CS449/649:
Human-Computer Interaction

Spring 2019

Lecture XIX-XXI

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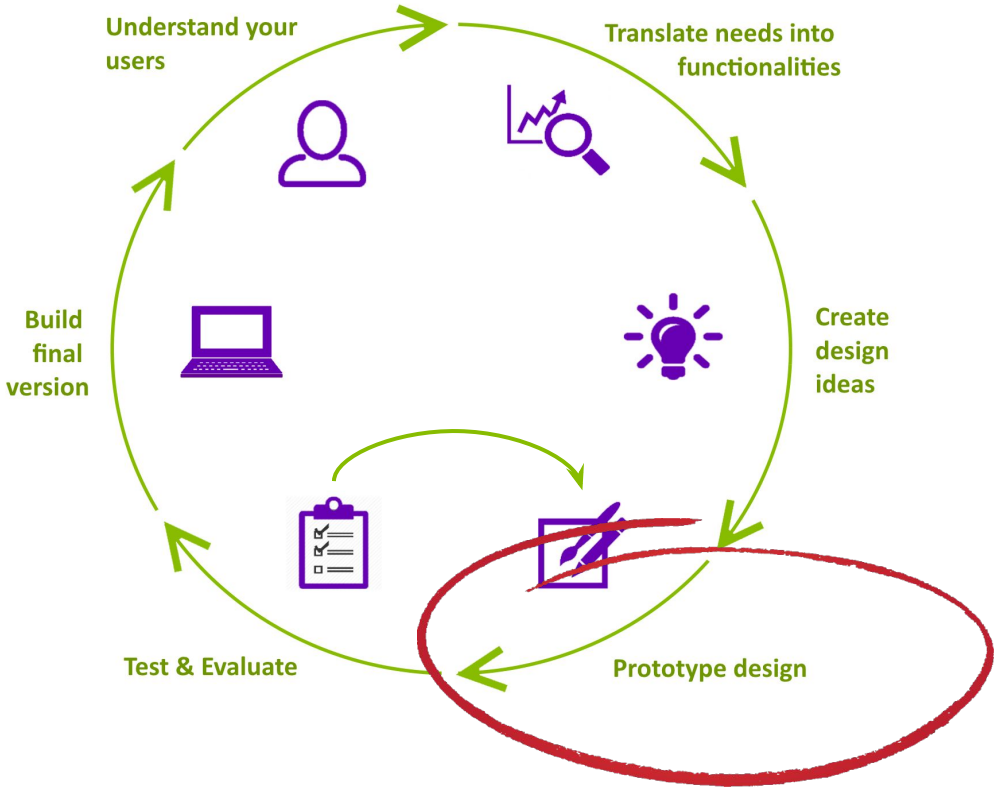

Understand your users
Translate needs into functionalities
Create design ideas
Prototype design
Test & Evaluate
Build final version

Create Design Ideas

Static representations of the product

- Sketches
- Wireframes
- Mockups

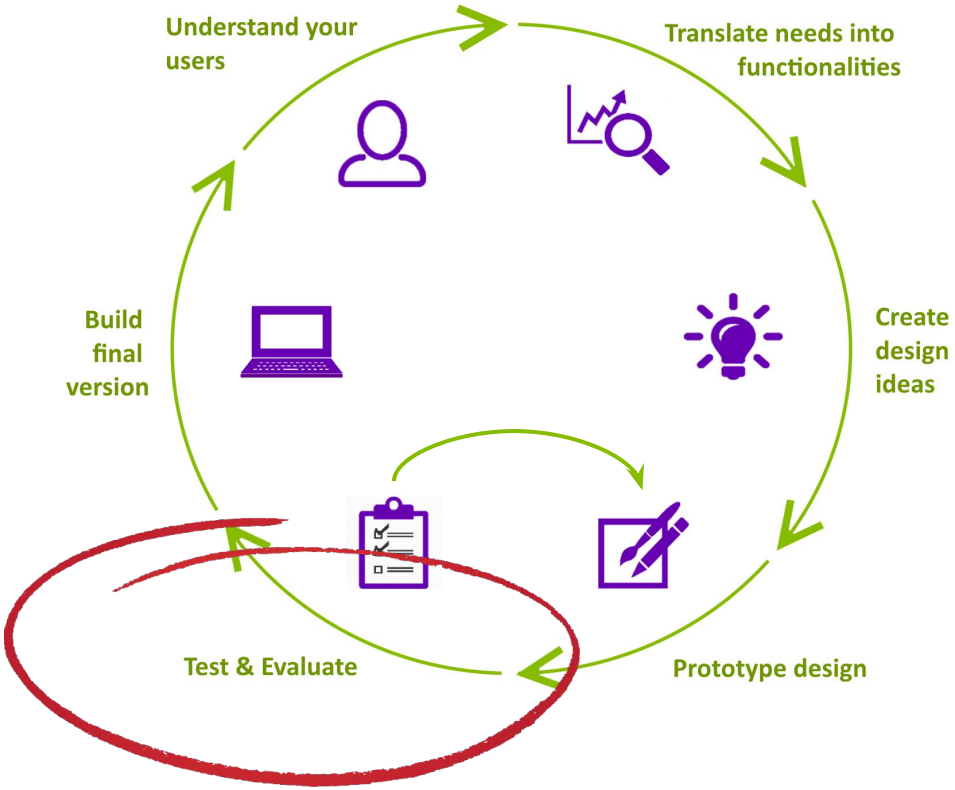
Visualization

Prototype Design

Prototypes
- interactive design model of the product

- Low-fidelity
- High-fidelity

Testing and Evaluation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Prototype Design

High Fidelity Prototype Evaluation

- Heuristic Evaluation
- Eye Tracking
- Focus Groups
- Tree Testing
- A/B Testing
- Walk Through
- Click Testing
- Keystroke Level Modeling
- Five Second Test

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	Walk Through	Five Second Test

Evaluated by **experts** (sometimes called “expert review”)

Following **prescribed user journeys** - set of specific, goal-based tasks

Assessment is based on **set of heuristics**

To conduct you need: 3-5 evaluators | List of tasks | List of heuristics | Form for notes

Report: Identify each **issue**, **prioritize** according to severity, relate each issue to a **screenshot**

Prototype Design

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Usability Heuristics for User Interface Design

Visibility of system status	Consistency and standards	Flexibility and efficiency of use	Help and documentation
Match between system and the real world	Error prevention	Recognition rather than recall	
User control and freedom	Help to recognize and recover from errors	Aesthetic and minimalist design	

Jakob Nielsen

Prototype Design

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Other sets of usability heuristics:

- Ben Shneiderman: *Eight Golden Rules of Interface Design*
- Jill Gerhardt-Powals: *10 Cognitive Engineering Principles*
- Bruce Tognazzini: *First principles of interaction design*
- William Lidwell, Kritina Holden, Jill Butler: *Universal principles of design*
- Connell & Hammond: *30 Usability Principles*
- Alan Cooper: About face 2.0: The essentials of interaction design
- Larry Constantine: *Software for use*

List made by Luke Chambers

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
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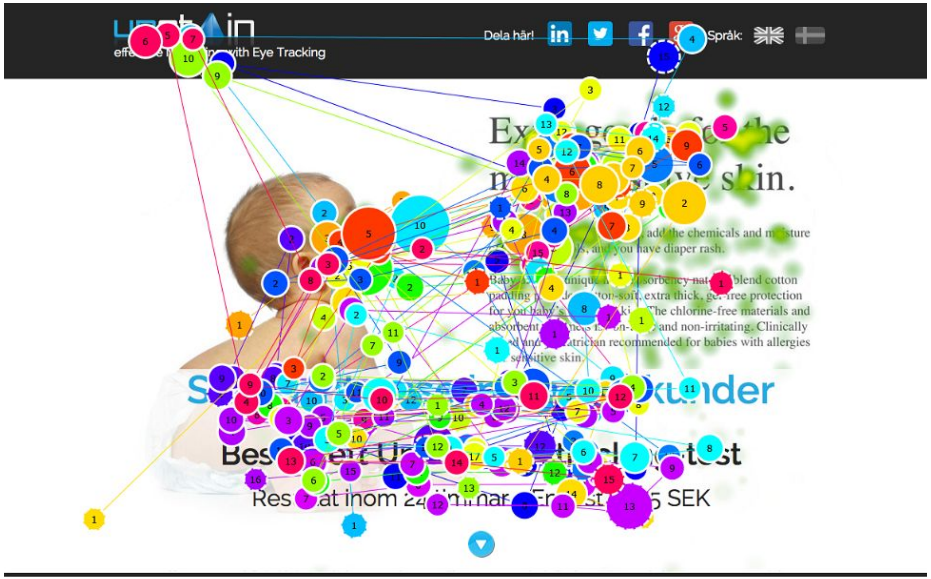
Detects person's fovea **fixations** and the **movements in between** fixations

Showing hard-to-articulate behaviour

Where participants expected to find certain elements	Whether participants noticed a particular element	Whether there are differences between user groups
What elements of the interface are distractive	Efficiency of a design guidances through a task	Which content participants read in details, scan or ignore

Reported as a **gaze plot** for one participants and as **heat maps** for study overall

Gaze Plot



Heat Map

Images: http://www.upstain.com/

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
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Focus Groups	Walk Through	Five Second Test

Typically lasts about two hours, 6-10 people

Type of an interview: Conversation based on **open-ended** questions and **story sharing**

Run by a **moderator** who maintains focus of the conversation according to a **discussion plan** and asks clarification questions

Explores users' **attitudes**, opinions and expectations as well as **general reaction** to a concept or prototype, all **self-reported**

Prototype Design

Heuristic Evaluation | Tree Testing | Click Testing

Eye Tracking | A/B Testing | Keystroke Level Modeling

Focus Groups | Walk Through | Five Second Test

Assessment of Information Architecture: Detects navigation structure problems

Items | Groups | Labels

~50 participants, ~10 tests per person, keep trees under several hundreds items (guidelines, not a rule)

Ask participants to find an item, use realistic task scenarios.

Measurements:

Task completion | Time per task | Number of attempts | Taken paths

Tip: Ask about confidence, associate confidence and completion

Prototype Design

Heuristic Evaluation | Tree Testing | Click Testing

Eye Tracking | **A/B Testing** | Keystroke Level Modeling

Focus Groups | Walk Through | Five Second Test

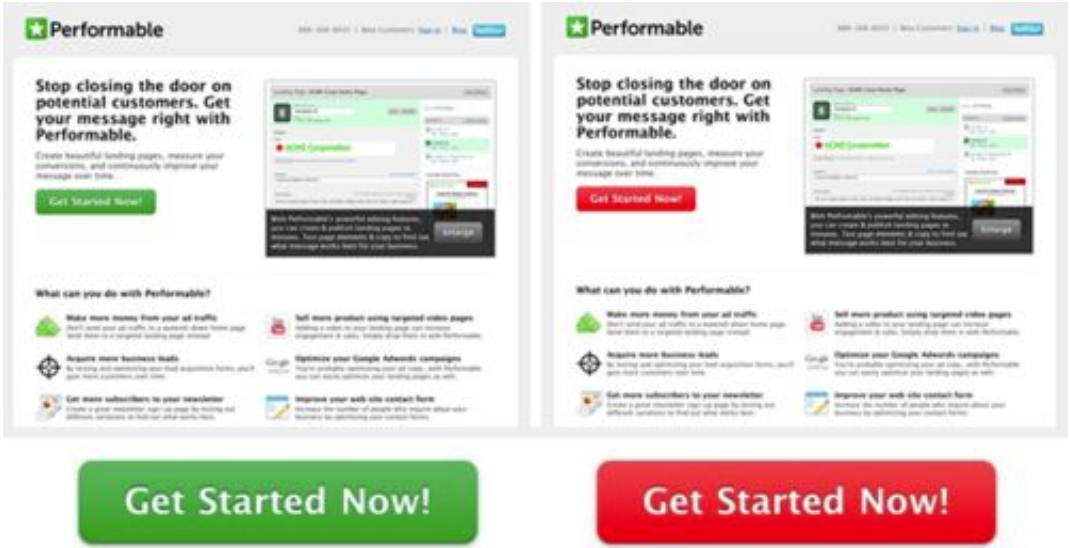
Quantitative comparison of **two versions** of an element by a defined **success metric**

- Trigger elements style
- Images and text content
- Headlines / descriptions
- Layout, style, color scheme
- Input forms

Split user traffic between two versions and run them **simultaneously**

Correlation does not mean causation. Variations should aim at addressing **actual causes** of an issue

Need to reach **statistical confidence**



[The Button Color A/B Test: Red Beats Green]

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	**Walk Through**	Five Second Test

Task-based approach to identify potential problems for **novice users**.

Users prefer to **learn by doing** rather than reading manuals

Create a **"successful story"** for each task and include **step-by-step** list of actions (for assessment).

During the walkthrough assess:

- **Does user attempt the expected step?**
- **Does user notice available correct option?**
- **Does user's expectation align with the outcome?**
- **Does user understand provided feedback?**

Wharton, C., Rieman, J., Lewis, C., Polson, P. "The cognitive walkthrough method: A practitioner's guide." Usability inspection methods. John Wiley & Sons, Inc., 1994

Prototype Design

Heuristic Evaluation	Tree Testing	**Click Testing**
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	Walk Through	Five Second Test

Examines what user **clicks on first** in order to complete a given task

Users are almost **twice as likely to succeed** in a task if their first click was down the right path

To conduct you need a **list of tasks** (for users) and **correct paths** (for researchers)

- Track each click
- Track time to make first click

Create a **satisfaction / confidence scale** and **difficulty scale**, ask participants to assess each task

Create **heatmaps** to visualize study results and analyze clusters

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	**Keystroke Level Modeling**
Focus Groups	Walk Through	Five Second Test

Predicts a **skilled** user's error-free task time (within 10-20% of the actual time), estimates UI **efficiency**

Keystroke 0.8sec | Pointing 1.1sec | Homing 0.4sec | Drawing | Mental Operator 1.35 sec

KLM was proposed by Stuart K. Card, Thomas P. Moran and Allen Newell. A **GOMS** model technique

TLM (touch level model) was proposed by Andrew D. Rice and Jonathan W. Lartigue

Added **operators for touchscreen** interactions

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	Walk Through	**Five Second Test**

Tests **first impression** of a page / screen and its **communicative ability** regarding the main purpose

Participant is given context and exposed to an **image of a page for 5 seconds**, then image is removed

- What participant can recall
- What can they do on the page
- What caught their attention

Best on pages designed with a single primary purpose

- Is critical content clear?
- Is purpose clear?
- Are options obvious?
- General impression

Prototype Design

High Fidelity Prototype Evaluation

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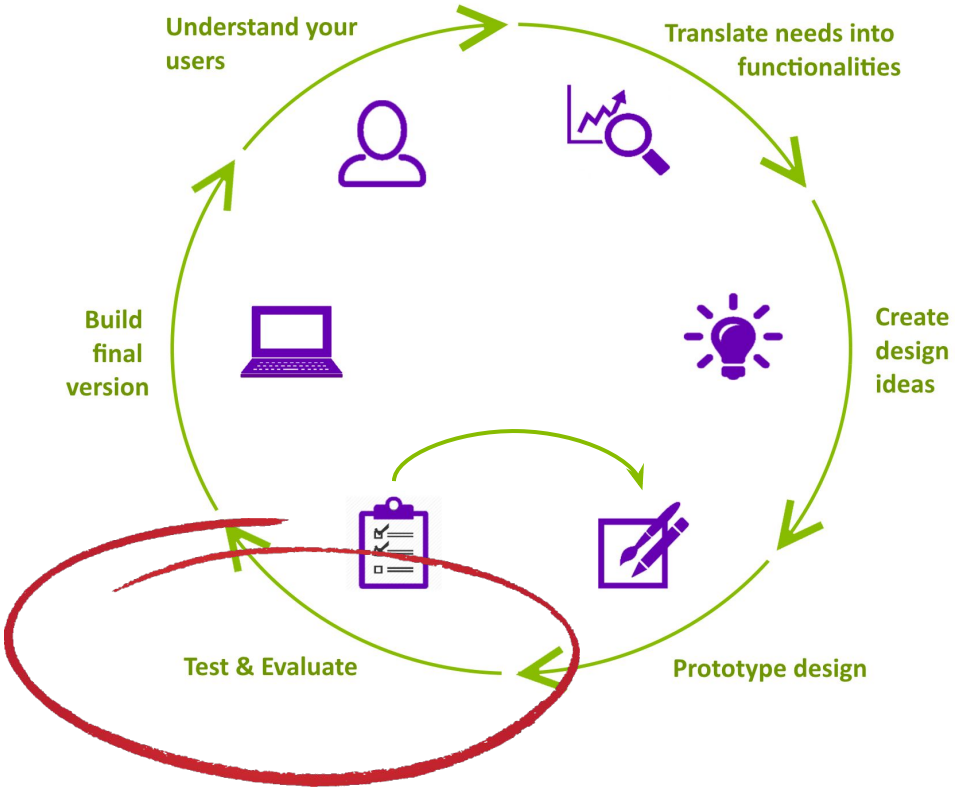
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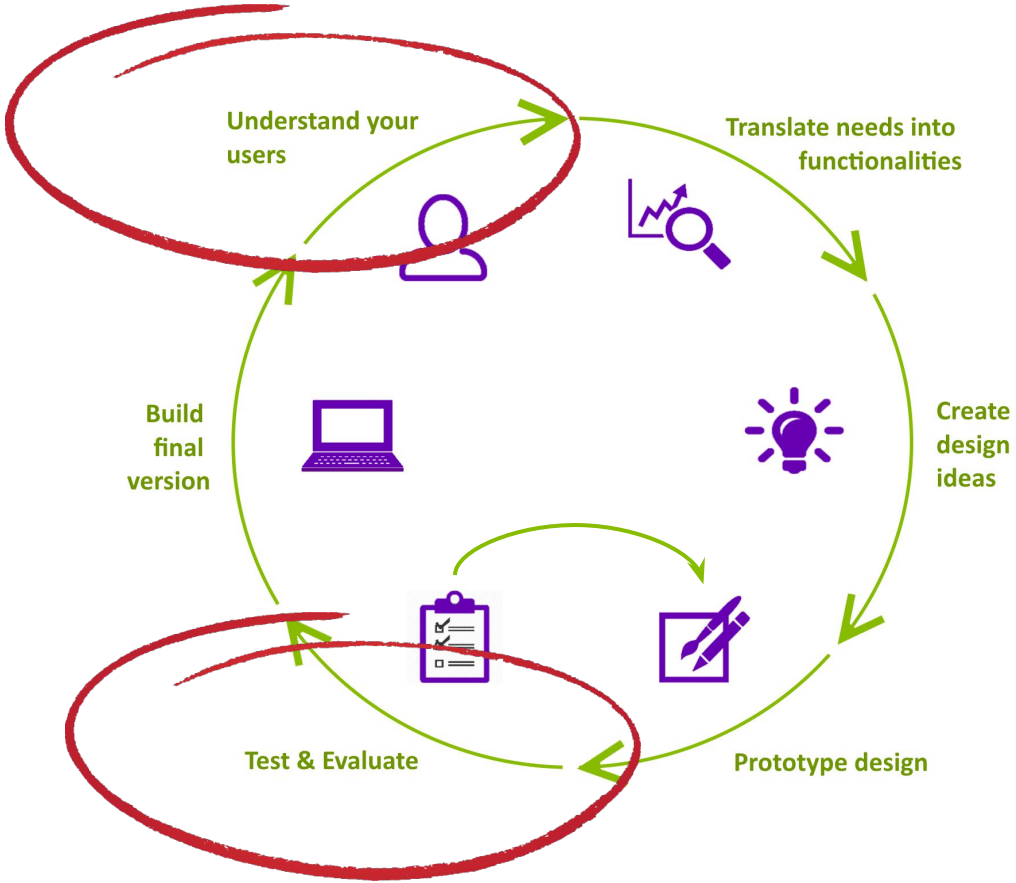
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Understand Your Users: Exploratory Studies

There is a product

- **True-Intent Studies**
- Remote Unmoderated Usability Studies
- Intercept Surveys
- Clickstream Analysis

- Ask about user's goals and/or intentions when they entering the service
- Track their subsequent behavior
- Ask if they were successful in achieving their goal

click me

- Questionnaires
- Observations
- Interviews

- Diary/Camera Studies
- Participatory Design

- Ethnographic Field Studies
- Contextual inquiry

Understand Your Users: Exploratory Studies

There is a product

- True-Intent Studies
- **Remote Unmoderated Usability Studies**
- Intercept Surveys
- Clickstream Analysis

- Quantitative/qualitative automated method
- Captures **behaviors** (through software on participant device) and **attitudes** (through embedded survey questions)
- Usually includes goals/scenarios

click me

- Questionnaires
- Observations
- Interviews

- Diary/Camera Studies
- Participatory Design

- Ethnographic Field Studies
- Contextual inquiry

Understand Your Users: Exploratory Studies

There is a product

- True-Intent Studies
- Remote Unmoderated Usability Studies
- **Intercept Surveys**
- Clickstream Analysis

- A survey triggered during the use of a product
- Usually very short

click me

- Questionnaires
- Observations
- Interviews

- Diary/Camera Studies
- Participatory Design

- Ethnographic Field Studies
- Contextual inquiry

Understand Your Users: Exploratory Studies

There is a product

- True-Intent Studies
- Remote Unmoderated Usability Studies
- Intercept Surveys
- **Clickstream Analysis**

- Analyzing the record of elements that users clicks on/views, as they use a software product
- Requires proper software instruments / tools for telemetry data collection enabled

click me

- Questionnaires
- Observations
- Interviews

- Diary/Camera Studies
- Participatory Design

- Ethnographic Field Studies
- Contextual inquiry