KAIST Fall 2018 CS408E/F: Computer Science Project

User-Centered Design Process

2018.08.27 Juho Kim



Project-oriented course in which students design, develop, test, validate, and present a software system in a team.

"What goal to keep in mind as we design our 408 system?"

Usability

"What process should my team follow while working on a 408 project?"

> User-centered design as a guiding principle

Saturday, January 13

Earlier Today

▲ EMERGENCY ALERTS

1m ago

X

Emergency Alert BALLISTIC MISSILE THREAT INBOUND TO HAWAII. SEEK IMMEDIATE SHELTER. THIS IS NOT A DRILL.

Twitter @wpugh/via Reuters





Anthony Quintano/Civil Beat/AP, @MorganMyrmo on Twitter

BMD False Alarm

Amber Alert (CAE) - Kauai County Only Amber Alert (CAE) Statewide 1. TEST Message PACOM (CDW) - STATE ONLY Tsunami Warning (CEM) - STATE ONLY DRILL - PACOM (CDW) - STATE ONLY Landslide - Hana Road Closure Amber Alert DEMO TEST High Surf Warning North Shores

Hawaii Emergency Management Agency



Hawaii Emergency Management Agency via Hawaii News Now

1. State EOC

1. TEST Message

DRILL-PACOM (DEMO) STATE ONLY

False Alarm BMD (CEM) - STATE ONLY

Monthly Test (RMT) - STATE ONLY

PACOM (CDW) - STATE ONLY

Richard Rapoza / Via Hawaii Emergency Management Agency

"Stupid users keep making mistakes when using this simple feature."

> "I built this really cool thing. How come nobody uses it?"

Human Error? No, it's BAD DESIGN.

You're not the user.

- System needs to communicate with users.
 - –Users are NOT LIKE YOU.

- The user is ALWAYS RIGHT.
 - -Usability problems are the designer's fault.



User experience models



Tom Hiskey / tomhiskey.co.uk

Technology-centric

User-centric

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Example from https://medium.com/@vinoth3.141/mental-model-ux-64e7a9d2a03f



how well users can use the system's functionality

Dimensions of Usability

• Learnability: is it easy to learn?

• Efficiency: once learned, is it fast to use?

• **Safety**: are errors few and recoverable?

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Learnability









Photo by Hyunjong Lee

Better Learnability?



Metaphor







Desktop metaphor



Trashcan metaphor

Consistency







Metaphorical: with the chosen interface metaphor







Input tex



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External Consistency: Design Guidelines

material.io/guidelines

"Develop a single underlying system that allows for a unified experience across platforms and device sizes."

Affordances



Team Player Award

Affordances





Feedback Matters

Wed 5/3	Thu 5/4	Fri 5/5	Sat 5/6
		Stay at Hyatt Regency De	nver at Colorado Convention Ci CHI
11–230p SEAS design GK	18:39 - 11:39 gk design meeting		
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e 38p - B 38p Improv 101 class			 ★ Tp - Practice plants ★ Sp - Run
E Flig	ht to Denver		
Fri, May Where	5, 3:28pm - 8:0 Boston BOS ma	7pm	

This event was automatically created from an email.

Free concert!

· Jazz Bands Spring Concert ·



Explanation of the system's model

Customers Who Shopped for Concept Board Game Also Shopped For











UI Techniques for Improving Efficiency

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danny glover	2,210,000 results		
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danny boy	3,240,000 results		
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Fitts's Law

• The time required to rapidly move to a target area is a function of the ratio between the **distance** to the target and the **width** of the target.



Mac vs Windows







Personalized Interfaces



http://www.eecs.harvard.edu/~kgajos/research/supple/



Dangerous Actions Should be Far Apart


Confirmation Dialogs: Good or Bad?



You are about to permanently delete this document.

□ I'm Sure. □ I'm Really Sure.



	Save Message	
? Message has not been sent.	Do you want to save the message in the	Drafts folder?
4		
4		



Confirmation Dialogs: Use for Rare, Crucial Actions



from github

Gmail Keyboard Shortcuts

Action	Shortcut
Move focus to toolbar	
Select conversation	x
Toggle star/rotate among superstars	s
Archive	e
Mute conversation	m
Report as spam	1
Delete	#
Reply	r
Reply in a new window	Shift + r
Reply all	а
Reply all in a new window	Shift + a
Forward	f
Forward in a new window	Shift + f

Error Messages



Your request is invalid.

Please correct the following:

• '4111 1111 1111 1111' is not a valid Visa Card Number. Please enter only the numbers

Make a complaint, give us a compliment or leave some feedback

java.net.URISyntaxException: Illegal character in query at index 113: http://eforms.exeter.gov.uk/Ef3/General.jsp?form=ComplaintsCompliments& page=CompConfPage&error=S&errortext=Failed to send Email: Email send error:



- be polite, non-blaming
- be precise
- speak user's language
- restate the input
- suggest how to fix

Intelligent Search

• Google Photos uses automated object recognition and tagging in their search interface.



Intelligent Search: cost of failure



http://mashable.com/2015/07/01/google-photos-black-people-gorillas/#v3QwN6bx1uqX

What Properties Does Good Software Have?

- Performance
- Cost
- Security
- Maintainability

- Size
- Reliability
- Standards
- Marketability

- Modularity
- Intelligence
- Usability

Designing Usable Software: User-Centered Approach



https://divergentmba.wordpress.com/2011/03/14/sketching-user-experiences-by-bill-buxton/



https://www.linkedin.com/pulse/bill-buxtons-design-funnel-frank-kloos

User-Centered Design Process



Needfinding



Team CCR, Stanford CS247, Winter 2009 | Stanford d.school

Popular Methods for Needfinding

- Interview & Observation
- Contextual Inquiry
 - In the user's actual work environment, discussing actual work products
 - Establish a master-apprentice relationship
- Participatory Design
 - Include a user directly on the design team
 - When domain expertise matters

Users	Needs	Ins	ights



Point of View

- Focus on ONE meaningful challenge.
- "a unique, concise reframing of the problem that is grounded in user needs and insights."

POV Example

- We met
 - a young millennial living in Daejeon.
- We were amazed to realize

 he protects & preserves clothing by not washing them often.
- It'd be game-changing to
 help him care for his clothes while keeping them clean.

- Tide Total Care keeps your colors like new.
- Protects Colors -- Conditions wash water to help prevent damage from chlorine and mineral deposits
- Maintains Finish -- Helps maintain the smoothness and overall texture of your clothes by reducing the friction between fibers that occurs during washing and daily wear.





"We met..."

"We were amazed to realize..."

"It'd be game-changing to..."

For each POV, come up with HMW questions

- How Might We...?
- "Might" helps you defer judgment.
- Go for quantity.
- Encourage wild, open ideas.
- **Too narrow**: "HMW create a cone to eat ice cream without dripping?"
- Too broad: "HMW redesign dessert?"
- **Proper**: "HMW redesign ice cream to be more portable?"

For each HMW, come up with solution ideas

Extreme in some way

- ultra-learnable
- ultra-efficient
- ultra-safe (preventing all errors)
- for illiterate users
- for blind users
- for children
- for the elderly
- for use while driving
- for other extreme users, context, situations

Storyboarding



Team FoodEx, Stanford CS147, Fall 2008



Prototype

"A representation of a design, made before the final solution exists." Moggridge, Designing Interactions



Prototyping a Computer Mouse

https://www.youtube.com/watch?v=0LQr1Flold0



- "Even best designers are wrong the first time."
- "Multiple prototypes matter so that you can compare and test your assumptions & hypotheses."
- "Offends engineers."

https://www.youtube.com/watch?v=0LQr1Flold0

Paper Prototyping

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Hanmail Paper Prototype

• What are some of the useful techniques?

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Why Paper Prototyping?

- Fast to build
- Easy to change
 - Even *during* a user test
 - No code investment
- Focuses attention on big picture
 - Designer doesn't waste time on details
 - Customer makes more creative suggestions, not nitpicking
- Nonprogrammers can help
 - Only kindergarten skills are required

Wizard of Oz Prototyping



Kramer's Moviefone



Wizard of Oz Prototyping

- Simulate machine behavior with human operators
- Make an interactive prototype without (much) code

- Rapidly test the prototype with people
 - Higher fidelity than paper
 - Lower cost than actual implementation
- Simulations might misrepresent, wizard training & fatigue

Video Prototyping



https://www.youtube.com/watch?v=tLBOZJ1M2J4
Video Prototyping

- Capture rich & real context, illustrate context of use
- Great communication tool, portable
- Connects UI and task
- Full usage scenario needs to be thought out
- Good storyboards & paper prototypes can yield quick videos
- Not interactive
- Can be caught up in detail

Prototype Tools

- Photoshop, Powerpoint
- Balsamiq Mockup, Marvel, InVision, proto.io, ...

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Team CCR, Stanford CS247 Winter 2009

Types of User Testing

• Formative evaluation

- Find problems during iterations
- Often in lab, with chosen tasks
- Qualitative observations (usability problems)

• Field study

- Find problems in context
- In real context, on real tasks
- Mostly qualitative observations
- Controlled experiment
 - Tests a hypothesis (e.g., interface X is faster than interface Y)
 - Often in lab, with chosen tasks
 - Mostly quantitative observations (time, error rate, satisfaction)

Presentation & Communication



Stanford CS147, Fall 2008 | HCI@KAIST 2017 Workshop



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13/07

Tasks

 Browse through contents, within and between categories

 View and like Jjals created by other Ducks Contraction of the local division of the loc

 Create and share Ujols with other Ducks

NEEDS

- User Needs & Problems From DP1
 - Interviewee C
 - Early 30s married man
 - Living in the United States of America.
 - He cooks breakfast every day together with his wife.
 - He wants to cook together with his wife efficiently.

Creativity & Challenge

CS374 Design Process Example

- [DP0] Week 03: Team Formation
- [DP1] Week 04: Needfinding
- [DP2] Week 06: Storyboards
- [DP3] Week 07: Paper Prototyping
- [DP4] Week 09: Lo-fi Prototyping
- [DP5] Week 11: Mid-fi Prototyping
- [DP6] Week 13: Hi-fi Prototyping
- [DP7] Week 14: User Testing
- [DP8] Week 16: Iteration & Wrap-up

Takeaway Messages

- It's not human error. It's bad design.
- Usability: learnable, efficient, & safe (≠ good-looking)
- User-centered design process

 Empathize → Define → Ideate → Prototype → Test
- Use different prototyping methods for your needs.
- Talk to users well before you have a final solution.
- Iterate. Multiple times.