

1 QUANTIFICATION

- When to use Performance Measurement Models
 - **When it's difficult to test by using real users**
 - Interface design ⇔ Analytical Approach ⇔ comparative evaluation of different systems
 - Develop predictive model of performance
 - Solve problems such as the best placement and size of the object ⇔ Fitt's law
 - Assumptions about users
 - Users have appropriate cognitive skill
 - They are expert users
 - The Performance Measurement Models are based on
 - **Hierarchical Task Analysis (HTA)**
 1. Breaks down the tasks into sub-components.
 - **GOMS**
 1. A set of Goals ⇔ what the users wish to achieve
 2. A set of Operators ⇔ Cognitive actions and processes that must be performed in order to satisfy the goal
 3. A set of Method for achieving the goals ⇔ method is the sequence of steps required to reach the goal
 4. A set of Selections rules ⇔ determine which method to choose when there is an alternative
 - Natural GOMS Language = NGOMSL
 - Based on cognitive psychology theories
 - Cognitive Perceptual Motor GOMS = CPM-GOMS
 - Represents dependencies of operators like a PERT chart

Models used in measuring performance

- Descriptive: **Key-Action Model**
 - 帮助设计有效的快捷键和 command
 - Looks at how users interact with the interface using keyboard and what shortcut keys are used in software
 - Keyboard buttons can be categorized into:
 - Symbol Keys – the buttons help to form sentences
 - Executive Key
 - Modifier Keys
- Predictive: **Keystroke-Level Model (KLM)**
 - 相当于是一个 GOMS 和 HTA 的结合 ⇔ 步骤多的 method 有可能会使用较少的时间, 可以测试手机程序
 - A practical design tool to predict the time to accomplish task using computer software
 - A quick and easy to use system design tool
 - No deep knowledge of psychology is required to use it
 - Task times can be predict without building a prototype/testing on users ⇔ save time and money 4
 - How to use Keystroke Level Model (steps):
 - Define a task (Hierarchical Task Analysis)
 - Selecting a method for performing the task (GOMS – select method)
 - Knowing the command language/ skill parameters of users/ responsive time of the system
 - Calculating the execution time by sum the time spent on each operators in the method
- Predictive: **Fitt's Law**
 - Predicts the time required to move to a target area ⇔ use the Shannon Formulation to predict the time
 - How to decrease the duration to move to target button?
 - Decrease the distance & Increase the button size ⇔ same result
 - Using right clicks & pop-up menus 右键和双击快捷菜单
 - Limit the Objects Area ⇔ Less options in one area, faster to choose/select 苹果的菜单和 windows 的菜单

2 INPUT, OUTPUT AND INTERACTION

- Virtual Reality – Instead of viewing a screen user are able to interact with a 3D world, it has different usages like simulations or games
- Augmented Reality ⇔ Users are able to interact with virtual content in real world, and are able to distinguish between them
 - Benefits
 - Solving the issues with the use of mouse
 - Feeling the materials we are touching ⇔ Haptic feedback gloves (better interaction with object in AR)
 - Seeing information everywhere
 - Seeing an object in its future location

Special User Interface Design Principles for VR/AR:

- **Discovery** ⇔ Giving user enough freedom to discover what all they can do with the platform
 - Give hints and guideline to inform user what they can do
- **Scalability** ⇔ how well gestural interactions work on objects with different sizes

Difference between VR and AR:

- Both VR and AR are similar in the goal of engaging users in virtual world
- AR – users continue to be in touch with the real world while interacting with virtual object around them
- VR – user is isolated from the real world while covered in a world which is completely fabricated

Selecting an appropriate input and output method

1. What input method is **appropriate for the target user**? consider their needs and limitation
2. Is the selected input method appropriate for **the task**?
3. Is the selected input method appropriate for **the environment**?
4. What are the **user experience goals**?

Special Input methods to help users ⇔ its about how we transfer users input to outputs that are usable for the users and how well we support natural input

The **transformable** input

- Speech/Face recognition
- Eye tracking
- Handwriting to text
- Text to speech
- Brain signal to command

Game based designs:

- **Games inspired design** – a user interface that has game's artwork style
- **Serious Game** – Similar to normal games but they are developed with the purpose of training a concept to a specific group of users
 - Teaching Games
 - Simulators
 - Meaningful/purposeful games
- **Gamification (not a game)** – use of video game mechanics in *non-game context* to encourage and engage users in the context by making sense of playfulness and fun
 - Data collection, online community, software popularity
 - E-learning
 - Health care and sport
 - Human resources