Human Computer Interaciton(HCI): deal with interactions between humans and computing devices, understand how people make use of devices and systems, enhance human performance and experience (学习 HCI 的重要性会是考点)。

HCI deals with the interactions between humans and computing devices, where certain tasks are performed （HCI 概念）

Tasks: set of activities undertaken in order to achieve a specific goal

Computing devices include:

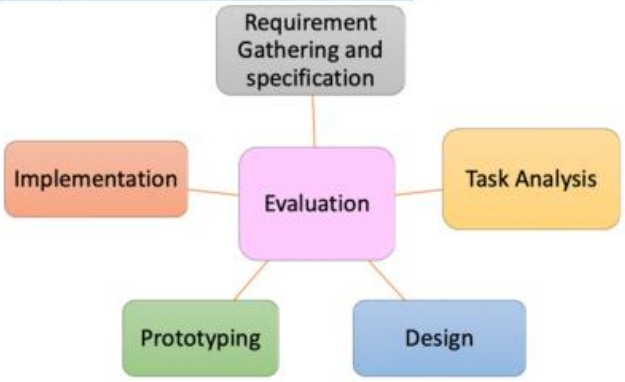
o laptops, desktop computers, tablets, mobile phones, smartwatches, smart TV, ATM, vending machine, ticket machines, self-checkouts, the flight deck of an aircraft carrier, Google Home, Amazon Echo, …

UI design 的重要性会是简答题的考点，同样可以用来回答其他的简答题

1. Cost saving
2. increase efficiency
3. improve customer satiification

user center design 是 UI 设计的核心

- Design of Interactive Systems



The Star Life Cycle Model (Adapted from Hix and Hartson 1993)

Usability Aspects 三大万能词汇

o Effectiveness: the accuracy and completeness with which users achieve goals within a context

有效性：用户在上下文中实现目标的准确性和完整性

o Efficiency: based on the resources expended (e.g. time and effort) to complete a task

效率：基于完成任务所花费的资源(例如，时间和精力

o Satisfaction: the level of the comfort and acceptability of the system to its users, and the extent to which the user experience that results from actual use meets the user's needs and expectations.

满意度：系统对其用户的舒适度和可接受性水平，以及从实际使用中获得的用户体验在多大程度上满足用户的需求和期望。

Principles of Discoverability 五个方面的概念+例子必背

o Affordances 示能

Physical objects (and their physical appearance) communicate the information about how we interact with them 物理对象(以及它们的物理外观)传达关于我们如何与它们互动的信息

Affordance is a relationship between the object and the user who discovers how the object can be used 是对象和发现如何使用该对象的用户之间的关系

Affordance of an object defines what actions we can perform on that object 对象的支付定义了我们可以在该对象上执行哪些操作

Perceived Affordances

In effective design, affordances need to be discoverable and perceivable 在有效的设计中，经济实惠需要可发现和感知

To design perceived affordances, visible and strong visual clues must be used so we can easily discover how to interact with it. 为了设计感知到的支付能力，必须使用可见和强烈的视觉线索，以便我们能够轻松地发现如何与它互动。

o Signifiers 指示符

When an affordance is not perceivable, signifiers need to be used

Signifiers communicate what actions we can do and where the action should take place

They signal the object's affordance

Signifiers can be signs, labels, arrows, icons or drawings to indicate how to operate on an object

当启示不可感知时，需要使用符号♣符号传达我们可以做什么以及动作应该在哪里发生♣它们用信号表示对象的启示♣符号可以是符号、标签、箭头、图标或绘图，以指示如何对对象进行操作

o Feedback 反馈

Feedback communicates the results of an action

Feedback tells us what is happening or/and what happened

It can be textual, visual, auditory, or as vibration (mobile)

Feedback must be informative

Poor feedback can be worse than no feedback

Immediate feedback (for inline validation)

Feedback is very important to evaluate the results of an action

当启示不可感知时，需要使用符号♣符号传达我们可以做什么以及动作应该在哪里发生♣它们用信号表示对象的启示♣符号可以是符号、标签、箭头、图标或绘图，以指示如何对对象进行操作

o Constraints 限制

Constraints provide different ways of restricting the kind of interaction that the user can have

They can limit the set of possible actions

They prevent user errors, and reduce memory load by minimising the information to be remembered

Examples: – using a list of options to select from – disabling a button or menu options – limiting the number of digits or letters in form fields – controlling the order of steps to complete a task

当启示不可感知时，需要使用符号♣符号传达我们可以做什么以及动作应该在哪里发生♣它们用信号表示对象的启示♣符号可以是符号、标签、箭头、图标或绘图，以指示如何对对象进行操作

o Mappings 图示

Mappings are the relationships between the elements of two sets of things – two sets include controls and what is being controlled

Mapping is important in the design and layout of controls and displays

Identifying mappings between the elements should be clear and easy

当启示不可感知时，需要使用符号♣符号传达我们可以做什么以及动作应该在哪里发生♣它们用信号表示对象的启示♣符号可以是符号、标签、箭头、图标或绘图，以指示如何对对象进行操作

Knowledge in the Head 二者区别必考

Knowledge in the head is the knowledge in the human memory system

It requires learning

We can get the knowledge of the world and transfer it into our head

头脑中的知识是人类记忆系统中的知识♣它需要学习♣我们可以获得世界的知识并将其转化到我们的头脑中

o Knowledge in the World 二者区别必考

Knowledge in the world is external knowledge

“Knowledge in the world is always there, waiting to be seen, waiting to be used”

Much of the knowledge we need to perform tasks can come from the information in the world (using affordances, signifiers, feedback and mappings)

世界中的知识是外部的知识♣“世界上的知识总是存在的，等待观察，等待使用”♣我们执行任务所需的大部分知识都可以来自世界上的信息(使用启示、象征、反馈和映射)

Cognitive Process 认知过程

Cognition occurs through cognitive processes

Cognitive processes include: 注意简答题

attention (the first step) can be visual or auditory,
perception and recognition,
memory,
Learning (and then reading, speaking and listening)
reasoning and problem solving (reflective cognition)
注意力（第一步）可以是视觉或听觉，
感知和认可，
记忆
学习（然后阅读、演讲和聆听）
推理和解决问题（反思认知）
When users interact with a system/product it involves a number of cognitive Processes

Different types of memory:

Sensory memory
very short (about milliseconds)
most sensory memory will be forgotten soon unless you get it into short-term memory by paying attention to it consciously –
Short-term (or working) memory (STM) 掌握例子——选择题
holds a small amount of information for a short period of time
limited in terms of time and the number of the items it can retain
Long-term memory (LTM) 掌握例子——选择题
It can retain the information for hours, months or years
It has unlimited capacity

Reduce short memory load: 好的设计都要做到这一点

by minimising controls and including only those that are necessary we reduce short memory load
by minimising clutter and avoid including too much information
by making affordances visible, discoverable and perceivable
by providing feedback
by using natural mapping
by using constraints
by using consistency and redundancy
by considering users' mental models and knowledge in the head (designing based on what users know, and their previous knowledge)
通过尽量减少控制，只包括那些必要的，我们减少内存加载时间短
通过尽量减少杂乱，避免包括太多的信息
通过使负担可见、可发现和可感知
通过提供反馈
使用自然映射
使用约束
通过使用一致性和冗余性来
考虑用户的心理模型和头脑中的知识（设计）

基于用户的知识以及他们以前的知识）

User Requirement Gathering and Analysis

Data Gathering Methods 简答题——掌握各种数据收集方式的特点、优点、缺点

o Studying existing documentation – Manuals, instruction books or training materials o 研究现有文档-手册、说明书或培训材料

o Researching similar systems/products o 研究类似的系统/产品

*Data collection methods that involve users: *涉及用户的数据收集方法:

o Observation o 观察

o Passive observation: watching and listening to users in their environments

o Active observation: asking users questions and having a conversation

o Hawthorne (or observer) effect: if users are aware of being observed, their behavior may be affected

o 被动观察：在环境中观察和倾听用户的意见

o 主动观察：询问用户问题并进行对话

o 霍桑（或观察者）效应：如果用户意识到被观察，他们的行为可能会受到影响

o Interviews

Interviews involve asking users questions about a topic 面试涉及向用户询问有关主题的问题

Close-ended questions: e.g. Yes/No questions, they limit the discussion and data elicitation

Open-ended questions: enable exploring, probing and learning more, and allow discussing complex topics

封闭式问题：例如，是/否问题，它们限制了 讨论和数据引出

开放式问题：能够探索、探索和了解更多内容，并允许讨论复杂的主题

o Different types of interviews:

Structured: using a list of predetermined questions 结构化：使用预先确定的问题列表

Semi-structured: using some predetermined questions but also allowing further elaboration and discovery 半结构：使用一些预先确定的问题，但也允许进一步阐述和发现

Unstructured: mainly using open questions 非结构化：主要使用未公开的问题

o Interviews can be conducted at the user's workplace – It has the advantage of learning more about the user's workplace o 面试可以在用户的工作场所进行 -它具有了解更多有关用户工作场所的知识的优势

o Interviews can be conducted away from their workplace – It has the advantage of avoiding work related interruptions o 面试可以在工作场所之外进行-它具有避免与工作相关的中断的优点

o Focus groups or workshops o 焦点小组或讲习班

o A focus group allows data collection through group discussions 焦点小组允许通过小组讨论收集数据

o Participants are usually key stakeholders 参与者通常是关键利益相关者

o Participants' selection is important 参与者的选择很重要

o It allows participants to discuss their experiences and express their opinions and beliefs
它允许参与者讨论他们的经验和表达他们的意见和信仰

o An efficient and effective way to highlight the key areas 突出关键领域的高效方法

o The role of the facilitator/moderator is very important – To lead and manage the discussions – To ensure all topics are covered – To ensure all participants contribute to the discussions
主持人/主持人的作用非常重要——领导和管理讨论——确保涵盖所有议题——确保所有与会者都为讨论作出贡献

Questionnaire – More common in the evaluation phase (usability testing) 问卷–在评估阶段更为常见（可用性测试）

o It can be paper-based or electronic (online) 它可以是纸质的或电子的（在线）

▪ It allows gathering data from a large group ▪它允许从一大群人收集数据

▪ It allows the user to provide anonymous feedback ▪它允许用户提供匿名反馈

▪ It uses a set of standard questions ▪它使用一组标准问题

▪ It can include closed and open questions – Likert scale questions▪它可以包括封闭和开放的问题-喜欢规模的问题

▪ Questions should be carefully selected or designed 应仔细选择或设计问题

▪ Questions should cover all the key variables and topics▪问题应涵盖所有关键变量和主题

▪ The flow of questions should be right ▪问题的流动应该是正确的

▪ The questions should be easy to understand ▪ 这些问题应该很容易理解

▪ The wording should be clear ▪措辞应该很明确

Design Personas 设计人物

o A persona: typical example of a user (a user archetype) 角色：用户的典型示例（用户原型）

o Personas can provide us with better understanding of user needs, goals and behaviour patterns 角色可以让我们更好地了解用户需求、目标和行为模式

o Goal-directed design involves personas, goals and scenarios 目标导向设计涉及角色、目标和场景

o Persona: “A precise description of our user and what he wishes to accomplish.” 角色："准确描述我们的用户以及他希望完成什么。

o Goal: what the user wants to achieve 目标：用户想要实现的目标

Each persona usually has 2-4 goals 每个角色通常有 2-4 个目标

Goals are different from tasks, which are performed to achieve goals 目标与任务不同，任务是为了实现目标而执行的

o Scenario: is a narrative to describe the interaction of a persona with a product to achieve a goal in a particular situation 场景：是描述角色与产品相互作用的叙述 在特定情况下实现目标

Navigation 导航 is about finding information by navigating through the interface. The main mechanisms for navigation are the menus. Menus are important for navigation.

Guidelines for Menu Design

Strive to be consistent

Use familiar and concise terminology to describe items

Provide visibility

Avoid long and complex menus, and reduce short term memory

Meaningful grouping of items

Structure the menu and organise the items relevant to user tasks

Logical sequence of items

Using effective negative spaces

Provide an easy option to go back, and return to the main menu

Consider knowledge in the head and the world

Display menus such that they are effortless and natural to find and use
Provide a number of different navigation options for items
Limit the use of cascading menus for frequently used functions
Reduce errors through disabling/greying out inapplicable menu items
With mega menus, broad-shallow menus are preferred to narrow-deep ones

努力保持一致
使用熟悉简洁的术语来描述项目
提供可见性
避免长而复杂的菜单，并减少短期内存
有意义的项目分组
构建菜单并组织与用户任务相关的项目
项目的逻辑序列
使用有效的负空间
提供返回主菜单的简单选项
考虑头脑和世界的知识
显示菜单，以便他们毫不费力和自然地找到和使用
为项目提供多种不同的导航选项
限制频繁使用的功能使用级联菜单
通过禁用/变灰不适用的菜单项来减少错误
通过大型菜单，宽浅菜单优于窄浅菜单

Form Design 表单设计

Steps in Filling a Form for users:

1. Understand the question
   Questions should be easy to understand
   Use familiar concepts and words
   Ask one question at a time
   Long forms can be broken up by topic
2. Finding an answer ——简答分析题，记住概念及例子
   Slot-in answers: answers that depend on our memory, e.g. address, phone number 插槽答案：取决于我们记忆的答案，例如地址、电话号码
   gathered answers: that need to be personally collected and gathered or very distant memories, e.g. credit card number, the tax file number 收集的答案：需要亲自收集和收集或非常遥远的记忆，例如信用卡号码，税务档案号码
   third-party answers: that require asking other people, e.g. when you need to ask your partner about the dinner reservation (whether to book indoors or outdoors table) 第三方答案：这需要询问其他人，例如，当你需要询问您的伴侣关于晚餐预订（无论是预订室内还是室外餐桌）
   created answers: require the least amount of memory 创建的答案：要求最少的内存量

Jane using an online form for buying flowers for her mum		
Info the user needs	**How to find the answer**	**The answer type**
Name	In her head	Slot-in
Method of payment	Needs to get the credit card from her bag	Gathered
Time of delivery	Makes a phone call to check when her mum will be home	Third-party
Message	Thinks for a few seconds to make up something appropriate	Created

Form Design Guidelines ——结合这些原则分析表单设计的好坏

Create a smooth and natural conversational flow, with logical and sensible order of options
If the form requires gathered or third-party answers, try to store this information
When the form is split across pages by topic, use a progress indicator
Error prevention (e.g. through constraints, user selected data, hints and examples)
Provide useful error messages
Finish the form smoothly with a “thank you” or an acknowledgement
Meaningful, familiar and standard field labels
Consistent terminology and abbreviations
Optional and required fields clearly marked
Comprehensible instructions
Use visible space and boundaries for data entry fields
Differentiate grouped items
Visually appealing layout (alignment)
Use lists if possible to minimise errors
Immediate and completion feedback

创建顺畅、自然的对话流程，并具有逻辑和合理的选项顺序
如果表单需要收集或第三方答案，请尝试存储此信息
当表单按主题跨页拆分时，请使用进度指示器
防错（例如通过约束、用户选择的数据、提示和示例）
提供有用的错误消息
以"谢谢"或确认顺利完成表格
有意义、熟悉和标准的字段标签
一致的术语和缩写
可选和必需字段清楚地标记
可理解的说明
数据输入字段使用可见空间和边界
区分分组项目
视觉吸引力布局（对齐）
尽可能使用列表以最大限度地减少错误
即时和完成反馈

Mobile Form Guidelines ——结合这些原则分析移动端表单设计的好坏

Replace horizontal labelling by vertical labelling
Keep the input fields to a minimum and combine similar input fields
Eliminate redundant and less important entries
Use clear error messages
Error correction: refocus on the field containing the error

Consider all possible inputs by the user in the design
Provide the user with the feedback on the current status and progress
Inline feedback wherever appropriate
Provide hint text using appropriate design pattern
Reduce visual clutter
Logical grouping of related items
Shorten the list items to the most popular or primary options

通过垂直标签取代水平标签
将输入字段保持在最低限度，并结合类似的输入字段
消除冗余和不太重要的条目
使用清晰的错误消息
错误更正：重新聚焦于包含错误的字段
考虑用户在设计中的所有可能输入
向用户提供有关当前状态和进度的反馈
在适当情况下 内联反馈
使用适当的设计模式提供提示文本
减少视觉杂乱
相关项目的逻辑分组
将列表项目缩短为最热门或最主要的选项

Evaluation and Usability Testing 评估和可用性测试

Types of Evaluation:

Experts

- Cognitive walkthrough
  - Preparation phase
  - Evaluation phase
  - Interpretation phase

Heuristic evaluation 两大理论必背，解释每条原则+例子

Nielsen's 10 heuristics

Visibility of system status (Provide feedback) 系统状态的可见性（提供反馈）

a. Provide users with meaningful and useful feedback about the system and tasks status 为用户提供有关系统和任务状态的有意义和有用的反馈

b. Feedback should be visible, clear, concise and in a timely manner 反馈应清晰简洁及时

e.g. let the user know their interaction was successful when an action is performed;
indicate progress or the path in multi-page processes;
for longer operations, use a progress bar;
indicate when the task is completed

例如，当执行操作时，请让用户知道他们的交互是成功的：
指示多页进程中的进展或路径：
对于较长的操作，请使用进度栏：
指示任务完成时间

Match between system and the real world (Simple and natural dialogue, Speak the user's language) 系统与现实世界的匹配（简单而自然的对话，说用户的语言）

a. use of words (language), concepts, and objects familiar to the user (speak the user's

language) 用户熟悉的单词（语言）、概念和对象的使用（说用户的语言）

b. follow real world conventions (skeuomorphic design) 遵循现实世界的惯例（变形设计

User control and freedom 用户控制和自由

provide options of undo and redo 提供撤消和重做选项

allow users to confirm or cancel actions 允许请确认或取消

Consistency and standards 一致性和标准

follow common standards and conventions 遵循共同的标准和惯例

do not introduce different and unfamiliar words, icons and actions for the same objects. 不要为同一对象引入不同和不熟悉的单词、图标和动作。

Error prevention 错误预防

a. use constraints a.

b. use helpful suggestions (auto-suggest/ auto-complete features)

c. user selected data

d. provide examples of data entry format

e. use of useful defaults, particularly for doing repetitive actions

a. 使用限制 a.

b. 使用有用的建议（自动建议/自动完成功能）

c. 用户选择的数据

d. 提供数据输入格式示例

e. 使用有用的默认值，特别是用于重复操作

Recognition rather than recall 识别而不是回忆

a. recognition reduces memory load by making actions and options visible

b. menus are the typical example of recognition

c. providing recognition gives the user extra help in remembering information

d. recall requires the user to retrieve information from the memory

e. recall can be error-prone and difficult

a. 识别通过使操作和选项可见来降低内存负载

b. 菜单是识别的典型示例

c. 提供识别功能为用户记忆信息提供了额外的帮助

d. 召回要求用户从内存中检索信息

e. 召回可能容易出错且困难

Flexibility and efficiency of use 灵活性和使用效率

support both novice and experienced users:

e.g. provide keyboard shortcuts and advanced search options

支持新手和经验丰富的用户:

例如，提供键盘快捷方式和高级搜索选项

Aesthetic and minimalist design 美学和极简主义设计

a. avoid including information that is irrelevant or might be rarely used

b. avoid overloading and cluttering

a. 避免包含无关紧要或可能很少使用的信息

b. 避免超载和杂乱无章

Help users recognize, diagnose, and recover from errors 帮助用户识别、诊断和从错误中恢复

Error messages clearly specify what is the problem (in a language that any user can

understand), and provide a useful option or solution.
错误消息清楚地说明了问题所在（使用任何用户都能理解的语言），并提供了有用的选项或解决方案。

Help and documentation　帮助和文档

a. It is recommended to provide documentation

b. provide effective and efficient search options to find information easy and fast according to the user task and keyword

a.建议提供文档

b. 提供有效和高效的搜索选项，根据用户任务和关键字轻松快速查找信息

Shneiderman's Eight Golden Rules

Strive for consistency　努力保持一致性

consistency of terminology, colour, layout, fonts, or order of actionsc 术语、颜色、布局、字体或行动顺序

Cater to universal usability　迎合普遍可用性

Design for diverse users, and consider different levels of experience, age difference, disabilities, and cultural differences 针对不同用户的设计，并考虑不同级别的体验、年龄差异、残疾和文化差异

Offer informative feedback　提供翔实的反馈

For more frequent and minor actions, provide low level of feedback 对于更频繁和更小的操作，提供低级别的反馈

b. For infrequent and major actions, provide detailed feedback 对于不常见和重大操作，请提供详细的反馈

Design dialogs to yield closure　设计对话以产生关闭

Organize a series of actions into groups (the beginning, middle and end), and provide right feedback according to each stage 将一系列行动组织成小组（开始、中间和结束），并根据每个阶段提供正确的反馈

Prevent errors　防止错误

a. Design the system such that errors can be avoided

b. Detect errors and handle the error in a simple way

a.设计系统，避免错误

B。检测错误并以简单的方式处理错误

Permit easy reversal of actions (undo)　允许轻松逆转操作（撤消）

Support internal "locus of control"　支持内部"控制点"

a. Users should feel they are in charge of the interface

b. Provide them with more flexibility and options

c. Do not surprise them with unexpected results and behavious

a.用户应该感觉他们负责界面

B。为他们提供更多的灵活性和选择

c. 不要惊讶他们与意想不到的结果和行为

Reduce short term memory　减少短期内存

Similar to recognition rather than recall 类似于识别而不是回忆

Low-fidelity prototyping & High-fidelity prototyping 高低保真

Low-fidelity prototype: with basic and limited functionalities; static

High-fidelity prototype: interactive, and similar to final product but not fully functional

Low-fidelity prototyping techniques used in **participatory design**:**参与式设计**中使用的低保真原型设计技术：单选题

PICTIVE (Plastic Interface for Collaborative Technology Initiatives through Video Exploration) 图片（通过视频协作技术举措的塑料接口） 探索）

- PICTIVE is an experimental participatory design method to encourage users to participate in the design process
- PICTIVE uses “low fidelity office items” and “a collection of design objects to investigate specific screen and window layouts for a system”
- It focuses on what the system will do, and the tasks
- It enables a non-technical user to suggest ideas and participate in the design process
- It helps with understanding users’ workflow
- PICTIVE 是一种实验性的参与式设计方法，旨在鼓励用户 参与设计过程
- PICTIVE 使用"低保真办公物品"和"设计对象集合"，以 调查系统的具体屏幕和窗口布局"
- 它侧重于系统将做什么和任务
- 它使非技术用户能够提出想法并参与设计过程
- 它有助于理解用户的工作流程

CARD (Collaborative Analysis of Requirements and Design) CARD（需求和设计的协作分析）

- Uses printed cards
- It focuses on tasks and workflow options
- Cards can represent screens (or parts of a screen), goals or tasks related to screens, and the workflow
- It involves workshop sessions where cards are moved around by the participants
- Can be used in conjunction with PICTIVE
- 使用打印卡
- 它侧重于任务和工作流选项
- 卡片可以代表屏幕（或屏幕的一部分）、与屏幕相关的目标或任务以及工作流程
- 它涉及研讨会，参与者移动卡片
- 可以与事先知情同意一起使用

Storyboards 情节提要

- A different type of card-based prototyping
- Originated from the film industry
- It includes a series of sketches and key screens in a certain order
- It helps to understand how the user interacts with the system and their workflow while progressing through the tasks
- 不同类型的基于卡的原型
- 起源于电影业
- 它包括一系列按一定顺序排列的草图和关键屏幕
- 它有助于了解用户在完成任务时如何与系统及其工作流程进行交互

“Wizard-of-Oz” prototyping "奥兹巫师"原型

- It is used to evaluate an unimplemented product through simulating the response of a system by a “wizard”
- It is a static type of prototyping
- It can be used to test interfaces and system functionality before it is fully implemented, e.g. for testing AI-based systems

o 它用于通过模拟"向导"对系统的反应来评估未实施的产品
o 它是一种静态的原型
o 在全面实施之前，它可用于测试接口和系统功能，例如用于测试基于 AI 的系统

Advantages of Low-fidelity prototypes 低保真模拟原型的优缺点——选择/简答

o Simple, cheap and quick to create
o Truly hands-on because the designers have to manually manipulate the content.
o The process of cutting, pasting, sorting, labelling forces designers to become familiar with the content elements.
o It can be constructed quickly and efficiently and portable.
o Easy to refine in the final product
o Prototypes appear to enhance teambuilding skills
o With low-fidelity prototypes, users and designers are often more willing to suggest changes.
o Users are more comfortable working with paper and criticizing it rather than the real system.
o It allows for more iterations
o It allows to test with more users and identify more problems
o 简单、便宜且快速创建
o 真正的动手操作，因为设计人员必须手动操作内容。
o 切割、粘贴、分拣、贴标签的过程迫使设计师熟悉内容元素。
o 它可以快速、高效、便携地建造。
o 在最终产品中易于改进
o 原型似乎能增强团队建设技能
o 使用低保真原型，用户和设计师通常更愿意提出更改建议。
o 用户更乐于使用纸张和批评它，而不是真正的 系统。
o 它允许更多的迭代
o 它允许与更多的用户一起测试并识别更多问题

High-fidelity Prototypes 高保真模拟原型的优缺点——选择/简答

Advantages:

o Interactive
o Enables testing navigation, graphical elements and colours, legibility, image quality, alignment and spacing
o Looks and works more like the real product, resulting in more useful feedback
o Designers can show and test real flow and interactions
o 交互式
o 支持测试导航、图形元素和颜色、清晰度、图像质量、对齐度和间距
o 外观和工作更像真正的产品，从而产生更有用的反馈
o 设计师可以显示和测试真正的流程和交互

Disadvantages:

o Not as cheap as low-fidelity prototypes
o Not as fast as low-fidelity prototypes
o Not as portable as low-fidelity prototypes
o Cannot be refined as easy as low-fidelity prototypes
o 不像低保真原型那么便宜
o 速度不如低保真原型快

- 不像低保真原型那样便携
- 不能像低保真原型那样简单精炼

Web Content Accessibility Guidelines (WCAG) 2.0

Perceivable 可感知

- Provide text alternatives for non-text content.
- Provide captions and other alternatives for multimedia.
- Create content that can be presented in different ways, including by assistive technologies, without losing meaning.
- Make it easier for users to see and hear content.
- 为非文本内容提供文本备选方案。
- 为多媒体提供字幕和其他备选方案。
- 创建可以以不同方式（包括辅助技术）呈现的内容，而不会失去意义。
- 使用户更容易查看和听到内容。

Operable 可操作

- Make all functionality available from a keyboard.
- Give users enough time to read and use content.
- Do not use content that causes seizures.
- Help users navigate and find content.

通过键盘提供所有功能。

- 给用户足够的时间来阅读和使用内容。
- 不要使用导致癫痫发作的内容。
- 帮助用户导航和查找内容。

Understandable 可理解

- Make text readable and understandable.
- Make content appear and operate in predictable ways.
- Help users avoid and correct mistakes.
- 使文本可读且易于理解。
- 使内容以可预测的方式出现和操作。
- 帮助用户避免和纠正错误。

Robust 健壮

- Maximize compatibility with current and future user tools.
- 最大限度地兼容当前和未来的用户工具。

Interaction Styles

Fitts's Law 菲茨定律 It takes more time to move the cursor and point at smaller targets that are further away, but it takes less time to hit bigger targets closer to you：移动光标并 指向更远的较小目标需要更多时间，但击中离您更近的较大目标所需的时间更少

e.g. for scroll bars 滚条

Hick's Law 希克定律: The amount of time it takes for the user to make a decision depends on the number of possible choices. 用户 做出决策所需的时间取决于可能的选择数量

KISS (Keep it short and simple) 保持简短和简单）

Different design languages and styles (strengths and limitations)

Skeuomorphic Design 仿实设计 – limitations 优缺点

- It might lead to unnecessary visual clutter o 这可能会导致不必要的视觉混乱
- Obsolete and less appealing o 过时且吸引力降低
- It could lead to false affordances and confusion o 这可能导致虚假的负担和混乱
- Skeuomorphic interfaces include many image files that can degrade performance o 变形界面包括许多可以降低性能的图像文件

Flat Design 优缺点

- It focuses on simplicity and minimalism o 它侧重于简单和极简主义
- It offers a refined, simple aesthetic o 它提供了一个精致的，简单的美学
- It uses simple typography and iconography and bold colours o 它使用简单的排版、肖像和大胆的颜色
- Flat 2.0 adds shadows and highlights to create a 3D experience o 平面 2.0 添加阴影和高光以创建 3D 体验

Metro Design 地铁式设计(MDL), MDL2, and Fluent Design 流畅设计 优点

- Microsoft Design Style Principles (Windows 8) o 微软设计风格原则（视窗 8）

Pride in craftsmanship: maintain consistency across all applications 工艺的骄傲：在所有应用中保持一致性

Be fast and fluid: Design for touch, Delight with motion; Be responsive and ready 快速流畅：触摸设计，运动愉悦：反应迅速，做好准备

Authentically digital 真实数字化

Win as one 一起赢

Do more with less (limit the app to the core functionalities) 用更少的功能做更多的事（将应用限制在核心功能上）

Be great at something 做一件伟大的事情

Inspire confidence 激发信心

Put content before chrome 在铬之前放置内容

MDL2

It makes changes to UI elements such as buttons, sliders, and combo boxes 它对 UI 元素进行了更改，如按钮、滑块和组合框

Thinner borders and lines 更薄的边界和线

It uses textures and 3D effects 它使用纹理和 3D 效果

Microsoft's Fluent Design Principles

Adaptive: Fluent experiences feel natural on each device)自适应：每个设备上都感觉自然流利的体验

Empathetic: Fluent experiences are intuitive (to behave the way the user expects it) and powerful (global and universal) 感同身受：流畅的体验是直观的（按照用户的期望行事）和强大的（全球性和通用性）

Beautiful: Fluent experiences are engaging and immersive (using light, shadow, motion, depth, and texture 美丽：流畅的体验引人入胜，身临其境（使用光线、阴影、运动、深度和纹理）

iOS Design

Themes: Clarity, Deference, Depth 主题：清晰、尊重、深度

Principles:

Aesthetic Integrity 美学完整性

Consistency　一致性
Direct Manipulation　直接操纵
Feedback　反馈
Metaphors　隐喻
User Control　用户控制

Guidelines 考试形式和表单一样，

- Use meaningful titles of the report o 使用有意义的报告标题
- Include meaningful information 包括有意义的信息
- Balance the layout 平衡布局
- Design an easy navigation system for a multi-page report 为多页报告设计一个简单的导航系统
- All important information should be highlighted 所有重要信息应突出显示
- For text in a report　报告中的文本
  - use mixed uppercase and lowercase 使用混合大写和小写
  - avoid using overly fancy fonts 避免使用过于花哨的字体
  - use enough spacing between paragraphs 在段落之间使用足够的间距
  - left-justify text and leave a ragged right margin 左辩护文本，　并留下一个不规则的右边际
  - use abbreviations and acronyms only when they are widely understood and are significantly shorter than full text　只有在被广泛理解且明显短于全文时才使用缩写和首字母缩略词

For tables and lists in a report 报告中的表格和列表

- all columns and/or rows should have meaningful labels
- labels should be separated from other content by highlighting
- redisplay labels when the data extend beyond a single screen/page
- sort in a meaningful order
- avoid using overly fancy fonts
- right-justify numeric data
- left-justify textual data
- break long sequence of alphanumeric data into small groups of 3 to 4 characters each

所有列和/或行都应该有有意义的标签
标签应通过突出显示与其他内容分开
当数据扩展到单个屏幕/页面之外时，　重新显示标签
排序在一个有意义的顺序
避免使用过于花哨的字体
正确证明的数字数据
左经的文本数据
将字母数字数据的长序列分解为每个字符 3 到 4 个字符的小组