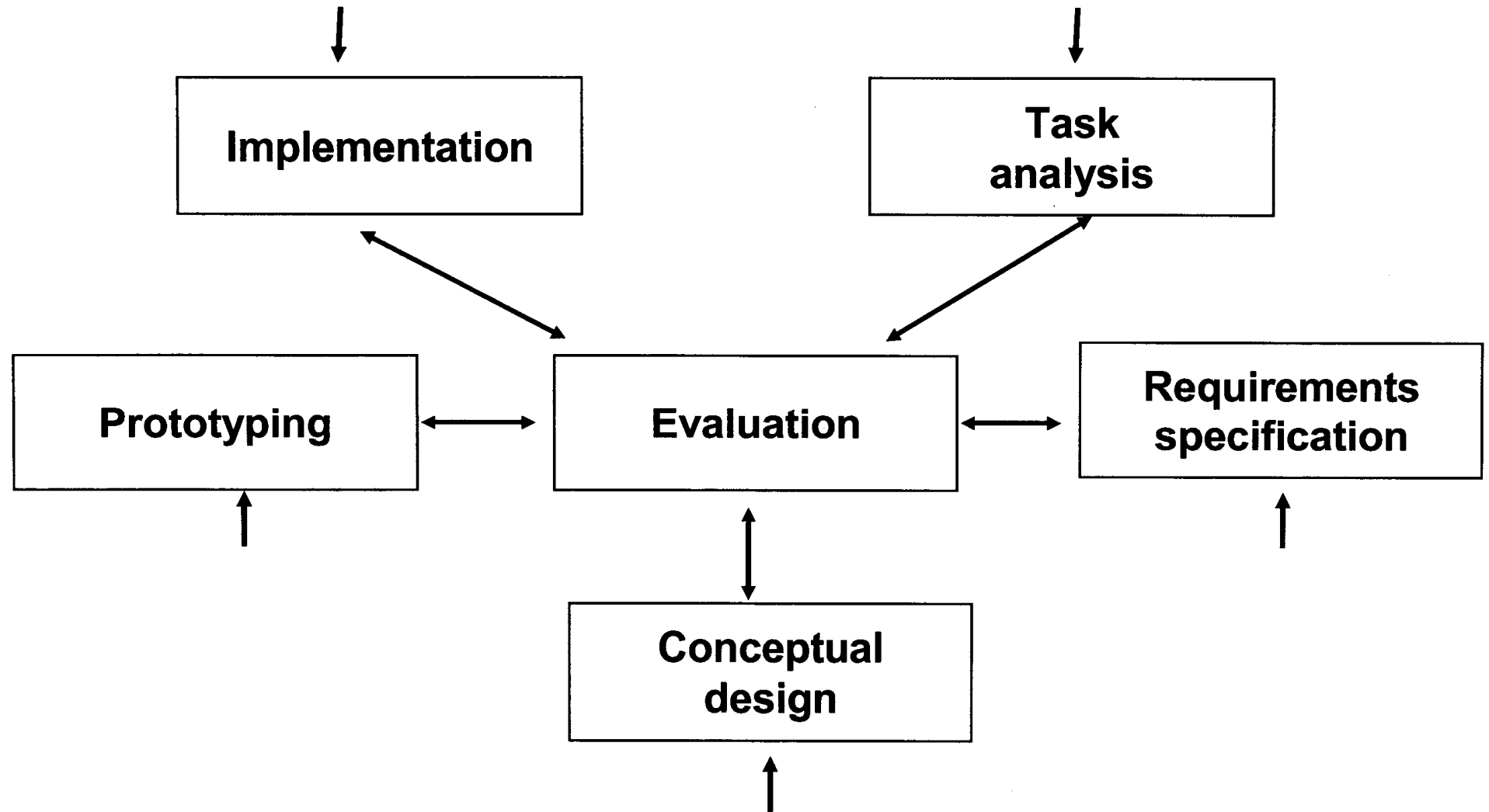


Lifecycle Models

Star lifecycle

- Suggested by Hartson and Hix (1989)
- Important features
 - Evaluation is at the center of activities
 - Interconnected via the evaluation activity
 - No particular ordering of activities. Development may start in any one of the activities
 - Derived from empirical studies of interface designers

Lifecycle Models



Lifecycle Models

ISO 13407 Human-centered design process for interactive systems

- It specifies 4 human-centered design activities which are central to a system development project:
 - Understand and specify the context of use
 - Specify the user and organizational requirements
 - Produce design solutions
 - Evaluate designs against requirements

Lifecycle Models

