ISYS3401
Information Technology Evaluation

Week 1 Lecture

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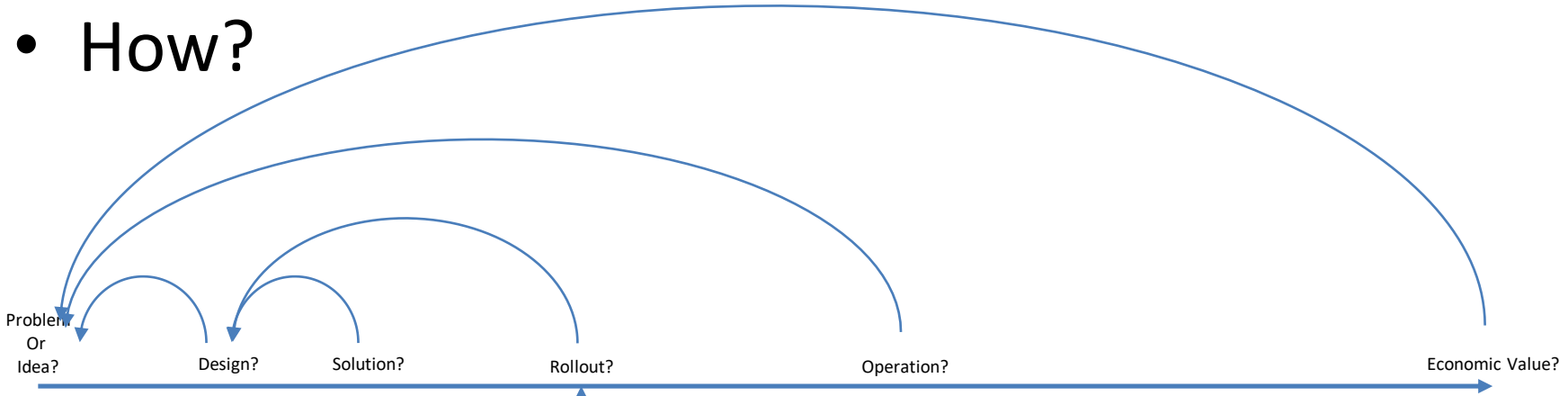
Agenda

- Welcome
- Adminstrivia
- Introduction (Evaluating Information Technology)
- Introduction to User Experience
- Class Activities
- User Experience (UX) Metrics
- Value of UX Metrics
- Neilsens' 10 Usability Heuristics
- New Realities

Evaluating Information Technology

- When?
- What?
- How?



Development Phase
Use cases, Co-design

Use Phase
Change Management
User training…

The Big Moment

Qualitative/
Quantitative

Qualitative
/Quantitative

User Experience (UX)

- We will focus user experience as a key example to demonstrate on how you can evaluate an IT software, websites, or comparing devices etc.
- However, you can apply the same concept and metrics to other applications you might come across in the future; the underlying phenomena do not change drastically.

Text Book

There are two textbooks:

1. First book is less statistical but telling you (**what** and) **why** you need to do it:

   Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics, by William Albert, Thomas Tullis. (Can search online and Download Free via the university library)

2. Second book is the **how -** it gives you the statistics knowledge you require to perform the calculations:

   Anol Bhattacherjee, Social Science Research: Principles, Methods, and Practices. Global Text Project, 2012

   (can search online too)

Problem: Design versus UX

User Experience (1)

- **What is User Experience?** (p. 4)
  a. A user is involved
  b. That user is interacting with a product, system, or really anything with an interface
  c. The users' experience is of interest, and observable or measurable
- **Why is Usability?**
  a. "Easy to use"?
  b. Usability can be defined a number of ways, we use a simple and easy to follow definition from The U.S. Department of Health and Human Services is: "How effectively, efficiently and satisfactorily a user can interact with a user interface." (http://www.usability.gov)

User Experience (2)

- **Why is it important to IT?**
  - What might be some of the issues with such a system in terms of impacts on usability and UX?
- **Example,**
  - One study found 22 separate usability issues that contributed to patients receiving the wrong medicine; on average, 98,000 Americans died annually due to medical error. (p.5)
  - An AED (Automatic External Defribulator) is a device used to resuscitate an individual experiencing cardiac arrest, can be found in shopping malls, airports, and sporting events. In his research of usability AED, Andre (2003) found two of the four devices were OK, but the other two devices, 25% could not be operated by the participants. (p.5)
  - An increased of 50% donations after the redesign of an charitable-giving website: you want a visitor easy to navigate to find where to make a donation. (p.6)

User Experience (UX) Metrics (1)

- A metric is a way of measuring or evaluating a particular phenomenon or thing that is quantifiable such as distance (longer), height (taller), or speed (faster).
- Metrics vary between industries: car (e.g. horsepower, petrol consumption), IT industry (e.g. processor speed, memory size, life of a laptop battery), and education (e.g. grades, technical skills) (pp.6-7)
- UX metric is related to:
  - People and their behaviour and attitudes (such as user satisfaction, usefulness, and ease of use);
  - Task success (such as effectiveness and efficiency);
  - Confidence intervals (variability in the data); and
  - Relevancy.

User Experience (UX) Metrics (2)

- At the end of day, UX metric is for organisations to understand the performance of their products, or to make decisions on their products. So the UX metrics have to answer questions such as [p.7]:
  - Will the users recommend the product?
  - Is this new product more efficient to use than the current product?
  - How does the user experience of this product compare to the competition?
  - Do the users feel good about the product or themselves after using it?
  - What are the most significant usability problems with this product?
  - Are improvements being made from one design iteration to the next?
- **UX Metrics can be conducted using observation, quantitative survey, eye tracking (experiment)[p.10], and qualitative survey [p.11].**

Value of UX Metrics (1)

- Problem:
  - If all eight participants in a study have the same exact problem, you can be quite certain it is a problem!
  - But what if only two or three of the eight participants encounter this problem? What does it mean?
    - UX metrics offer a way to estimate the number of users likely to experience this problem.
- In a business plan, you might need to show how the revenue would increase a result of a new product design. UX metrics are a key ingredient in calculating a ROI.
- **Thus, you need to justify your numbers using statistics.**

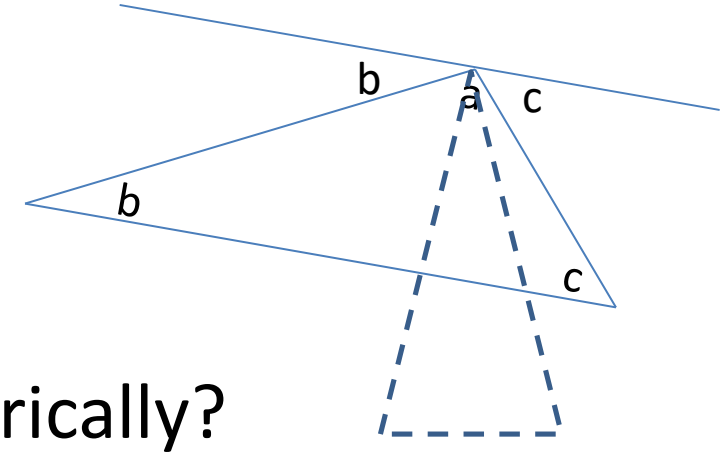
Value of UX Metrics (2)

- Furthermore, UX metrics help you gain new insights and lead toward a better understanding of user behaviour. It can help reveal patterns that are difficult or even impossible to see. Evaluating a product with a very small sample size (without collecting any metrics) usually reveals the most obvious problems. However, many more subtle problems require the power of metrics (p.9)
  - For example, sometimes it's difficult to see small inefficiencies, such as the need to re-enter user data whenever a transaction displays a new screen. Users may be able to complete their tasks—and maybe even say they like it—but many small inefficiencies can eventually build up to impact the user experience and slow down the process.

➢ **We need evidences to support our argument!**

What is Evidence??

- How do you know in a triangle, the 3 angles always add to 180^o ?



$a + b + c = 180^o$

- Empirically?
- What has done MATH1005 or equivalent?

Cases to be Covered

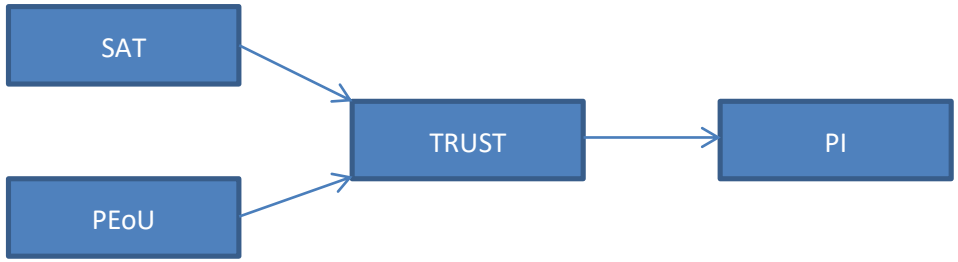
1. Apple versus Android
2. TAM (Technology Acceptance Model)
   - Neilsens' 10 Usability Heuristics
3. New Realities

A Practical Case of Discussion

		Samsung Galaxy Note8	Apple iPhone X	Apple iPhone 8 Plus
				
FEATURES	USB	3.1, Type-C 1.0 reversible connector	3.0, reversible connector	3.0, reversible connector
	Sensors	Iris scanner, fingerprint (rear-mounted), accelerometer, gyro, proximity, compass, barometer, heart rate, SpO2	Face ID, accelerometer, gyro, proximity, compass, barometer	Fingerprint (front-mounted), accelerometer, gyro, proximity, compass, barometer
	Messaging	SMS(threaded view), MMS, Email, Push Mail, IM	iMessage, SMS (threaded view), MMS, Email, Push Email	iMessage, SMS (threaded view), MMS, Email, Push Email
	Browser	HTML5	HTML5 (Safari)	HTML5 (Safari)
	Java	No	No	No
		- Samsung Desktop Experience support - Fast battery charging (Quick Charge 2.0) - Qi/PMA wireless charging (market dependent) - ANT+ support - Bixby natural language commands and dictation - MP4/DivX/XviD/WMV/H.265 player - MP3/WAV/WMA/eAAC+/FLAC player - Photo/video editor - Document editor	- Fast battery charging: 50% in 30 min - Qi wireless charging - Siri natural language commands and dictation - iCloud cloud service - MP3/WAV/AAX+/AIFF/Apple Lossless player - MP4/H.264 player - Audio/video/photo editor - Document editor	- Fast battery charging: 50% in 30 min - Qi wireless charging - Siri natural language commands and dictation - iCloud cloud service - MP3/WAV/AAX+/AIFF/Apple Lossless player - MP4/H.264 player - Audio/video/photo editor - Document editor
BATTERY		Non-removable Li-Ion 3300 mAh battery	Non-removable Li-Ion 2716 mAh battery	Non-removable Li-Ion 2691 mAh battery (10.28 Wh)
	Stand-by			
	Talk time	Up to 22 h (3G)	Up to 21 h (3G)	Up to 21 h (3G)
MISC	Music play	Up to 74 h	Up to 60 h	Up to 60 h
	Colors	Midnight Black, Maple Gold, Orchid Grey, Deep Sea Blue, Star Pink (Taiwan only)	Space Gray, Silver	Gold, Space Gray, Silver
	SAR			1.19 W/kg (head) 1.19 W/kg (body)
	SAR EU			0.99 W/kg (head) 0.99 W/kg (body)
TESTS	Price	About 1000 EUR	About 1150 EUR	About 910 EUR
	Performance	Basemark OS II: 3374 / Basemark OS II 2.0: 3333 Basemark X: 40890		Basemark OS II 2.0: 3601
	Display	Contrast ratio: Infinite (nominal), 4.148(sunlight)		Contrast ratio: 1395:1 (nominal), 3.957 (sunlight)
	Camera	Compare PHOTO / Compare VIDEO		
	Loudspeaker	Voice 67dB, noise 69dB, ring 71dB		Voice 76dB, noise 74dB, ring 79dB
	Audio quality	Noise -92.5dB / Crosstalk -93.2dB		Noise -93.5dB / Crosstalk -80.2dB
	Battery life	89h endurance rating		81h endurance rating

Another Practical Case for Discussion

- e-Commerce has been found to be one of the most powerful mechanism reforming the world economy in the past 2 decades.
- An important research question in the ecommerce domain is to study **consumers' trust** in online retailers. Based on prior researches,
- One may make the following hypotheses for online stores:
  - The trustworthiness perception of the online operation of a company would be positively affected by customers' satisfaction (SAT) with the offline operation of the company.
  - The trustworthiness perception of the online operation of a company would be positively affected by the perceived ease of use (PEoU) of the website.
  - The perceived trustworthiness of the website will in turn affect customers' purchase intention (PI).



Neilsens' 10 Usability Heuristics (1)

1. **Visibility of system status**

   The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

2. **Match between system and the real world**

   The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system oriented terms. Follow real world conventions, making information appear in a natural and logical order.

3. **User control and freedom**

   Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

4. **Consistency and standards**

   Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

5. **Error prevention**

   Prevent problems from occurring in the first place. Eliminate error-prone conditions or check for them ... present users a confirmation option before they commit to the action

(Ref: https://www.designprinciplesftw.com/collections/10-usability-heuristics-for-user-Interface-design)

Neilsens' 10 Usability Heuristics (2)

6. **Recognition rather than recall**

   Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for system use should be visible or easily retrievable whenever appropriate.

7. **Flexibility and efficiency of use**

   Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

8. **Aesthetic and minimalist design**

   Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

9. **Help users recognize, diagnose, and recover from errors**

   Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

10. **Help and documentation**

    Better if the system can be used without documentation, but may need to provide help and documentation. Should be easy to search, task focused, list concrete steps, minimalist

New Realities (1)

- Augmented reality (AR) refers to technology that incorporates real-time inputs from the existing world to create an output that combines both real-world data and some programmed, interactive elements which operate on those real-world inputs.

- In order to qualify as “Augmented Reality” (AR), the technology must:
  - Respond contextually to new external information and account for changes to users’ environments
  - Interpret gestures and actions in real time, with minimal to no explicit commands from users
  - Be presented in a way that does not restrict users’ movements in their environment

New Realities (2)

- As a type of non-command UI, AR interfaces provide excellent opportunities for improving UX
- To see why, consider an airplane mechanic who crawls around inside the hull of an aircraft in order to inspect it .... and needs to check for how long a certain part has been in service (but think of eg – surgeon doing a fixation of a major pelvic fracture and CT / XR image overlay)
  - With a traditional screen-based UI - mechanic would have to somehow "save" the part number (by remembering it, taking a picture of it on a smartphone, or writing it down on a piece of paper) and then access a phone or computer-based system to determine for how long that part has been in operation.
  - With an AR technology like HoloLens or Google Glass, the service record could be displayed right on top of the item, with little to no commands from the user.

New Realities (3)

- In this scenario (and in many others), AR can help the UX in 3 fundamental ways:
  a. By decreasing the interaction cost to perform a task
     - mechanic can remain in the current environment and have relevant data displayed right there, without doing any special action
  b. By reducing the user's cognitive load
     - with an AR system, the useful part information is displayed automatically and the mechanic does not need to commit a part number to working memory or "save" it (no commands AND context switching)
  c. By combining multiple sources of information and minimizing attention switches
     - with a non-AR system - to "save" the part number and use a different system to find its history-have to switch attention
     - with AR, the two sources of information are combined - so mechanic won't need to divide attention.

Remarks

- Even “well established” and liked tech supporting Virtual Care can have usability and UX issues
- New technology (e.g. VUIs, AR) offers both opportunities to improve UX, AND has pitfalls to avoid in supporting virtual care (NOT SURPRISINGLY)

- Ways forward irrespective of technologies
  - Better understanding of – and education around - usability
  - Design, formative evaluation, summative evaluation, testing +++++ (specifically for USABILITY)
  - More “participatory” design - including co-design
  - Or even .. a REAL and DEEP understanding of users and usage contexts

Next Week

- We will start looking at statistics (Chapter 2)
- Tutorial/Lab will start on Thursday