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NTNU

Introduction to User-Centered Design

Lecture 10 – Evaluation part 2

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Today's lecture

Goals Lecture 10

NTNU

What will you learn?

You will learn about evaluating your design

- More evaluation techniques
- Course Summery

Outline of this lecture

Goals Lecture 10

NTNU

Part 1: More evaluation techniques

- Heuristic Evaluation
- Cognitive walkthrough
- Eyetracking and other techniques

Part 2: How to improve your designs

- Design principles
- Guidlines

Part 3: Course Summery

- Summery
- Terms/ concepts /procedure
- Exam info

Part 1

1 More evaluation techniques

Expert evaluation

expert evaluation methods

Also known as inspections or discount techniques?

A set of evaluation methods that uses experts (design, usability, interaction design experts) instead of end-users to evaluate a design

- Heuristic evaluation
- Cognitive walkthrough

Expert evaluation

expert evaluation methods

Expert evaluations are no substitute for testing with real target users

but

they can be effective to identify major usability (or other) issues

Pros

- They can be relatively quick compared to typical usability evaluations
- Can be less expensive if experts are available

Cons

- Doesn’t uncover all the issues
- Experts are different from target users so they can introduce bias and overlook important issues

Heuristic evaluation

expert evaluation methods

It involves a number of expert evaluators examining an interface and judging its compliance with a set of recognized principles (the "heuristics").

Heuristic = guideline or rule of thumb (a well-known design principle)

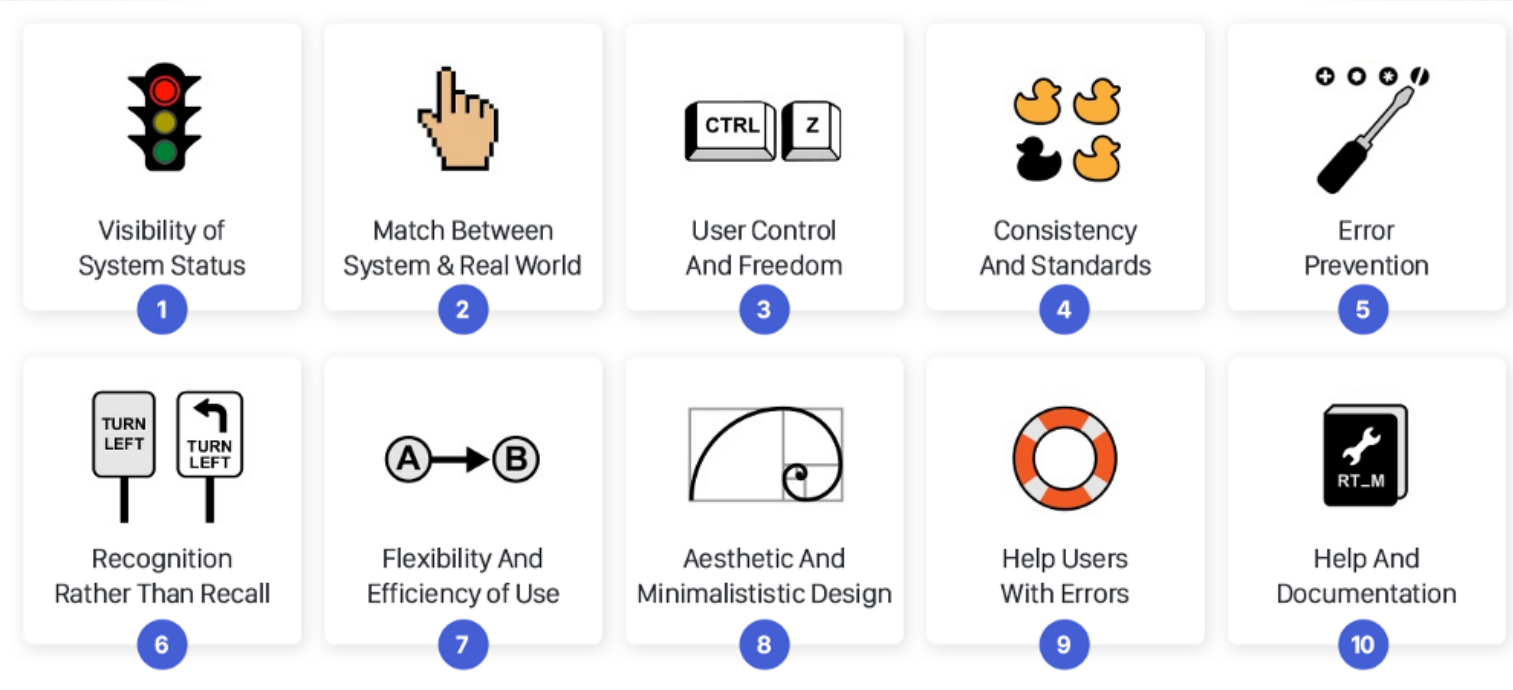
There are a variety of heuristics but for usability the most known are Nielsen and Molich's 10 User Interface Design Heuristics

https://www.interaction-design.org/literature/topics/heuristic-evaluation

Heuristic Evaluation

expert evaluation methods

Jacob Nielsen's 10 Heuristics



Heuristics

expert evaluation methods

Where do heuristics come from

In most cases it come from many years of experience with evaluation

E.g.,

- Nielsen Norman group had conducted in hundreds of usability reviews and decided to cluster frequently occurring usability issues they identified into clusters.
- Then they created guidelines for how to overcome those (with descriptions, examples etc.)
- Many in industry and academia have used and validated thoe heuristics over the years

Let’s look at Jakob Nielsen's 10 heuristics

https://www.nngroup.com/articles/ten-usability-heuristics/

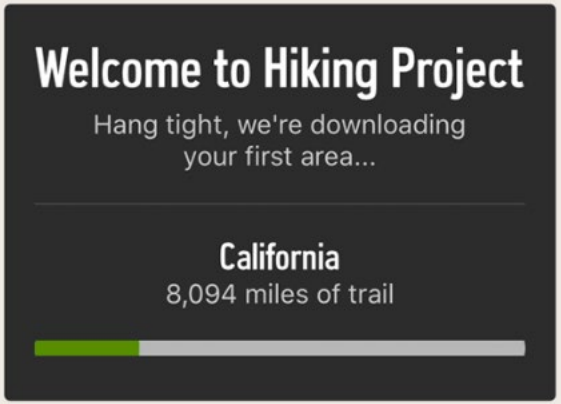
#1 Visibility of system status

expert evaluation methods

The design should always keep users informed about what is going on, through appropriate feedback within a reasonable amount of time

Tips

- Communicate clearly to users what the system's state is — no action with consequences to users should be taken without informing them.
- Present feedback to the user as quickly as possible (ideally, immediately)



More info about heuristic #1

Video link

#2 Match between system and the real world

expert evaluation methods

The design should speak the users' language. Use words, phrases, and concepts familiar to the user, rather than internal jargon. Follow real-world conventions, making information appear in a natural and logical order.

Tips

- Ensure users can understand meaning without having to go look up a word’s definition.
- Never assume your understanding of words or concepts will match those of your users.

[More info about heuristic #2]

[Video link]

Example of Usability Heuristic #2:
When stovetop controls match the layout of heating elements, users can quickly understand which control maps to which heating element.

#3 User control and freedom

expert evaluation methods

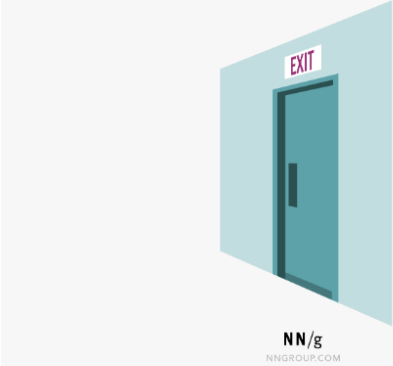
Users often perform actions by mistake. They need a clearly marked "emergency exit" to leave the unwanted action without having to go through an extended process.

Tips

- Support Undo and Redo.
- Show a clear way to exit the current interaction, like a Cancel button.
- Make sure the exit is clearly labelled and discoverable.

[More info about heuristic #3]

[Video link]



Example of Usability Heuristic #3:
Digital spaces need quick "emergency exits," just like physical spaces do.

#4 Consistency and standards

expert evaluation methods

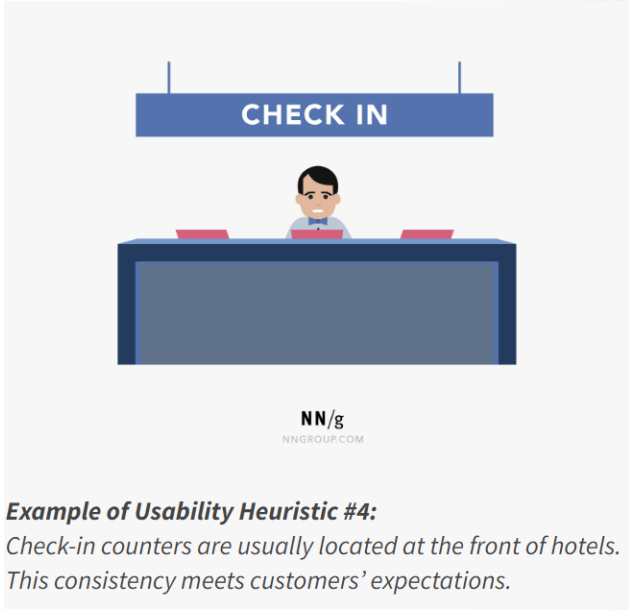
Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform and industry conventions.

Tips

- Improve learnability by maintaining both types of consistency: **internal** and **external**.
- Maintain consistency within a single product or a family of products (internal consistency).
- Follow established industry conventions (external consistency).

More info about heuristic #4

Video link



Example of Usability Heuristic #4:
Check-in counters are usually located at the front of hotels. This consistency meets customers' expectations.

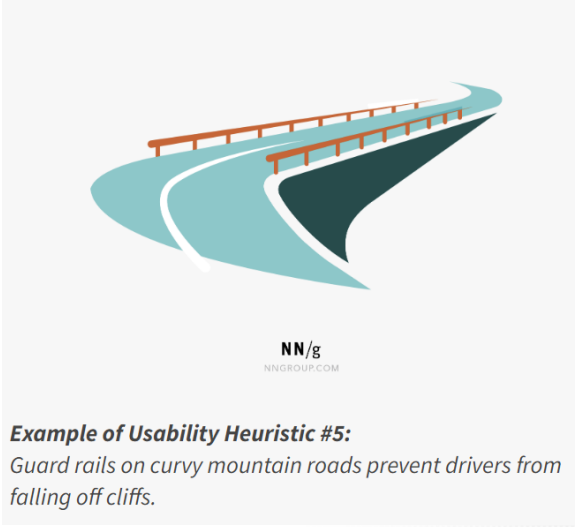
#5 Error prevention

expert evaluation methods

Good designs prevent problems from occurring rather than recovering from it. Either eliminate error-prone conditions, or check for them and present users with a confirmation option before they commit to the action.

Tips

- Prioritize your effort: Prevent high-cost errors first, then little frustrations.
- Avoid slips by providing helpful constraints and good defaults.
- Prevent mistakes by removing memory burdens, supporting undo, and warning your users..



Example of Usability Heuristic #5:
Guard rails on curvy mountain roads prevent drivers from falling off cliffs.

More info about heuristic #5

Video link

#6 Recognition rather than recall

expert evaluation methods

Minimize the user's memory load by making elements, actions, and options visible. The user should not have to remember information from one part of the interface to another

Tips

- Let people recognize information in the interface, rather than having to remember (“recall”) it.
- Offer help in context, instead of giving users a long tutorial to memorize.
- Reduce the information that users have to remember.

[More info about heuristic #6]

[Video link]

Example of Usability Heuristic #6:
It’s easier for most people to recognize the capitals of countries, instead of having to remember them. People are more likely to correctly answer the question Is Lisbon the capital of Portugal? *rather than* What’s the capital of Portugal?

#7 Flexibility and efficiency of use

expert evaluation methods

Shortcuts — hidden from novice users — may speed up the interaction for the expert user such that the design can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Tips

- Provide accelerators like keyboard shortcuts and touch gestures.

- Allow for customization, so users can make selections about how they want the product to work..

Example of Usability Heuristic #7:
Regular routes are listed on maps, but locals with more knowledge of the area can take shortcuts.

More info about heuristic #7

Video link

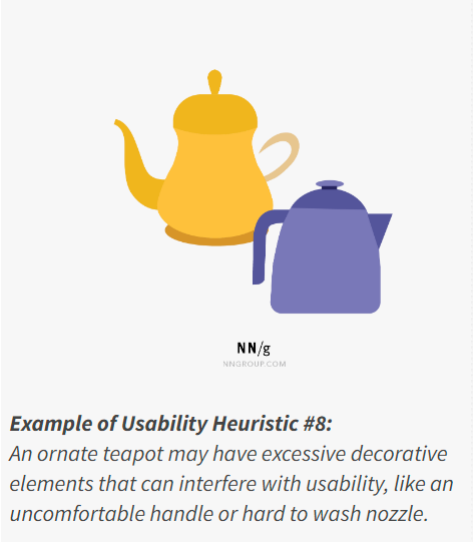
#8 Aesthetic and minimalist design

expert evaluation methods

Interfaces should not contain information that is irrelevant or rarely needed. Every extra unit of information in an interface competes with the relevant units of information and diminishes their relative visibility.

Tips

- Keep the content and visual design of UI focused on the essentials.
- Don't let unnecessary elements distract users from the information they really need.
- Prioritize the content and features to support primary goals.



Example of Usability Heuristic #8:
An ornate teapot may have excessive decorative elements that can interfere with usability, like an uncomfortable handle or hard to wash nozzle.

More info about heuristic #8

Video link

#9 Help users recognize, diagnose, and recover from errors

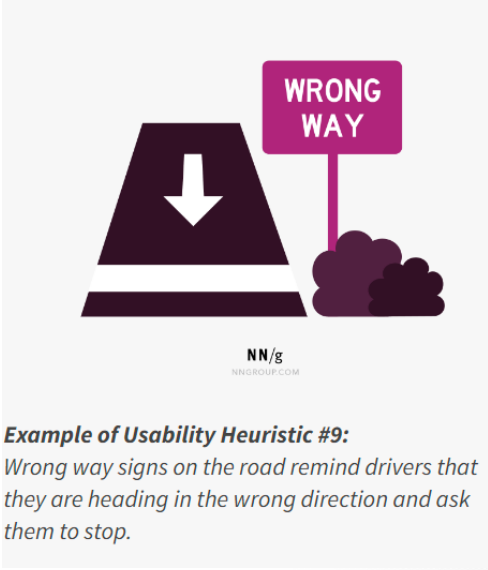
expert evaluation methods

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

Tips

- Use traditional error message visuals, like bold, red text.
- Tell users what went wrong in language they will understand — avoid technical jargon.
- Offer users a solution, like a shortcut that can solve the error immediately

Video link



Example of Usability Heuristic #9:
Wrong way signs on the road remind drivers that they are heading in the wrong direction and ask them to stop.

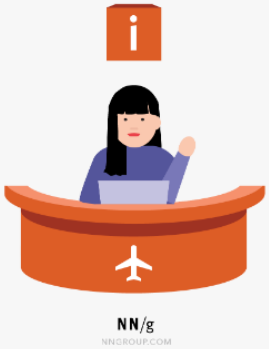
#10 Help and documentation

expert evaluation methods

It’s best if the system doesn’t need any additional explanation. However, it may be necessary to provide documentation to help users understand how to complete their tasks.

Tips

- Ensure that the help documentation is easy to search.
- Whenever possible, present the documentation in context right at the moment that the user requires it.
- List concrete steps to be carried out.



Example of Usability Heuristic #10:
Information kiosks at airports are easily recognizable and solve customers’ problems in context and immediately.

[More info about heuristic #10]

[Video link]

How to conduct heuristic evaluation

expert evaluation methods

Steps

1. **Know what to test and how** – Whether it's the entire product or one procedure, clearly define the parameters of what to test and the objective.

2. **Know your users and have clear definitions of the target audience's goals, contexts, etc. User personas** can help evaluators see things from the users' perspectives.

3. **Select 3–5 evaluators**, ensuring their expertise in usability *and* the relevant industry.

4. **Define the heuristics** (around 5–10) – This will depend on the nature of the system/product/design. Consider adopting/adapting the Nielsen-Molich heuristics and/or using/defining others.

https://www.interaction-design.org/literature/topics/heuristic-evaluation

How to conduct heuristic evaluation

expert evaluation methods

Steps

5. **Brief evaluators on what to cover in a selection of tasks**, suggesting a scale of severity codes to flag issues.

6. **1st Walkthrough** – Have evaluators use the product freely to **identify** elements to analyze.

7. **2nd Walkthrough** – Evaluators **scrutinize** individual elements according to the heuristics. They also examine how these fit into the overall design, clearly recording all issues encountered.

8. **Debrief evaluators** in a session so they can collate results for analysis and suggest fixes.

https://www.interaction-design.org/literature/topics/heuristic-evaluation

Practical Issues

expert evaluation methods

How many experts?

According to Nielsen, three to five evaluators are recommended

Having more than five evaluators does not necessarily increase the number of insights, which may add more cost than benefit to the overall evaluation.

Individual or Group Process?

The heuristic evaluation must start individually before aggregating results

This can reduce group confirmation bias. The evaluator should examine the prototype independently before entering group discussions to accumulate insights

Who are the experts?

For usability heuristics, it should be done by experienced people in usability evaluation

If you do not have access to those, you can train yourself or others in the heuristics but be careful about the results

Is heuristic evaluation only about usability?

expert evaluation methods

No **There are more sets of heuristics.**

Examples

Ben Shneiderman's **Eight Golden Rules of Interface Design**
Older than Nielsen, heuristics also focused on usability

Jill Gerhardt-Powals' **10 Cognitive Engineering Principles**
Jill Gerhardt-Powals developed a set of cognitive engineering principles for enhancing human-computer performance.

Steve Krug **The 7 key elements of good User Experience (UX) design**
Focused on UX but much more generic

Pros and Cons

expert evaluation methods

Pros and Cons of Heuristic Evaluations

Pros	Cons
Evaluators can focus directly on specific issues.	Evaluators can mark "issues" that aren't actually usability problems.
Evaluators can pinpoint faults with individual elements early on and determine their impact on overall UX.	You have to choose exactly the right heuristics (and number of them) to make sure evaluators find *all* usability issues.
Compared with testing on users, you can get feedback without the ethical and practical dimensions and costs.	It can be hard and/or expensive to find evaluators who are experts in a certain industry (e.g., banking) *and* usability.
You can combine it with usability testing.	As you need *several* expert evaluators, you may find it easier (and cheaper) to stick to usability testing.
With the right heuristics, evaluators can help flag detailed issues and lead the way to optimal solutions.	It's subjective: findings can lack proof and be biased, and solutions don't arise automatically.

Cognitive walkthrough

https://www.nngroup.com/articles/ten-usability-heuristics/

Cognitive Walkthroughs

expert evaluation methods

A cognitive walkthrough is :

a task-based usability-inspection method that involves a team of reviewers walking through each step of a task flow and answering a set of prescribed questions to identify those aspects of the interface that could be challenging to new users.

It is a task-specific approach to usability

in contrast to heuristic evaluation which is a more holistic usability inspection

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Cognitive Walkthroughs

expert evaluation methods

Questions

1. **Will users try to achieve the right result?**
   In other words, do users understand that the action (step) at hand is needed to reach their larger goal?

2. **Will users notice that the correct action is available?**
   In other words, is the interactive element that achieves the step visible or easily findable?

3. **Will users associate the correct action with the result they're trying to achieve?**
   Perhaps the right button is visible, but will users understand the label and will they know to engage with it?

4. **After the action is performed, will users see that progress is made toward the goal?**
   Based on what occurs after the action is taken, will users know that this action was correct and helped them make progress toward their larger goal?

https://www.nngroup.com/articles/cognitive-walkthroughs/

Part 2

2 How to improve your designs

How to improve your designs

How can you find ways to improve your designs?

- Heuristics are not only for evaluation but are also guidelines for design

- Design principles
- Interaction design principles
- **Look at other designs** (external consistency)
- **Look at platform-specific guidelines/principles** (e.g. mobile, web,desctop conversational interfaces)

Gestalt Laws of Perception

How to improve your designs

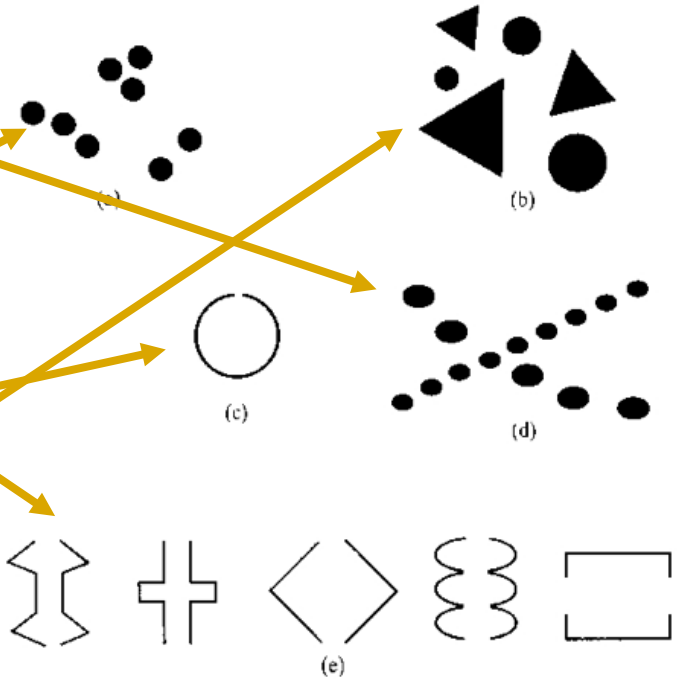
continuity
seen as two lines of dots crossing
rather than random set of dots

Symmetry
regions bounded by symmetrical borders
perceived as coherent figure

Proximity
dots appear as groups
rather than random clusters

Closure
missing parts filled in
to appear whole

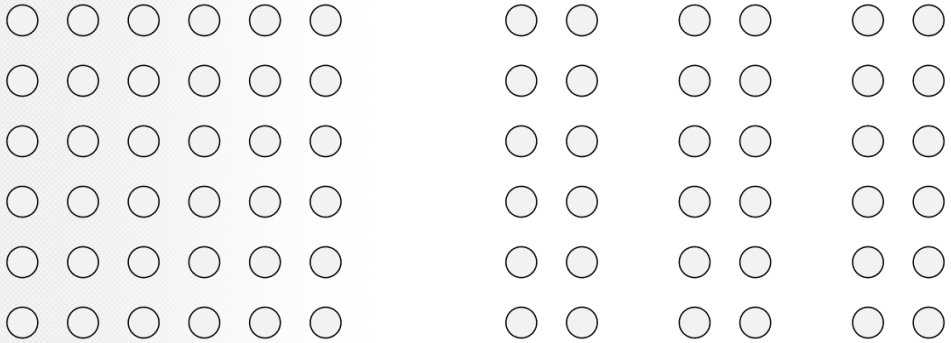
similarity
elements of same shape
seen as belonging together



Preece et al., 1994

Law of Proximity

Cognitive processes



a little white space makes you perceive columns

What does this say?

Cognitive processes

- Facebook posting:

TH15M35546353RV35T0PR0V3H0WTH3P0W3R0F0UR M1ND5C4NM4K3Y0UD04M4Z1NGTH1N65!3V3NR34LLY 1MPR3551V3TH1N651NF4CT!

1NTH38361NN1NG1TWA5H4RD8UTNOW0NTH15LIN3Y0UR M1ND15R34D1N61T4UT0M4T1C4LLYW1TH0UT3V3N TH1NK1N6480UT1T.

83PR0UD0NLYC34RT41NP30PL3C4NR3ADTH15R3P05T1FU C4N :-)

- Does this help?:

TH15 M355463 53RV35 T0 PR0V3 H0W TH3 P0W3R 0F 0UR M1ND5 C4N M4K3 Y0U D0 4M4Z1NG TH1N65! 3V3N R34LLY 1MPR3551V3 TH1N65 1NF4CT!

1N TH3 8361NN1NG 1T WA5 H4RD - 8UT NOW, 0N TH15 LIN3 Y0UR M1ND 15 R34D1N6 1T 4UT0M4T1C4LLY W1TH 0UT 3V3N TH1NK1N6 480UT 1T.

83 PR0UD! 0NLY C34RT41N P30PL3 C4N R3AD TH15. R3 P05T 1F U C4N :-)

What is Layout

Overview

Layout is the visual organization and composition of the User interface

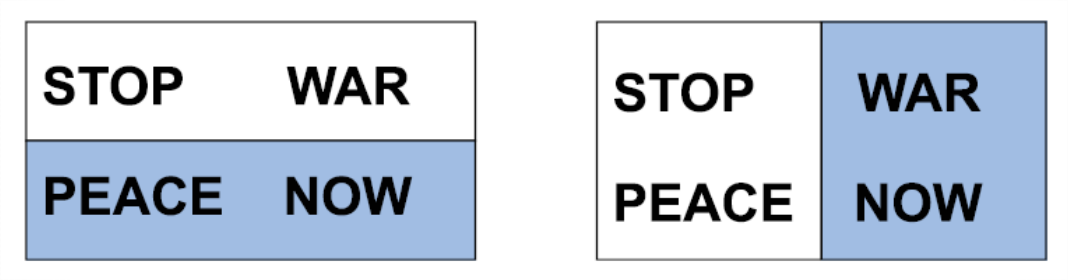
To create a layout means to use **type** and **graphics** and **space** to create visual flow as well as voice and style

Layout

introduction

From previous activities you know what your UI has to contain

Layout is about how you will present it



Layout elements

What are the elements of layout?

Medium

can be paper, book, magazine,
website and mobile app, t-shirt…

Constraints and Capabilities

Dimensions, resolution, edges, sides, center, weight, proportions, texture, size, shape, texture, orientation

Content

- text
- images
- logos
- navigation items
- buttons
- links
- forms
- input fields
- documents
- lists
- tables
- shapes
- …

Layout elements

What are the elements of layout?

Visual design elements

Lines

Shapes

Direction

Size

Color

Texture

Composition Principles

Alignment

Repetition (consistency)

contrast

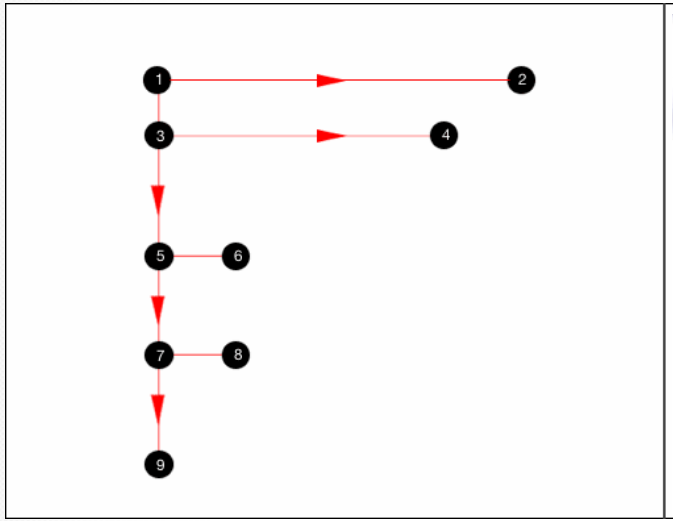
proximity

Balance

Eye Movement

How they eye moves over layout

F-pattern



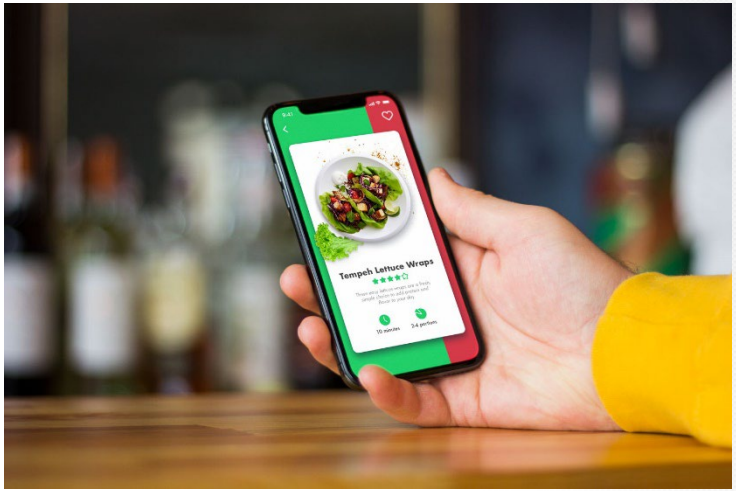
Z-pattern

Contrast

What is contrast ?

Contrast is the juxtaposition of opposing elements (opposite colors on the color wheel, or value light / dark, or direction – horizontal / vertical)**.**

Contrast allows us to emphasize or highlight key elements in your design.



Visual hierarchy - weight

Visual Hierarchy:

A way to express the relative importance of different elements by providing a visual guide to their organization

Visual Weight:

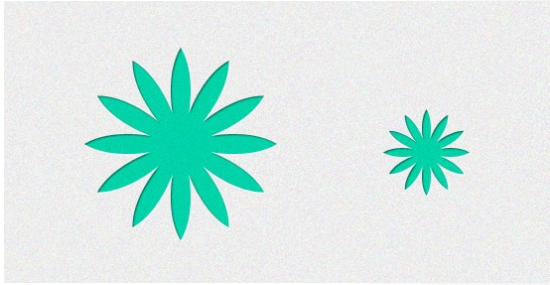
Visual weight is a measure of the force that an element exerts to attract the eye. The more an element attracts the eye, the greater its visual weight.

Visual weight

Visual hierarchy - weight

Size

Large elements are heavier than small elements.



Color

Warm colors tend to be perceived as more heavy than cool colors.
Red is considered the heaviest color and yellow the lightest.

Value

Dark elements have more visual weight than light elements.

Visual weight

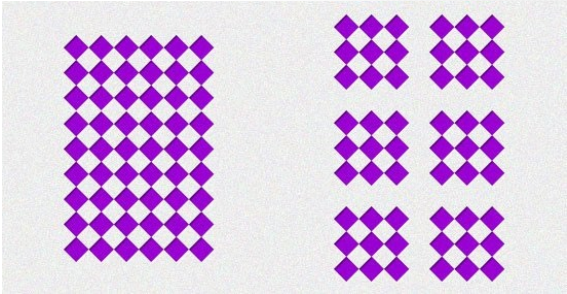
Visual hierarchy - weight

Position

Elements located higher in the layout are perceived to weigh more than elements located lower in the composition. Elements in the foreground carry more weight than elements in the background.

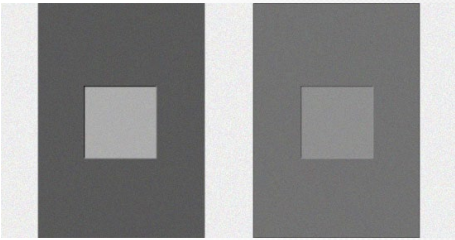
Proportion and Density

In the physical world, denser (or more compact) objects are heavier than less dense, more dispersed objects. We can achieve this concept in graphical representations by using less whitespace between objects.



Shape

Objects with a regular shape appear heavier than objects with an irregular shape.



Contrast

dramatically contrasted colors will catch the eye easily

Texture

Textured elements appear heavier than non-textured objects.

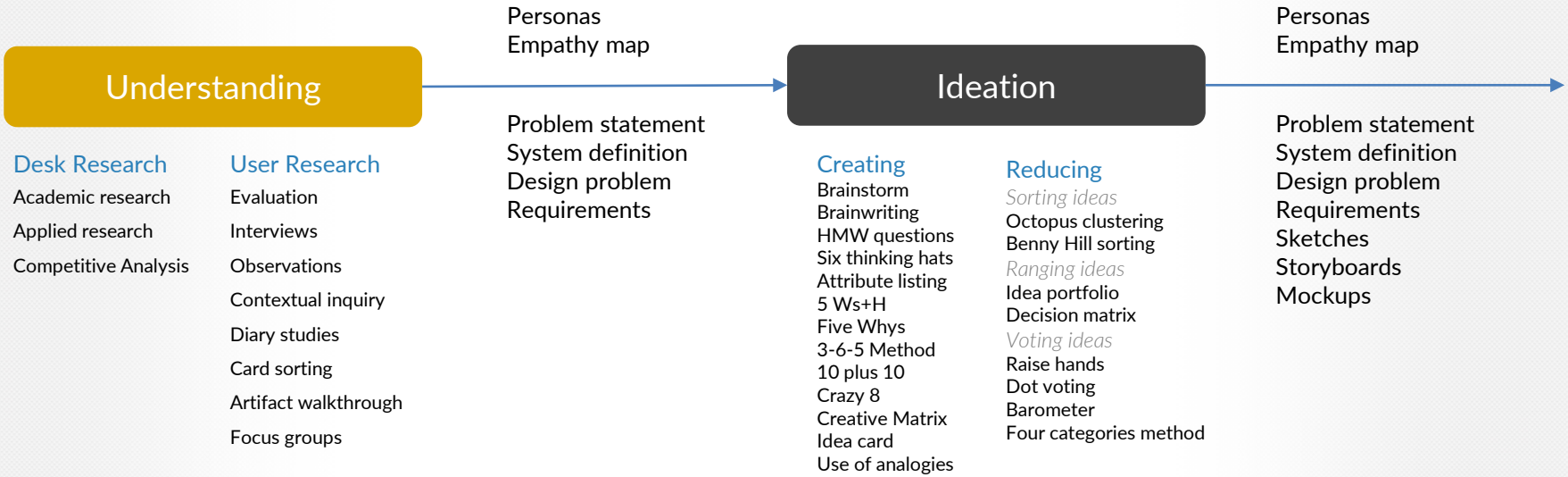
Part 3

3 Course Summery

- UCD Concepts / Process
- Understanding
- Ideation
- Prototyping
- Evaluation

Where are we in the process

process



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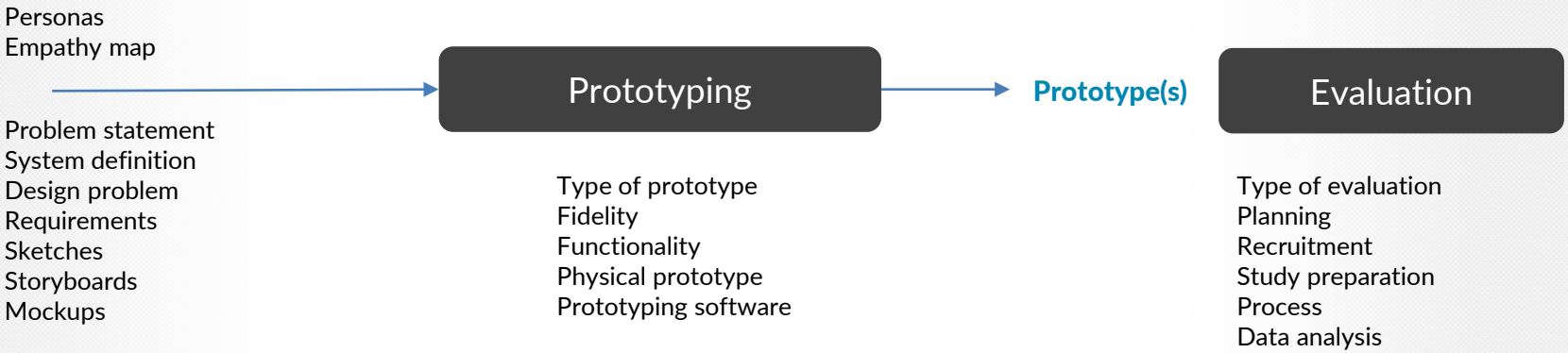
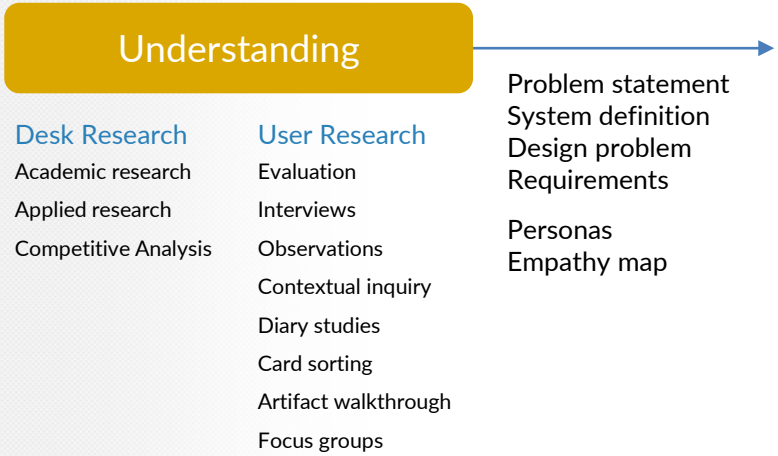
process



Understanding

process



Surface knowledge

- Definitions
- terminology

Examples

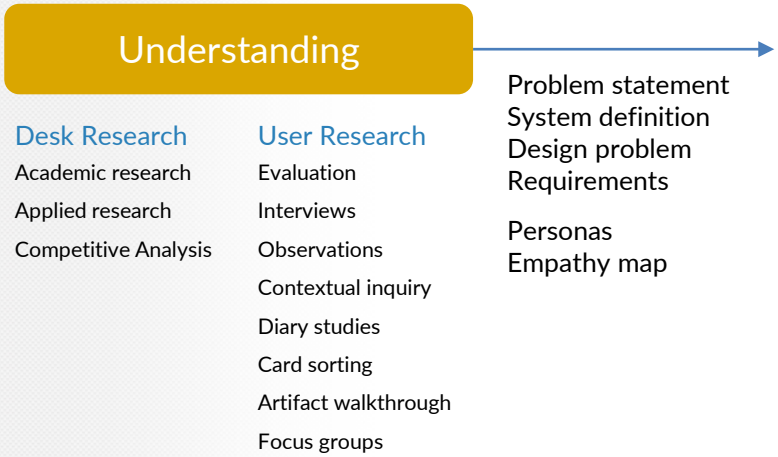
- What is card sorting?
- What are personas?

- What is the method called in which you lists the features, strengths, weaknesses of your competitors?

- What is the difference between academic and applied research?

Understanding

process



Deeper knowledge

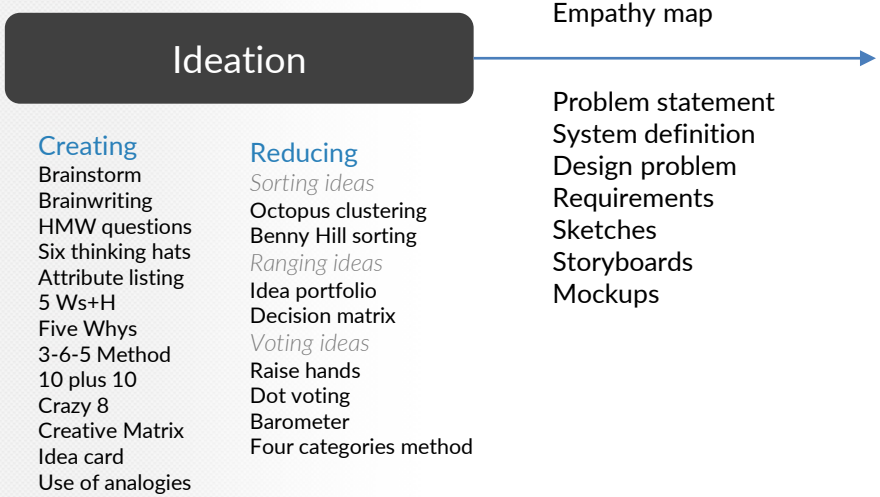
- describe
- explain
- reflect

Examples

- What are the appropriate techniques in applied research ?
- What are the steps in the interaction design lifecycle ?
- When do interviews have advantages compared to a survey
- What method would you use in a specific scenario

Ideation

process



Surface knowledge

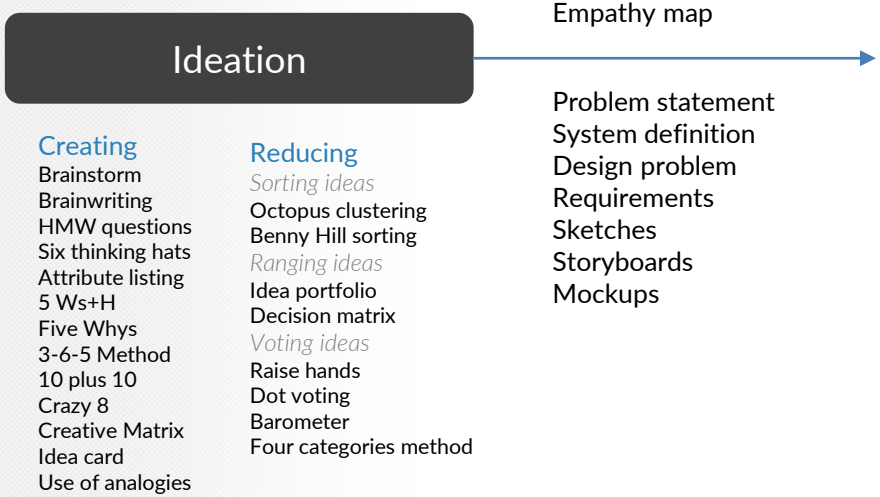
- Definitions
- terminology

Examples

- What are storyboards?
- What is the technique called in which you draw eight sketches in eight minutes
- Which of those techniques are for sorting ideas?

Ideation

process



deeper knowledge

- describe
- explain
- reflect

Examples

- Which of those are sketch qualities?
- Explain advantages and disadvantages of sketching in ideation
- Which are the most appropriate research methods in a specific scenario?

Prototyping

process

Prototyping

Type of prototype
Fidelity
Functionality
Physical prototype
Prototyping software

Surface knowledge

- Definitions
- terminology

Examples

- What is if low fidelity?
- What is a paper prototype?
- Name some prototyping software tools?

Prototyping

process

Prototyping

Type of prototype
Fidelity
Functionality
Physical prototype
Prototyping software

deeper knowledge

- describe
- explain
- reflect

Examples

- What type of prototyping is appropriate in which phase?
- What are the advantages of this vs another type of prototype?
- What type of prototyping would you do in this scenario…

Evaluation

process

Surface knowledge

- Definitions
- terminology

Evaluation

Type of evaluation
Planning
Recruitment
Study preparation
Process
Data analysis

Examples

- What is usability evaluation?
- What is usability and what UX
- What is a heuristic?

Evaluation

process

Evaluation

Type of evaluation
Planning
Recruitment
Study preparation
Process
Data analysis

deeper knowledge

- describe
- explain
- reflect

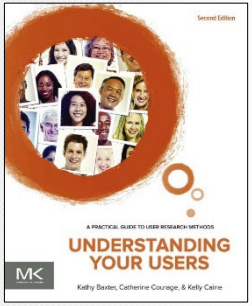
Examples

- How many people would you recruit in this scenario?
- What are the advantages of this evaluation technique
- Which are the most better evaluation technique in a specific scenario?

Reading material for this Lecture

exercise

Reading



Baxter, Courage, Caine **Understanding your Users**

- **Chapter 14** Evaluation Methods

For the Lab session

project

Meet up in the Lab rooms to develop and continue your prototype evaluation

- If you wan to include expert evaluation you can but you do not have to

NTNU

Thank you

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