

ToRCHI talk

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St. Bahen Centre, Toronto University

# Evaluating User Experience Using the UX Graph and Experience Recollection Methods

**MASAAKI KUROSU**

**THE OPEN UNIVERSITY OF JAPAN**

# Agenda

## Part 1: When EX Evaluation Should Be Done?

1. Business Process and Design Process

## Part 2: Satisfaction Is a Measure for UX

2. UX
3. Quality Characteristics and UX

## Part 3: Evaluation of UX

5. ESM (Type R)
6. TFD (Type R)
7. UX Curve (Type M)
8. UX Graph (Type M)
9. ERM (Type M)

Part 1: When EX Evaluation Should Be Done?

# **1. BUSINESS PROCESS AND DESIGN PROCESS**

# Human-Centered Design Process

(ISO 9241-210:2010)

# Design Thinking Process

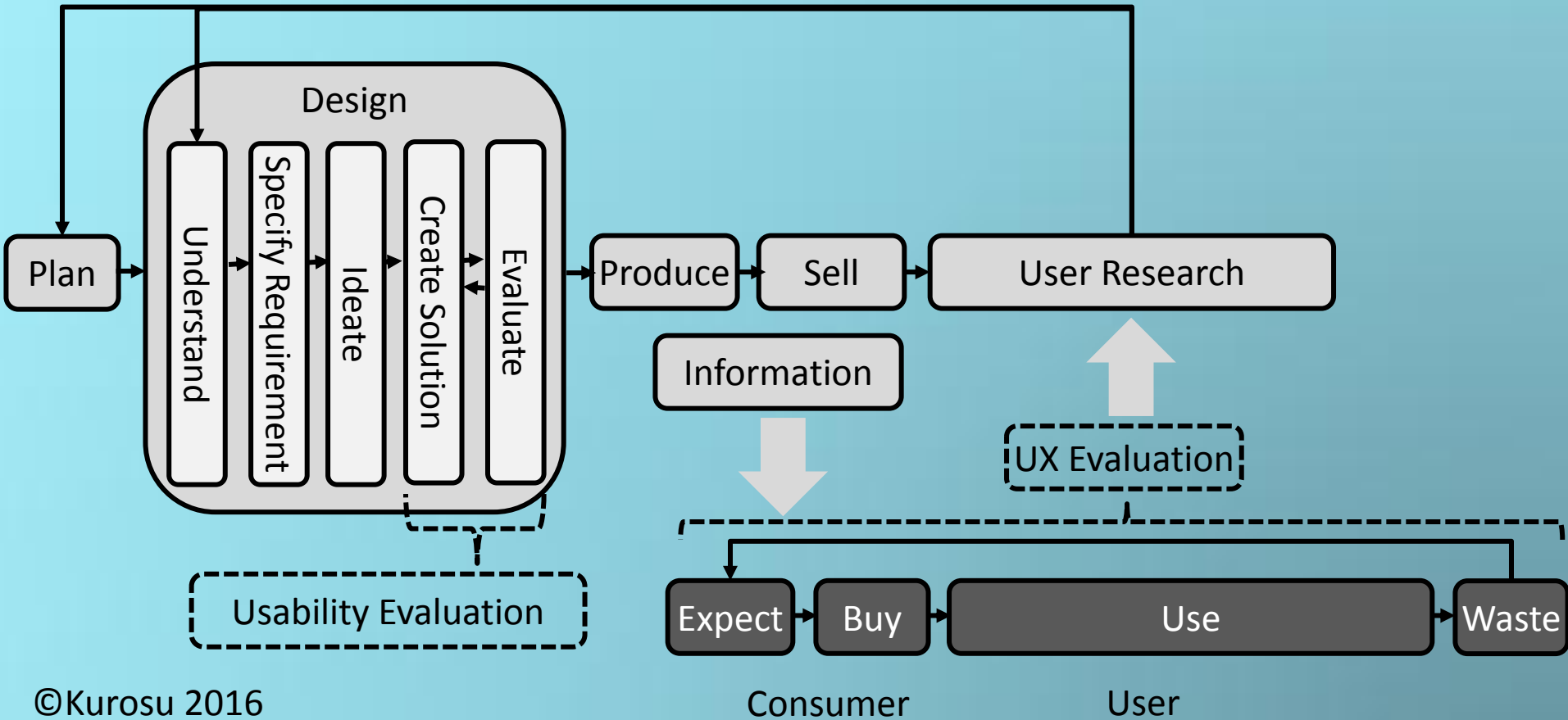
d-school, Stanford University

<http://www.blendmylearning.com/2014/05/28/using-design-thinking-to-develop-personalized-learning-pilots/>

# PDCA (Shewhart), PDSA (Deming)

# Experience Process: UX Over Time

# Business Process and Design Process





## Part 2: Satisfaction Is a Measure for UX

### 2. UX

# Origin of UX

- Norman, D.A. (1993)
  - became the User Experience Architect of Apple Computer
- Norman, D.A. (1998)
  - “I invented the term because **I thought human interface and usability were too narrow. I wanted to cover all aspects of the person’s experience** with the system including industrial design, graphics, the interface, the physical interaction, and the manual. Since then the term has spread widely, so much so that it is starting to lose it’s meaning”
- Norman, D.A. and Merholz, P. (2007)
  - “User experience, human centered design, usability, even affordances just sort of entered the vocabulary and no longer have any special meaning. **People use them often without having any idea why, what the word means, its origin, history, or what it’s about.**”

# Concept of UX

- 2010 ISO9241-210
  - Person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service
- 2011 UX White Paper
- Unlike the usability, the concept of UX was considered as leading to the sales promotion
  - Has become a buzzword

Part 2: Satisfaction Is a Measure for UX

# **3. QUALITY CHARACTERISTICS AND UX**

# Shackel and Richardson (1991)

Nielsen, J. (1993)

# ISO9241-11(1998)

# SQuaRE (ISO25010 2011)



- Quality in Design and Quality in Use



Jordan, P. (2000)

# Hassenzahl, M. (2004)

# Objective/Subjective Quality Characteristics

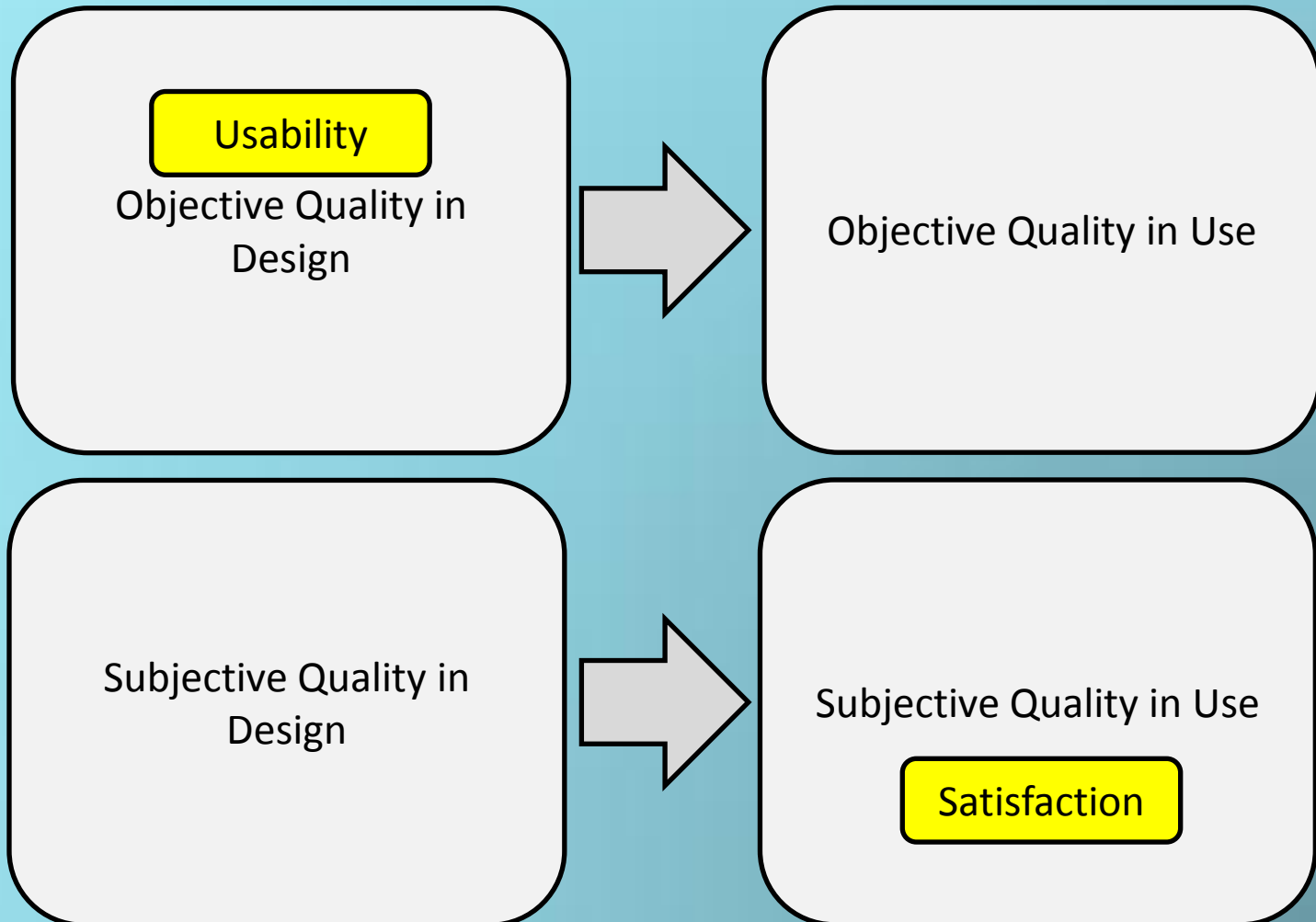
Usability

Objective Quality Characteristics

Subjective Quality Characteristics

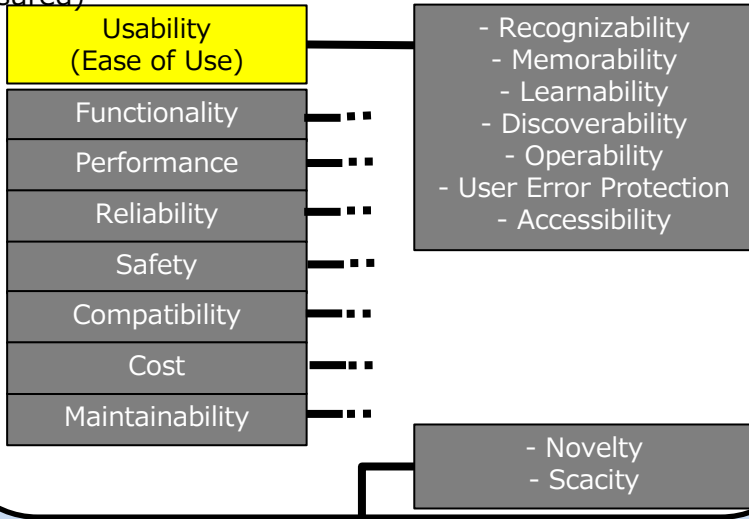
Satisfaction

# Four Quality Characteristics Area

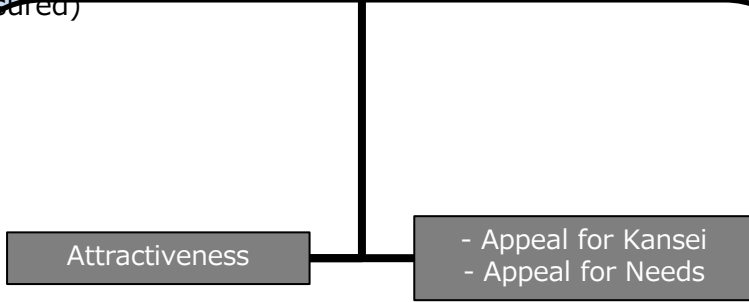


# Quality in Design

Objective Quality in Design (Externally Measured)

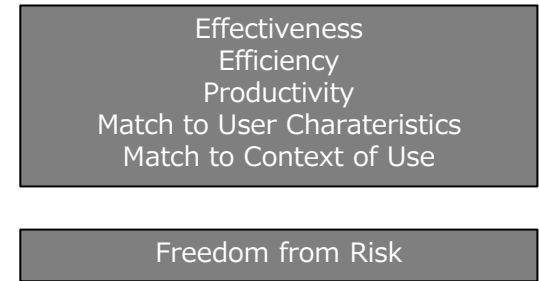


Subjective Quality in Design (Internally Measured)

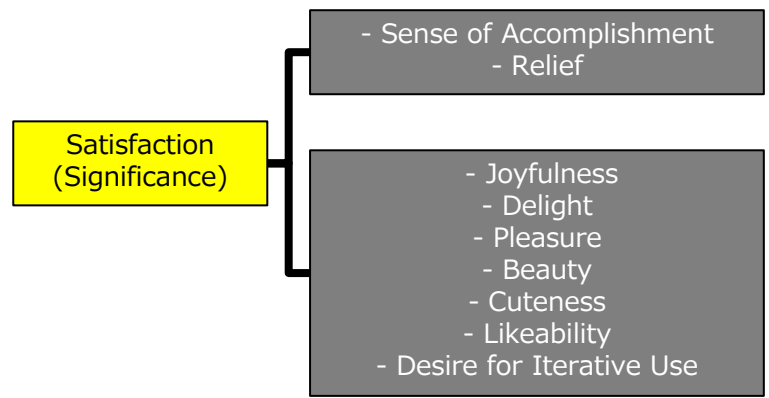


# Quality in Use

Objective Quality in Use (Externally Measured)



Subjective Quality in Use (Internally Measured)



# UI

User Characteristics Context of Use

# UX

Part 3: Evaluation of UX

# 4. EVALUATION OF UX

# Prerequisite for Evaluation

- Evaluation of UX shall be conducted
  - By real users
  - In the real situation
- Usability Test
  - Is not conducted using real users
    - Test participants
  - Is not conducted in the real situation
    - Usability laboratory



# Evaluation Method - Type R

- Real time Method
  - ESM(Experience Sampling Method)
    - Larson & Csikszentmihalyi(1983)
- Quasi Real time Methods
  - DRM(Day Reconstruction Method)
    - Karapanos et al. (2009)
  - TFD(Time Frame Diary)など
    - Kurosu & Hashizume (2008)
- Can obtain the live information on experience
- Difficult to conduct for a long period

# Evaluation Method - Type M

- Memory-based Methods: Retrospective Methods
  - CORPUS
    - von Wilamowitz-Moellendorff et al. (2006)
  - Joint Production of the Usage Time Table
    - Masaya Ando(2007)
  - iScale
    - Karapanos et al. (2009)
  - UX Curve
    - Kujala et al.(2011)
  - UX Graph
    - Kurosu (2014)
  - ERM (Experience Recollection Method)
    - Kurosu (2016)
- Can be influenced by the forgetting and distortion of memory
  - Forgetting and distortion can be interpreted as the description of experiences at present time
- UX can be evaluated for a long time (months, years)

## Part 3: Evaluation of UX

# 5. ESM (TYPE R)

# ESM (Experience Sampling Method)

- Using pagers to programmable watches
- Study experience in the naturally occurring contexts of everyday life.
  - Experience = any of the contents of consciousness: thoughts, feelings, sensations
- But is a disturbance to the life
- Max of around 2 weeks

## Part 3: Evaluation of UX

# 6. TFD (TYPE R)

# TFD (Time Frame Diary)

- One of diary methods
  - Divide a day (24 hours) into 96 time frames (each for 15 minutes)
- Informants carry the printed form and fill in the form for every 2-3 hours
  - Each time frame should be filled with the place and the behavior (incl. feeling)
  - Repeat for 7 days (Most of the people repeat similar behavior on every week)
- Then conduct the interview

Time	Place	What You Did	Time	Place	What You Did
0:00	home	drinking	12:00	University classroom	take lesson (English)
0:15	↓	↓	12:15	road	walk (go home)
0:30	my room	PC (paper work)	12:30	↓	Use cell-phone (call) (S)
0:45	↓	↓	12:45	home	Use cell-phone (mail) (S) x 2
1:00	↓	↓	13:00	↓	have lunch, watch TV
1:15	↓	↓	13:15	↓	↓
1:30	↓	PC (mail)	13:30	↓	↓
1:45	↓	↓	13:45	my room	PC (paperwork)
2:00	bedroom	sleep	14:00	↓	↓
2:15	↓	↓	14:15	road	walk (go to hair salon)
2:30	↓	↓	14:30	hairdresser (near my home)	get a haircut
2:45	↓	↓	14:45	↓	↓
3:00	↓	↓	15:00	↓	↓
3:15	↓	↓	15:15	↓	↓
3:30	↓	↓	15:30	↓	↓
3:45	↓	↓	15:45	road	walk (go home)
4:00	↓	↓	16:00	home	Use cell-phone (mail) (S) x 2
4:15	↓	↓	16:15	↓	bed room nap
4:30	↓	↓	16:30	↓	↓
4:45	↓	↓	16:45	↓	↓
5:00	↓	↓	17:00	my room	Use cell-phone (mail) (S) x 4
5:15	↓	↓	17:15	↓	PC (mail)
5:30	↓	↓	17:30	road	walk (go to supermarket)
5:45	↓	↓	17:45	supermarket (near my home)	shopping
6:00	↓	↓	18:00	↓	↓
6:15	↓	↓	18:15	road	walk (go home)
6:30	↓	↓	18:30	home	Use cell-phone (call) (S)
6:45	↓	↓	18:45	↓	↓
7:00	↓	↓	19:00	↓	↓
7:15	↓	↓	19:15	kitchen	preparation of dinner
7:30	↓	↓	19:30	↓	↓
7:45	↓	↓	19:45	↓	↓
8:00	living room	have breakfast	20:00	living room	↓
8:15	↓	↓	20:15	↓	↓
8:30	my room	PC (mail)	20:30	my room	Use cell-phone (call) (S)
8:45	↓	↓	20:45	↓	↓
9:00	↓	Use cell-phone (mail) (S) x 2	21:00	living room	have dinner
9:15	wash room	outfit	21:15	↓	↓
9:30	my room	outfit, PC (mail)	21:30	↓	↓
9:45	↓	outfit, PC (mail)	21:45	↓	↓
10:00	road	walk (go to University)	22:00	my room	PC (paperwork)
10:15	↓	↓	22:15	↓	↓
10:30	University classroom	take lesson (English)	22:30	↓	Use cell-phone (call) (S)
10:45	↓	↓	22:45	↓	↓
11:00	↓	↓	23:00	↓	PC (mail)
11:15	↓	↓	23:15	↓	PC (paperwork)
11:30	↓	↓	23:30	↓	↓
11:45	↓	↓	23:45	↓	↓

## Part 3: Evaluation of UX

# 7. UX CURVE (TYPE M)



# UX Curve

- Abscissa is time from the time when participants started using the artifact until “today”
- Ordinate is (a) attractiveness, (b) ease of use, (c) utility, (d) degree of usage
- Participants are asked to freely describe their general relationship and user experience by means of the product with the general UX Curve template

# UX Curve Template

# Example of UX Curve

# Pros and Cons of UX Curve

- UX curve reflects the real experience by the real user in the real situation
- Emphasis is rather on the curve than on episodes
- Fatigue by drawing similar curve for 3 (4) times

Part 3: Evaluation of UX

## 8. UX GRAPH (TYPE M)

# UX Graph

- Only one graph on the satisfaction (as the intensive measure of UX)
- First, episodes and ratings are written
- Then, the graph will be drawn
- Developed a software for supporting the use of this method

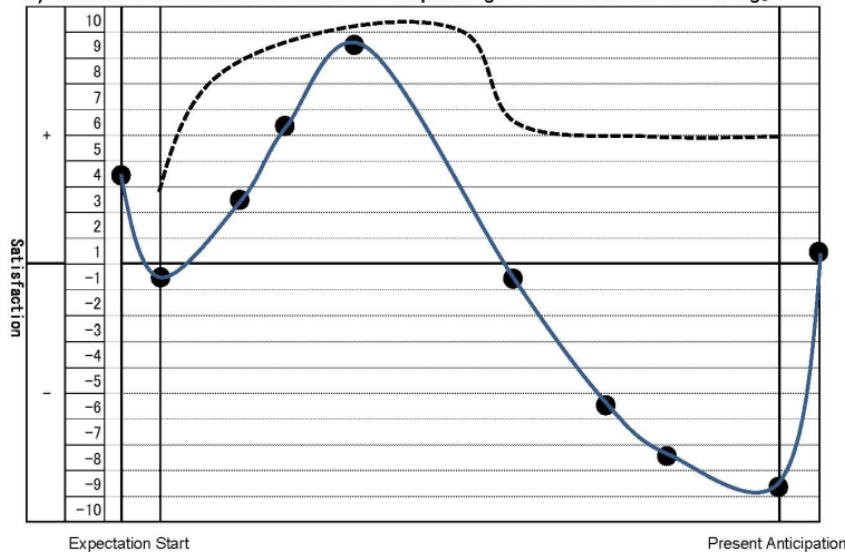
# Example of UX Graph

UX graph recording sheet      Target Item Smartphone (Android)  
 Your Name \_\_\_\_\_ Date Year 2016 Month Apr Date 1 Male/Female M Age 43

**1) Describe the event, your feeling and the level of satisfaction (from +10 to -10)**

- ① **Expectation** Interested in so much. But a bit anxious if I can fully use it. rating 4
- ② **Started to Use (Year 2012)** People around me changed to smartphone and I decided rating -1
- ③ **(Year 2012)** Amazed to see pictures taken beautifully. Twitter is interesting rating 3
- ④ **(Year 2013)** My pal taught me how to use LINE. Fascinating! rating 6
- ⑤ **(Year 2013)** He also taught me how to describe the bookmark and use the internet. rating 9
- ⑥ **(Year 2014)** Unpleasant that Facebook and other SNS link together without permission rating -1
- ⑦ **(Year 2015)** Charger connection became bad and can't charge adequately rating -6
- ⑧ **(Year 2015)** Applications update automatically and device doesn't work naturally rating -8
- ⑨ **(Year )** rating
- ⑩ **(Year )** rating
- ⑪ **(Year )** rating
- ⑫ **Present Time** Want to buy a new device because of malfunctioning. But expensive rating -9
- ⑬ **Anticipation in Near Future** Will buy a new one in 6 months. Perhaps iPhone. rating 1

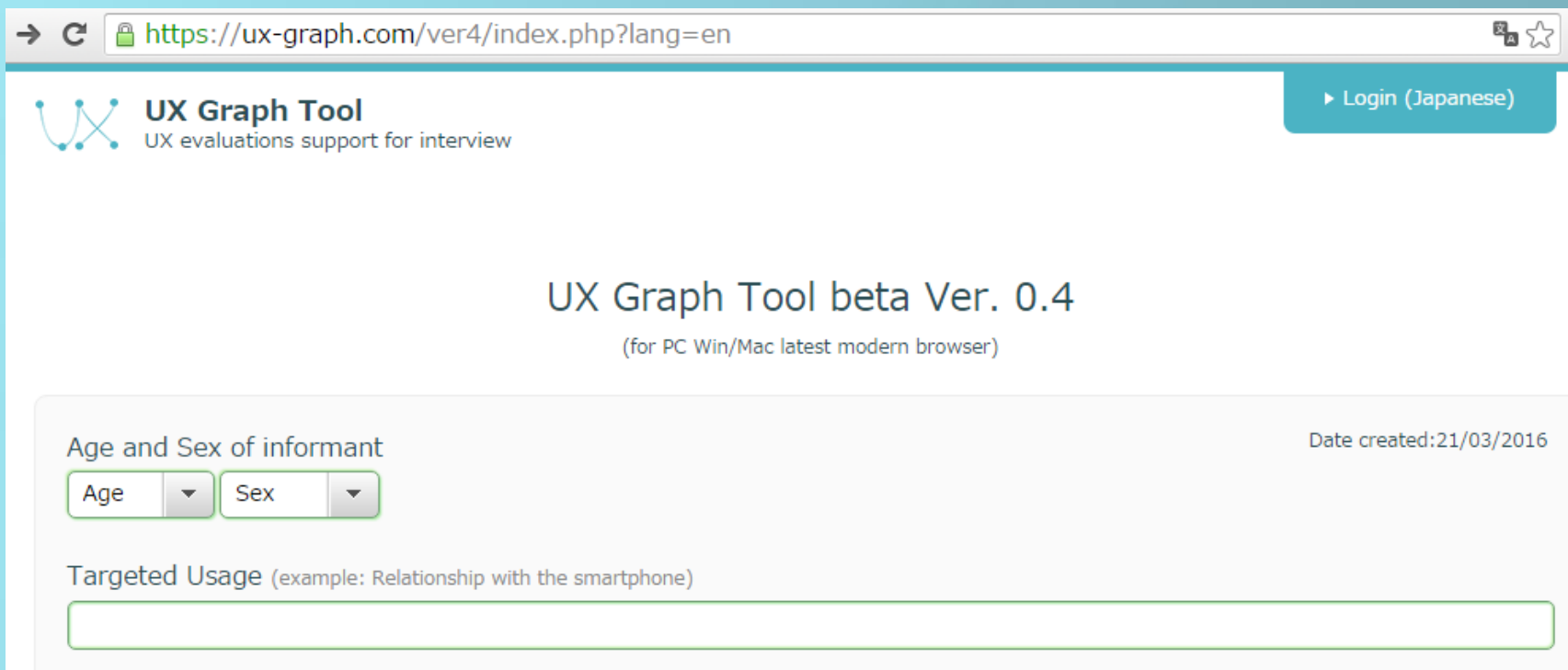
**2) Write down the circled numbers at the adequate height of level of satisfaction rating.**




Graph Satisfaction ——— Frequency of Use - - - - -  
**3) After the satisfaction graph, draw the curve of frequency of use in the upper half.**


# UX Graph Tool

- Web-based tool
  - Available free of charge  
(on <https://ux-graph.com/>)



The screenshot shows the web interface of the UX Graph Tool. The browser address bar displays the URL <https://ux-graph.com/ver4/index.php?lang=en>. The page header includes the logo for UX Graph Tool, the text "UX Graph Tool" and "UX evaluations support for interview", and a "Login (Japanese)" button. The main content area displays "UX Graph Tool beta Ver. 0.4" and "(for PC Win/Mac latest modern browser)". Below this, there is a form section titled "Age and Sex of informant" with a "Date created:21/03/2016" timestamp. The form contains two dropdown menus for "Age" and "Sex". Below these is a section titled "Targeted Usage (example: Relationship with the smartphone)" with a large text input field.

→ ↻ <https://ux-graph.com/ver4/index.php?lang=en> 

 **UX Graph Tool**  
UX evaluations support for interview [▶ Login \(Japanese\)](#)

UX Graph Tool beta Ver. 0.4  
(for PC Win/Mac latest modern browser)

Age and Sex of informant Date created:21/03/2016

Age  Sex

Targeted Usage (example: Relationship with the smartphone)



# UX Graph Tool

- Can be used by anybody
  - on the PC/ tablet/ smartphone with an internet environment with modern browsers (such as Firefox and google Chrome)

# How to Use the Tool?

- 1: input demographic information and targeted usage
  - age
  - sex
  - targeted artifact

Age and Sex of informant

Age  Sex

Sex

male

female

Targeted Usage  Relationship

Age and Sex of informant

50s  male

Targeted Usage (example: Relationship with the smartphone)

Relationship with the smartphone

# How to Use the Tool?

- 2: input prior and initial experience

## #Experience Prior

Date of Experience (Estimation)

  /  

Content Experience

(example: I saw other people using it and wanted it too.)

Expectation/Satisfaction Scale (-10 to +10)

## #Time of start of use

Date of Experience (Estimation)

  /  

Content Experience

(example: WoW ! I'm very happy to get it!)

Satisfaction Scale (-10 to +10)

# How to Use the Tool?

- 3: input more experience up to now

## Episode #01

Date of Experience (Estimation)

 / 

Content Experience

Satisfaction Scale (-10 to +10)

## Episode #02

Date of Experience (Estimation)

 / 

Content Experience

Satisfaction Scale (-10 to +10)

# How to Use the Tool?

- 4: input current feelings and future expectations

## #Current Feelings

Content Experience  
(example: It is a must-have tool. I always use it.)

Satisfaction Scale (-10 to +10)

 ▼

## #Future Expectations

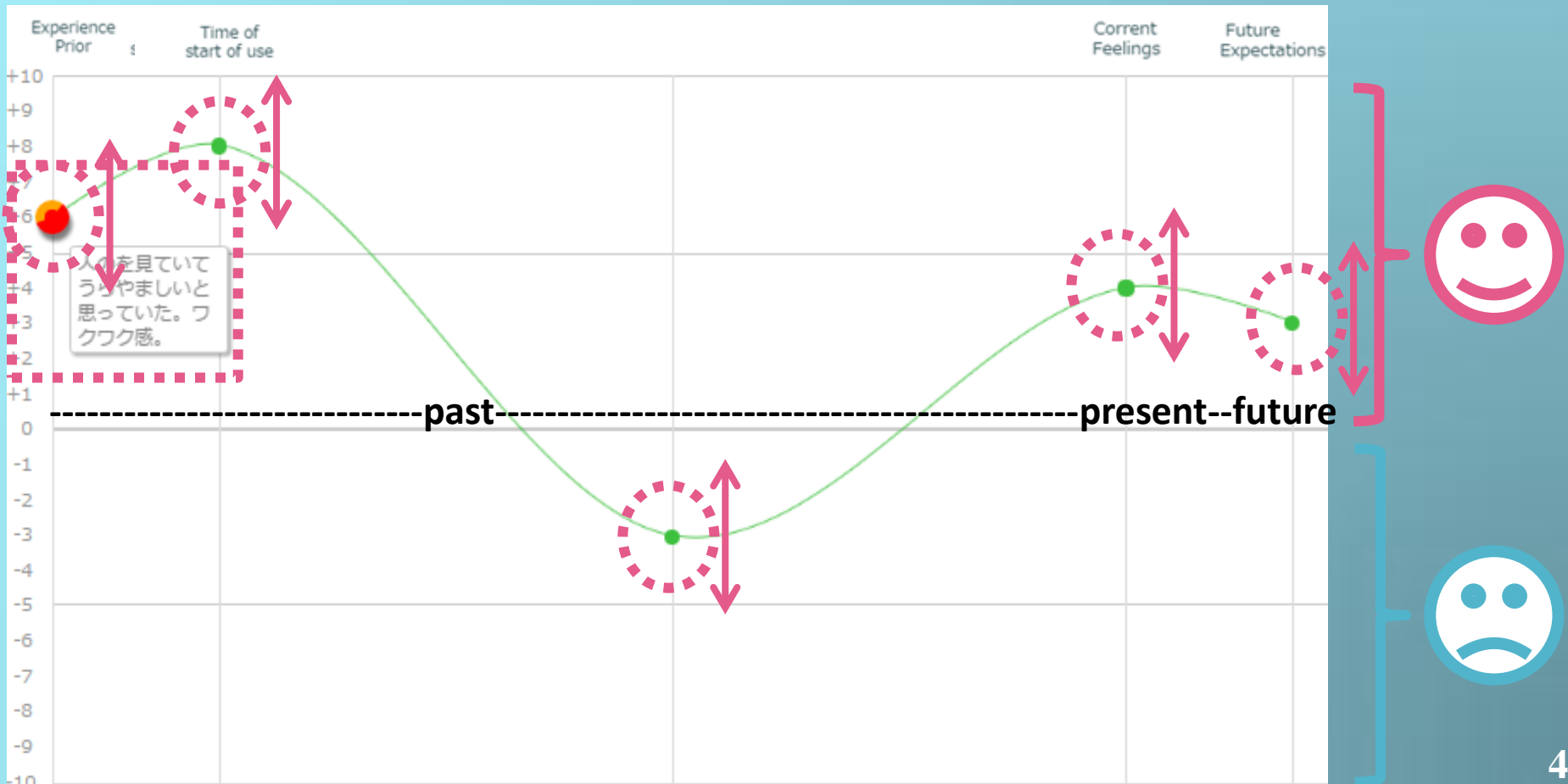
Content Experience  
(example: I can not imagine it being more convenient.)

Expectation/Satisfaction Scale (-10 to +10)

 ▼

# How to Use the Tool?

- 5: arrange and download the graph



# Evaluation of UX Graph

- Improvements compared to UX Curve
  - Simpler
  - Episodes are written more in detail
- Curve (Graph) is attractive, but the satisfaction rating is more useful
  - Curve may not be necessary
- Time unit on the abscissa is not uniform because of the ambiguity of memory

## Part 3: Evaluation of UX

# 9. ERM (TYPE M)



# ERM (Experience Recollection Method)

- No curve (graph)
- Time is not a ratio scale but an ordinal block
  - Before the usage
  - At the start of usage
  - A while after starting the use
  - During the usage
  - Recently
  - Now
  - In the near future (prediction)
- Satisfaction rating is from +10 to -10

# ERM Template 1/2

Recording Sheet for ERM: Experience Recollection Method    Target Item \_\_\_\_\_    Male/Female    Age \_\_\_\_\_

1. Write what you experienced at each phase and fill in the evaluation by +10 to -10 rating.

Phase		What you experienced	Evaluation
Expectation before the purchase			
Evaluation at the time of start of usage	Year		
Evaluation at early days from the start of usage			
Evaluation during the use			
Recent evaluation			
Present evaluation	Year		
Estimation in the near future			



# Example of ERM

Recording Sheet for ERM: Experience Recollection Method    Target Item Smartphone (iPhone 6)    Male Female    Age    27

1. Write what you experienced at each phase and fill in the evaluation by +10 to -10 rating.

Phase		What you experienced	Evaluation (+10~ -10)
Expectation before purchase		I expected to get the latest model of iPhone on the day of sale.	8
Evaluation at the time of starting to use	Year 2014	I was bewildered for the larger screen compared to my previous model (iPhone5).	5
Evaluation at early days from starting to use		I got used to the large screen soon. And I felt the advantage of large screen for enjoying the game.	10
Evaluation during the use		The body was bent, but was straighten back by pushing it harder.	5
Recent evaluation		The power loss of battery is unexpectedly fast.	-5
Present evaluation	Year 2016	It's now a must to carry the backup battery.	-5
Evaluation in the near future		I will use this until the next model will appear.	-2

**THANKS**

# Abstract

- Evaluation of User Experiences continues to be a challenge; especially, challenging is finding generalizable methods of systematic and rigorous evaluation. The approaches of UX Graph and the Experience Recollection Method (ERM) were developed specifically to help users to recollect their experiences with services and products, more precisely and in more detail. Using these methods, in the real context of use, helps users recollect their experiences more accurately, helps designers gain better understanding, and as a result produces better designs. The first part of this talk will discuss the challenges of integrating qualitative User Experience evaluations into business and design processes. Next, UX Graph and ERM methods will be introduced. Finally, these methods will be applied to real case studies.