CS449/649:
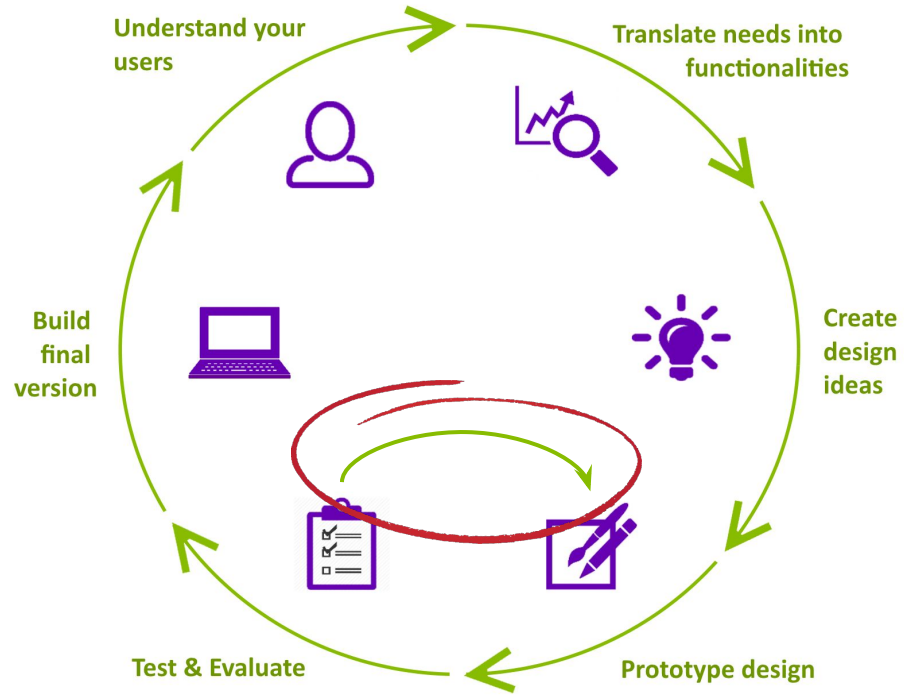# Human-Computer Interaction

Winter 2018
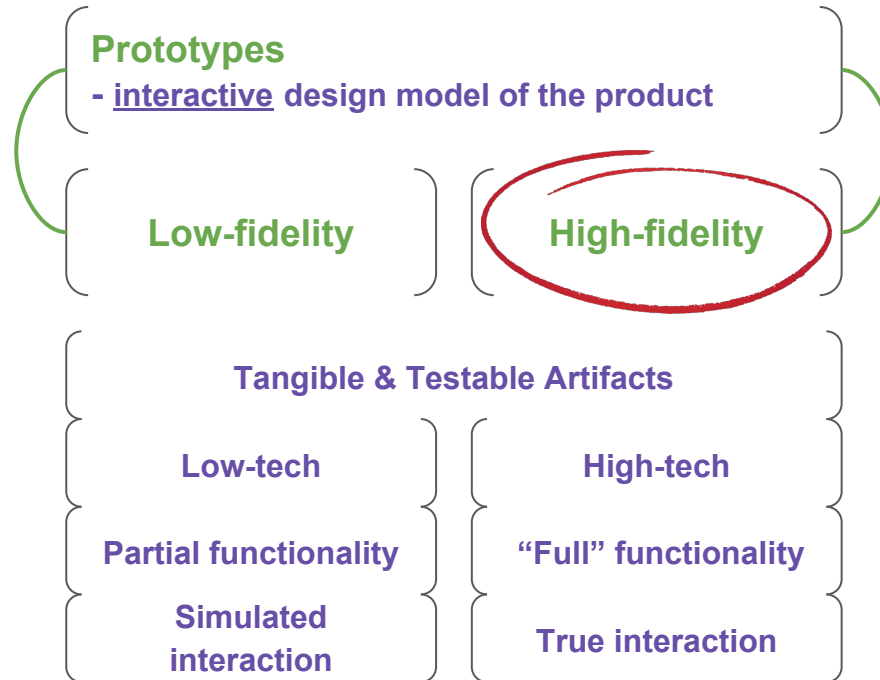
Lecture XII

Anastasia Kuzminykh

Prototype Design

Prototypes
- <u>interactive</u> design model of the product

Low-fidelity

High-fidelity

Tangible & Testable Artifacts

Low-tech	High-tech
Partial functionality	"Full" functionality
Simulated interaction	True interaction

Prototype Design

Designing User Interface

Elements & characteristics	Elements composition	Spatial organisation	Information processing	**Interaction**
Color Perception	The Von Restorff effect	Rule of Thirds	Dual-coding theory	**Manipulation**
Shape Perception	Gestalt Principles	Types of vision	Patterns matching	**Locomotion**
Visceral Reaction Triggers	Fitts' Law	Free space	Social & Emotional info	**Conversation**

Elements &
characteristics

Elements
composition

Spatial
organisation

Information
processing

Interaction

Types of Interaction
Terry Winograd
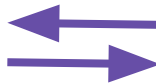
Manipulation   Locomotion   Conversation

"Back-end"   →   Mental Model
                    ←

Technology based   Metaphorical

Limited by device   Reflected in vocabulary

Often hidden mechanisms   Dependent on embodiment

Prototype Design

Designing User Interface

Elements & characteristics	Elements composition	Spatial organisation	Information processing	Interaction
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Prototype Design

High Fidelity Prototype Evaluation

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

Heuristic Evaluation

Tree Testing

Click Testing

Eye Tracking

A/B Testing

Keystroke Level Modeling

Focus Groups

Walk Through

Five Second Test

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

Heuristic Evaluation

Tree Testing

Click Testing

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A/B Testing

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Focus Groups

Walk Through

Five Second Test

Other sets of usability heuristics:

Ben Shneiderman: *Eight Golden Rules of Interface Design*

Bruce Tognazzini: *First principles of interaction design*

Alan Cooper: About face 2.0: The essentials of interaction design

Jill Gerhardt-Powals: *10 Cognitive Engineering Principles*

William Lidwell, Kritina Holden, Jill Butler: *Universal principles of design*

Larry Constantine: *Software for use*

Connell & Hammond: *30 Usability Principles*

List made by Luke Chambers

Prototype Design

Heuristic Evaluation

Eye Tracking

Focus Groups

Tree Testing

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Walk Through

Click Testing

Keystroke Level Modeling

Five Second Test

Evaluated by **experts** (sometimes called "expert review")

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

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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 **screenshot**

Prototype Design

Heuristic Evaluation

Eye Tracking

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Walk Through

Click Testing

Keystroke Level Modeling

Five Second Test

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

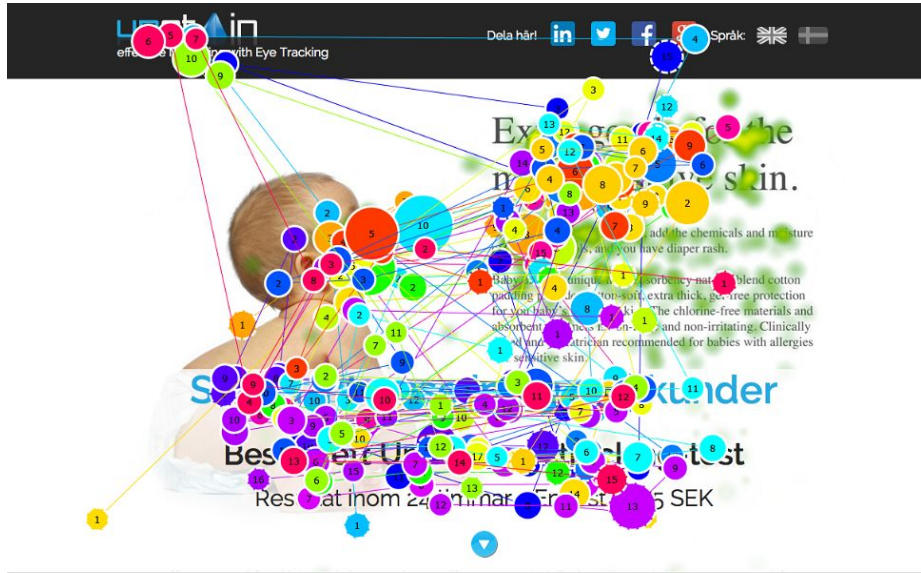Whether there are differences between user groups

What elements of the interface are distractive

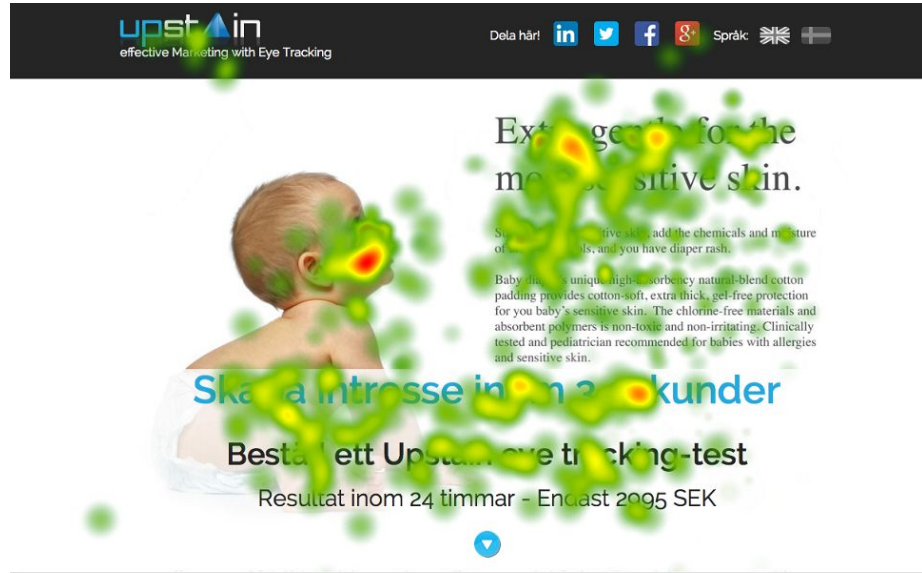Efficiency of a design guidances through a task

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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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

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Walk Through

Five Second Test
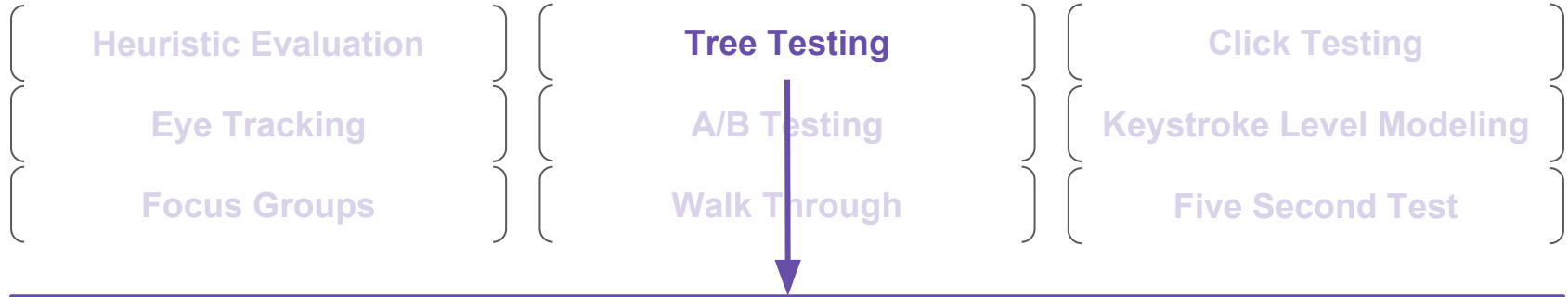
Assessment of Information Architecture: Detects navigation structure problems

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

Shop by
Department ▾   Your Store   Deals Store   Gift Cards   Sell   Help

Appstore for Android › Shop over 375,000 apps and games	**Home**	**Pet Supplies**
Books ›	All Home	All Pets
Music ›	Furniture	Dogs
Prime Photos & Drive › Unlimited Storage	Home Décor	Cats
Movies & TV Shows ›	Arts, Crafts & Sewing	
Kindle ›	Bedding	
Electronics ›	Vacuums & Floorcare	
Software ›	Heating & Cooling	
Video Games ›	Storage & Organization	
Home, Kitchen, & Pets ›	**Kitchen & Dining**	
Tools, Patio & Garden ›	All Kitchen	
Health, Beauty, & Grocery ›	Small Appliances	
Toys & Baby ›	Utensils, Gadgets & Barware	
Clothing, Shoes & Jewelry ›	Cookware	
Sports & Outdoors ›		
Automotive & Industrial ›		
Boutiques Francophones ›		
Full Store Directory		

Shop by
Department ▾   Your

Home   Best Sellers   Kitchen &

Show results for

‹ Home & Kitchen
Arts, Crafts & Sewing
Art Supplies (34,581)
Beading & Jewelry Making (45,257)
Cases & Transport (1,396)
Craft Supplies (61,817)
Fabric (7,779)
Fabric Care (44)
Fabric Painting & Dyeing (1,165)
Furniture & Accessories (3,547)
Knitting & Crochet (5,200)
Metalwork (9,056)
Needlework (8,267)
Organization & Storage (2,577)
Photography (90)
Printmaking (2,414)
Safety & Cleaning (314)
Scrapbooking (41,915)
Sewing (34,595)

Home   Best Sellers   Kitchen

1-24 of 62,157 results for **Home**

Show results for

‹ Home & Kitchen
‹ Arts, Crafts & Sewing
Craft Supplies
Adhesives (3,449)
Basket Making (242)
Candle Making (771)
Ceramics & Pottery (1,063)
Cutting Tools (2,138)
Doll Making (884)
Floral Arranging (547)
Framing Materials (866)
Glitter (701)
Gold Leaf (135)
Leathercraft (2,851)
Mosaic Making (137)
Paper & Paper Crafts (11,756)
Purse Making (215)
Rivets (625)
Rug Making & Latch Hook (200)
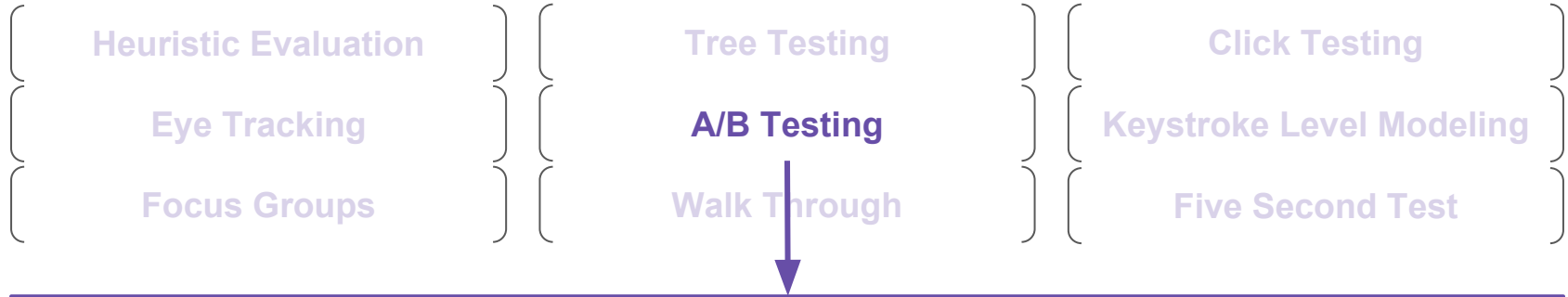Sculpture Supplies (703)
Soap Making (7,849)
Stained Glass Making (382)
Woodcrafts (1,152)

Prototype Design

Heuristic Evaluation

Eye Tracking

Focus Groups

Tree Testing

A/B Testing

Walk Through

Click Testing

Keystroke Level Modeling

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

Prototype Design

Heuristic Evaluation

Eye Tracking

Focus Groups

Tree Testing

A/B Testing

Walk Through

Click Testing

Keystroke Level Modeling

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

Eye Tracking

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Tree Testing

A/B Testing

Walk Through

Click Testing

Keystroke Level Modeling

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