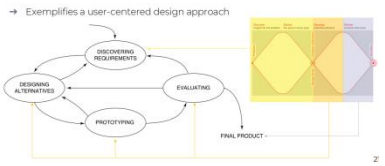
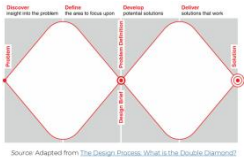
1 interaction design ： Designing interactive products to support the way people communicate and interact in their everyday and working lives.

2 Core characteristics of interaction design ： Users / usability and user experience goals / Iteration

3 Usability and user experience goals ： Usability is more objective: how useful or productive a system is from its own perspective / User experience is more subjective: how users experience an interactive product from their own perspective

4 The Process of Interaction Design：Discovering requirements / Designing alternatives / Prototyping/ Evaluating





5 Practical Issues in Interaction Design : What are the users needs?/ How to generate alternative designs? / How to choose among alternatives?

6 User-centered approach 3 principles : Early focus / Empirical measurement / Iterative design

Discovering Requirements

1 Describe requirement : Atomic requirement shell / User stories

2 Six most common types of requirements : Functional requirements/ Data requirements / Environment requirements / Users characteristics / Usability goals / User experience goals

3 Data gathering for requirements : Interviews, observations, and questionnaires / Studying documentation / Researching similar products

4 Bringing requirements to life : Personas / Scenario

Prototype

1 Feature : Cheaper & Faster! / Easier to communicate! / Direct feel!

2 Why prototype ： Understanding / Communication / test and reflection

3 The fidelity of a prototype refers to how it conveys the look-and-feel of the final product (basically, its level of detail and realism).

4 Prototyping tools : Storyboards / ‘Wizard-of-Oz’ prototyping ---The user thinks they are interacting with a computer, but a developer is responding to output rather than the system. / User journey map / Empathy map

5 Five dimensions in prototyping : Visual: / Interaction: / Breadth: / Depth/ Content:

6 What Type of Prototyping? throw-away / incremental (product built as separate components) / evolutionary

Design

1 Accessibility and inclusiveness : the extent to which an interactive product is accessible by as many people as possible / making products and services that accommodate the widest possible number of people

2 Design Principles: Visibility 可见性 / Feedback / Constraints 防止用户使用错误选项/ Consistency / Keypad numbers layout 键盘布局符合用户使用场景 / Affordances ： Refers to an attribute of an object that allows people to know how to use it. For example, a mouse button invites pushing, a door handle affords pulling / Mapping ： Relationship between controls and their effects

3 Shneiderman's Eight Golden Rules of Interface Design ： 1. Strive for consistency / 2. Enable frequent users to use shortcuts 允许频繁使用的用户使用快捷方式 / 3. Offer informative feedback/ 4. Design dialog to yield closure 设计对话以实现闭环/ 5. Offer simple error handling / 6. Permit easy traversal of actions / 7. Support internal locus of control / 8. Reduce short-term memory load

4 How to choose among alternatives ： A/B Testing / Quality thresholds （Different stakeholder groups have different quality thresholds (think of photo taking on the phone)

5 physical design : Menu design / Icon design / Screen design / Information display

6 Interface metaphors 界面隐喻 ： Exploit user’s familiar knowledge, helping them to understand ‘the unfamiliar’/ 让学习新系统变得更容易，帮助用户理解底层概念模型，用户更加易于访问/ 打破常规和文化规则，与设计原则相冲突，设计师可能无意中采用不良的设计元素并将其转移，限制了设计师在创造新概念模型时的想象力

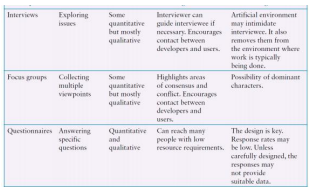
7 Interaction types ： Instructing 教 / Conversing 对话/ Manipulating 用户在物理世界的操纵/ Exploring 用户探索/ Responding 系统主动提醒

8 20 interface types covered ： Command / Graphical / Multimedia / Virtual reality / Web / Mobile / Appliance 器具/ Voice / Pen / Touch / Gesture / . Haptic 触觉 / Multimodal 多模态 / Shareable 可共享 / Tangible 可触知 / Augmented reality / Wearables / Robots and drones 无人机 Brain–computer interaction / . Smart 智能接口

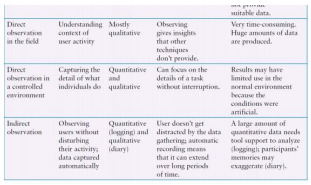
Evaluation

1 Running the interview ： Introduction: Introduce yourself, explain the goals of the interview, reassure about the ethical issues, ask to record, and present the informed consent form. / Warm-up: Make first questions easy and non-threatening. / Main body: Present questions in a logical order/ A cool-off period: Include a few easy questions to defuse tension at the end /. Closure: Thank interviewee, signal the end, for example, switch recorder off.

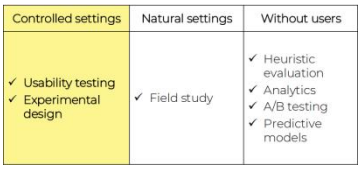
2 Choosing and combining techniques



Interviews	Exploring issues	Some quantitative but mostly qualitative	Interviewer can guide interviewee if necessary. Encourages contact between developers and users.	Artificial environment may intimidate interviewee. It also removes them from the environment where work is typically being done.
Focus groups	Collecting multiple viewpoints	Some quantitative but mostly qualitative	Highlights areas of consensus and conflict. Encourages contact between developers and users.	Possibility of dominant characters.
Questionnaires	Answering specific questions	Quantitative and qualitative	Can reach many people with low resource requirements.	The design is key. Response rates may be low. Unless carefully designed, the responses may not provide suitable data.



				suitable data.
Direct observation in the field	Understanding context of user activity	Mostly qualitative	Observing gives insights that other techniques don't provide.	Very time-consuming. Huge amounts of data are produced.
Direct observation in a controlled environment	Capturing the detail of what individuals do	Quantitative and qualitative	Can focus on the details of a task without interruption.	Results may have limited use in the normal environment because the conditions were artificial.
Indirect observation	Observing users without disturbing their activity; data captured automatically	Quantitative (logging) and qualitative (diary)	User doesn't get distracted by the data gathering; automatic recording means that it can extend over long periods of time.	A large amount of quantitative data needs tool support to analyze (logging); participants' memories may exaggerate (diary).



Controlled settings	Natural settings	Without users
✓ Usability testing ✓ Experimental design	✓ Field study	✓ Heuristic evaluation ✓ Analytics ✓ A/B testing ✓ Predictive models

3 Five key issues: Setting goals / Identifying participants / Relationship with participants / Triangulation / Pilot studies

4 Why, what, where and when to evaluate : Why: To check users' requirements and confirm that users can utilize the product and that they like it/ What: A conceptual model, early and subsequent prototypes of a new system, more complete prototypes, and a prototype to compare with competitors' products / Where: In natural, in-the-wild, and laboratory settings / When: Throughout design; finished products can be evaluated to collect information to inform new products

5 observation : 直接实地观察收集数据 处理敏感话题 / 间接跟踪用户活动→日记→交互日志→网络分析

6 Practical challenges of evaluation : Participants' consent 参与者的同意 / Interpreting data 可解释的数据

7 Without users ： More precisely, without direct involvement of users.： Heuristic evaluation / Walkthroughs/ Analytics/ A/B testing/ Predictive modeling

8 Nielsen's heuristics : Visibility of system status/ Match between system and real world / User control and freedom/ Consistency and standards/ Error prevention/ Recognition rather than recall (The user should not have to remember information from one part of the interface to another)/ Flexibility and efficiency of use/ . Aesthetic and minimalist design 美学与极简主义设计/ Help users recognize, diagnose, recover from errors/. Help and documentation

9 Doing heuristic evaluation: Briefing session to tell experts what to do / Evaluation period of 1-2 hours in which: Each expert works separately Take one pass to get a feel for the product Take a second pass to focus on specific features / Debriefing session in which experts work together to prioritize problems Disadvantages : Can be difficult and expensive to find experts / Experts have biases

10 walkthrough 3 questions : Users know what to do / Users know how to do it / Users understand the feedback

12 Analytics 自动记录活动的优势→如果不影响系统性能，这种做法不会引起注意→可以自动记录大量数据，并通过可视化工具等进行探索和分析。➔缺点→如果在参与者不知情的情况下进行，可能会引发伦理上的担忧

13 A/B Testing 大规模实验（涉及数千名或更多参与者）➔提供了一种评估网站、移动设备上运行的应用程序的方法➔常用于评估社交媒体应用设计的变化➔比较两组用户在两个不同设计版本上的表现➔如果用户不知情，可能会引发伦理问题

14 Predictive Modeling 提供一种无需直接涉及用户即可评估产品或设计的方法，且成本低于用户测试➔使用公式推导出各种用户性能指标➔仅适用于具有可预测任务的系统，例如语音邮件系统、智能手机和专用移动设备

15 Usability testing ： Users are observed and timed / Data is recorded on video, and key presses are logged/ The data is used to calculate performance times and to identify and explain errors / User satisfaction is evaluated using questionnaires and interviews / Quantitative performance measures 定量绩效指标

16 Experimental design ： Predict the relationship between two or more variables / Independent variable is manipulated by the researcher/ Dependent variable influenced by the independent variable/ Typical experimental designs have one or two independent variables/ Validated statistically and replicable

17 Null hypothesis: typically states that there is no difference between experimental treatments / Alternative hypothesis: a statement that is mutually exclusive with the null hypothesis / The goal of an experiment is to find statistical evidence to reject the null hypothesis in order to support the alternative hypothesis

18 Experimental designs type : Between subjects design (Different participants , Single group of participants is allocated randomly to the experimental conditions) / Within subjects design (Same participants , All participants appear in both conditions)

2 Field study 实地研究 Field studies are done in natural settings "In the wild" is a term for prototypes being used freely in natural settings