



Aalto-yliopisto  
Perustieteiden  
korkeakoulu

# Usability Evaluation

CS-E5210, Spring 2019, Periods IV + V

**Antti Salovaara**

with Aqdas Malik, Nina Karikoski and Marko Nieminen

# Contents of the lecture

1. What this course is about
2. Quick look at heuristic evaluation and usability testing
3. Practical issues about the course

# 1. What this course is about

# What you will learn in this course

After this course, you know how to...

- ...evaluate user interfaces without users
- ...plan a high-quality empirical lab study
- ...carry out and analyse an empirical lab study

Both in theory and in practice:

Theory: introductory lectures + a pre-exam

Practice: group work on a commercial product or service

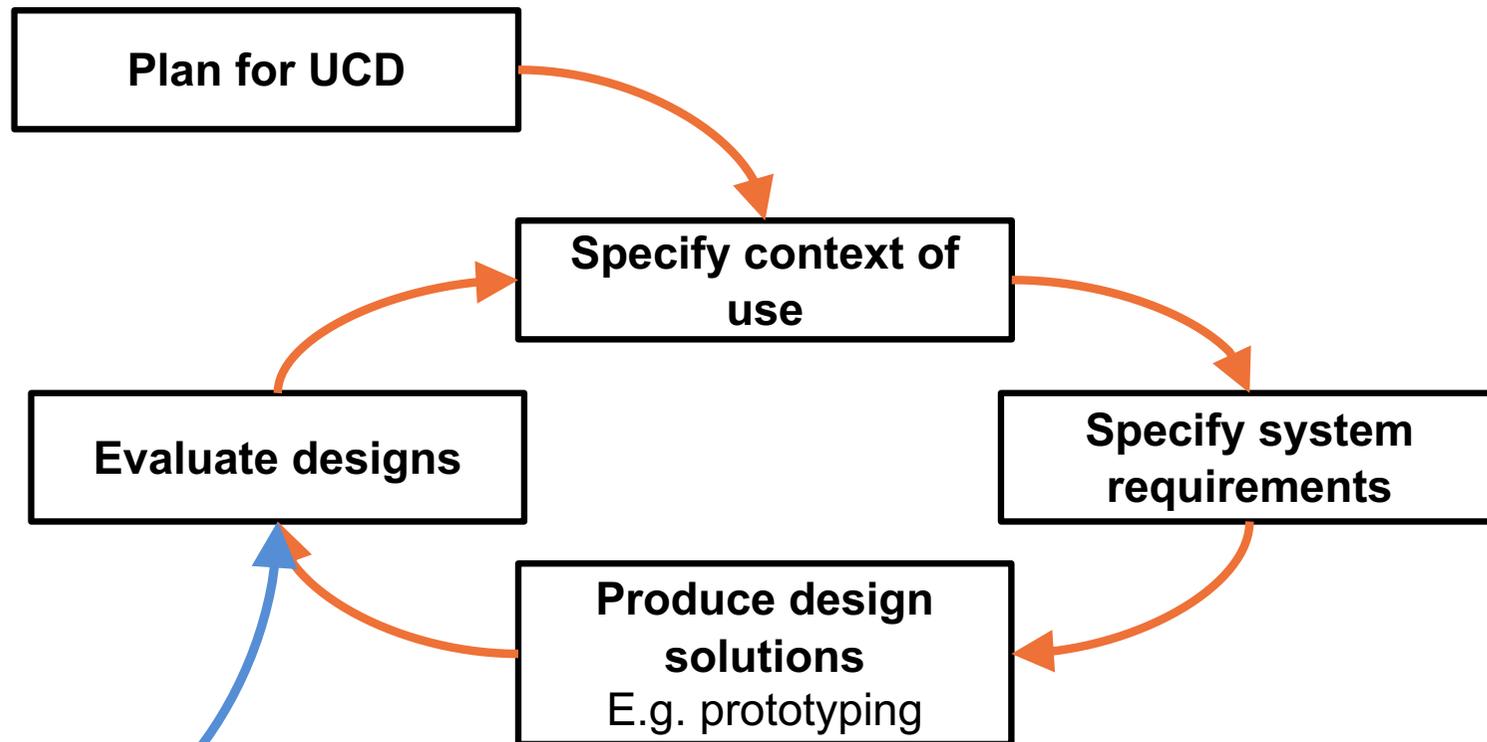
# What is Human–Computer Interaction (HCI)?

HCI is a field that **researches the design and use** of computer technology, focused on the interfaces between people (users) and computers.

Researchers in the field of HCI both **observe** the ways in which humans interact with computers and **design** technologies that let humans interact with computers in novel ways.

([https://en.wikipedia.org/wiki/Human–computer\\_interaction](https://en.wikipedia.org/wiki/Human–computer_interaction))

# User-centred design (UCD) process



**Usability  
evaluation**

Avoiding frustration and ensuring satisfying computer use

“Man destroys computer”

<https://www.youtube.com/watch?v=HtTUsOKjWyQ>

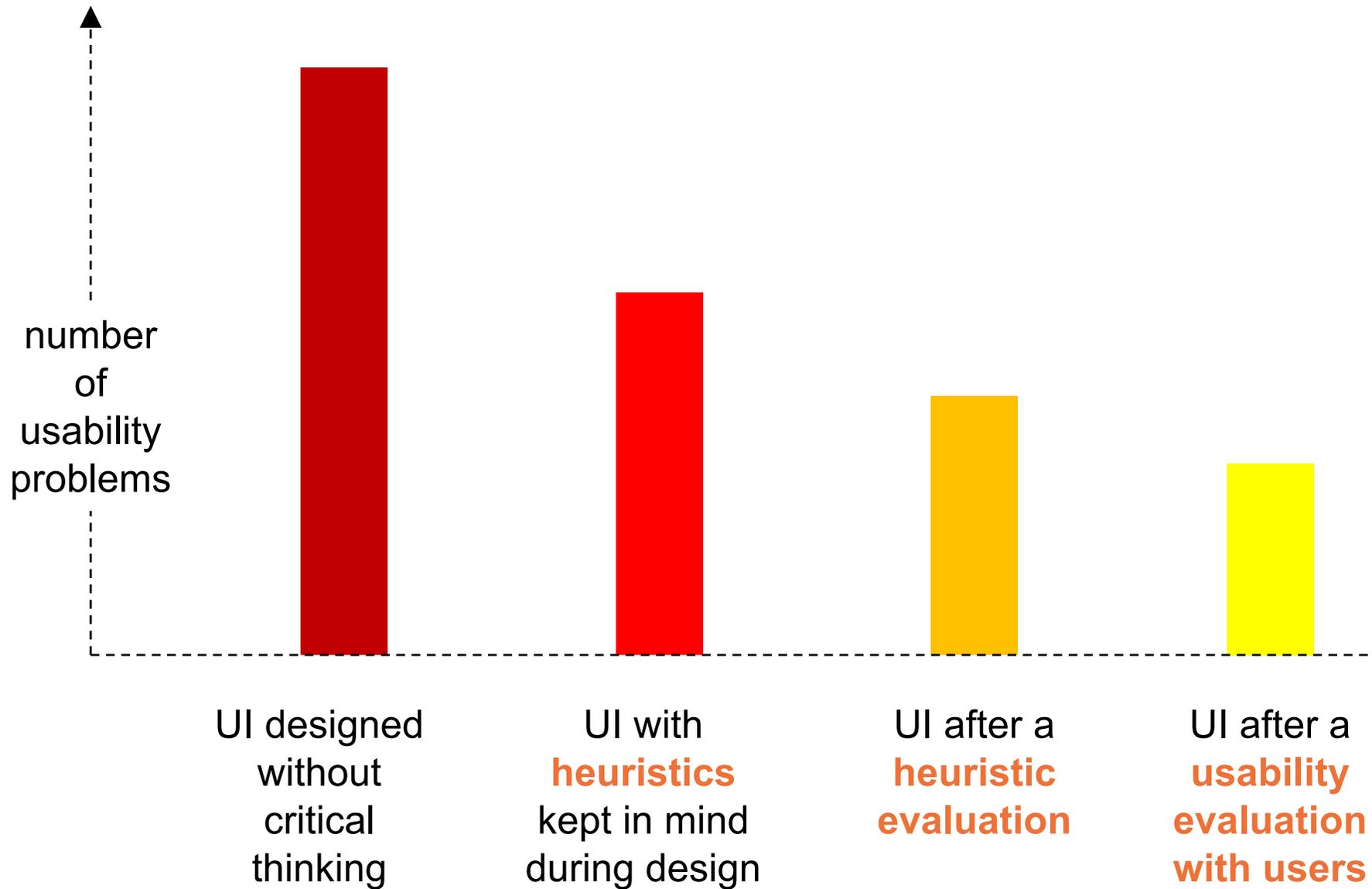


# Three aspects of usability

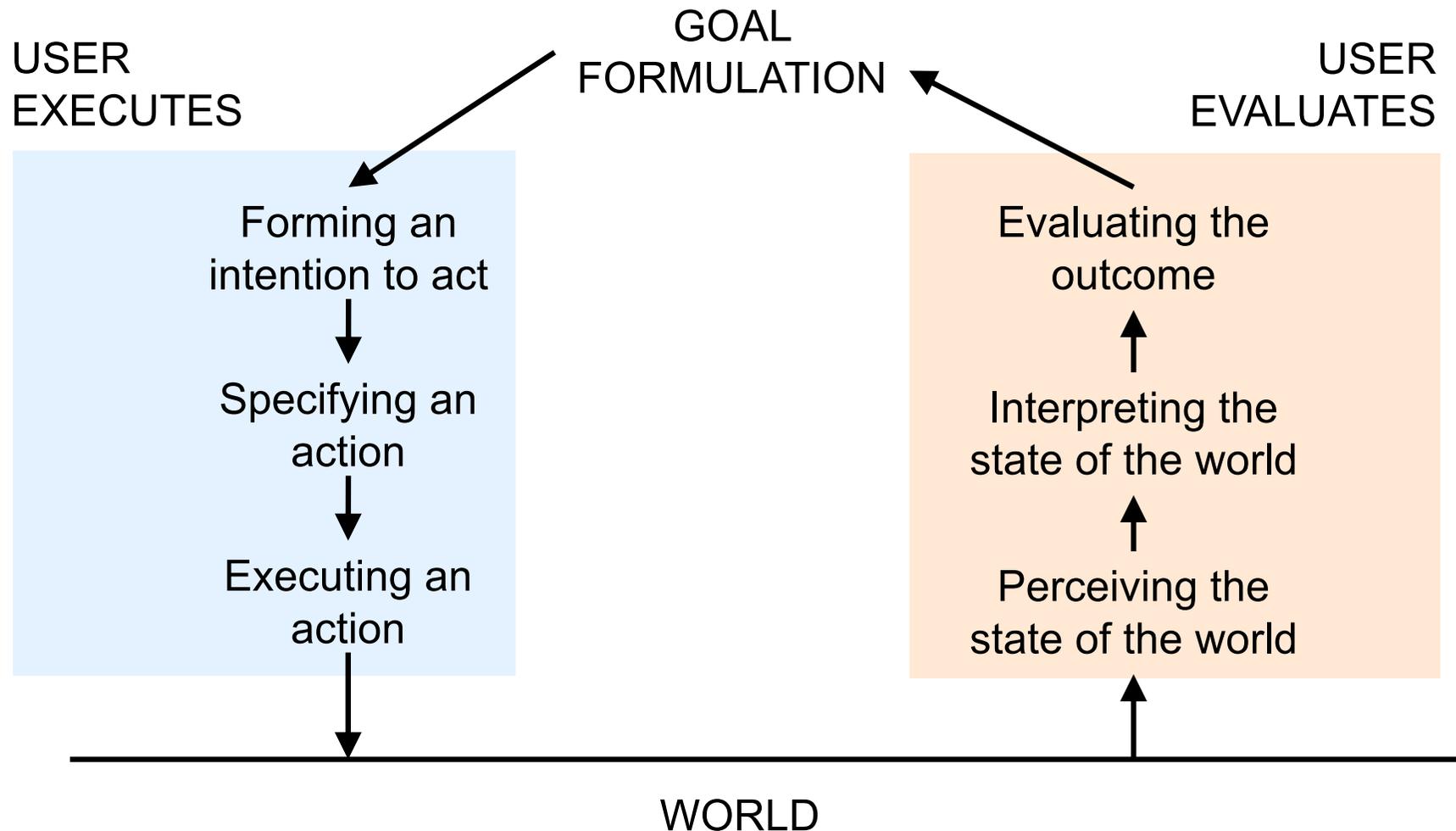
<b>ISO-9241</b>	<b>Hornbæk</b>	<b>Definition</b>
Effectiveness	Outcome	The right thing can be carried out
Efficiency	Interaction process	Interaction is easy and fast
Satisfaction	Users' attitudes and experiences	Task provides a positive experience

ISO (1998). Ergonomic requirements for office work with visual display terminals (VDTs)-Part 11: guidance on usability—Part 11: guidance on usability (ISO 9241-11:1998).

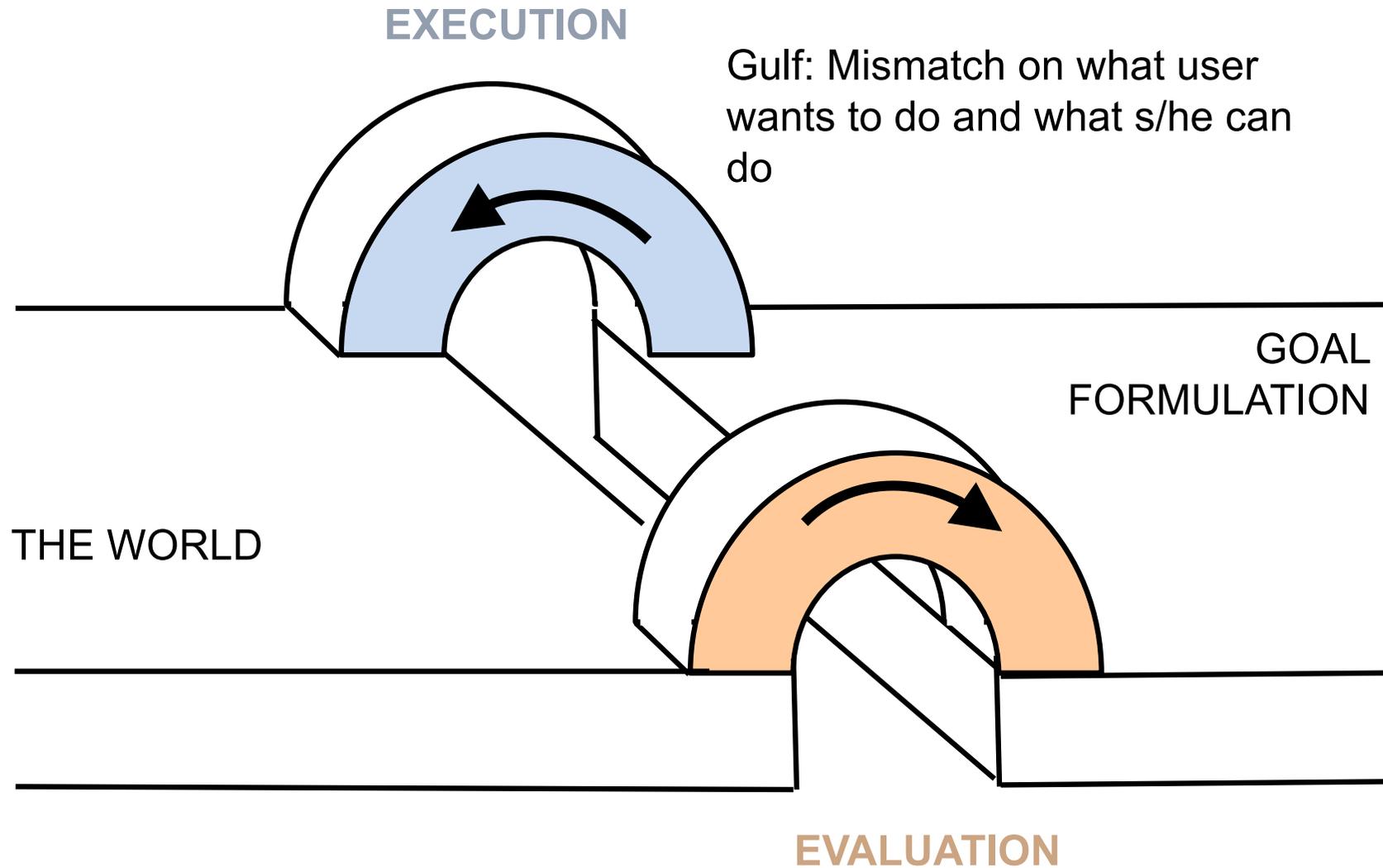
Hornbæk, K. (2006). Current practice in measuring usability: Challenges to usability studies and research. *International Journal of Human-Computer Studies*, 64(2), p. 96.



# The seven stages of action in HCI

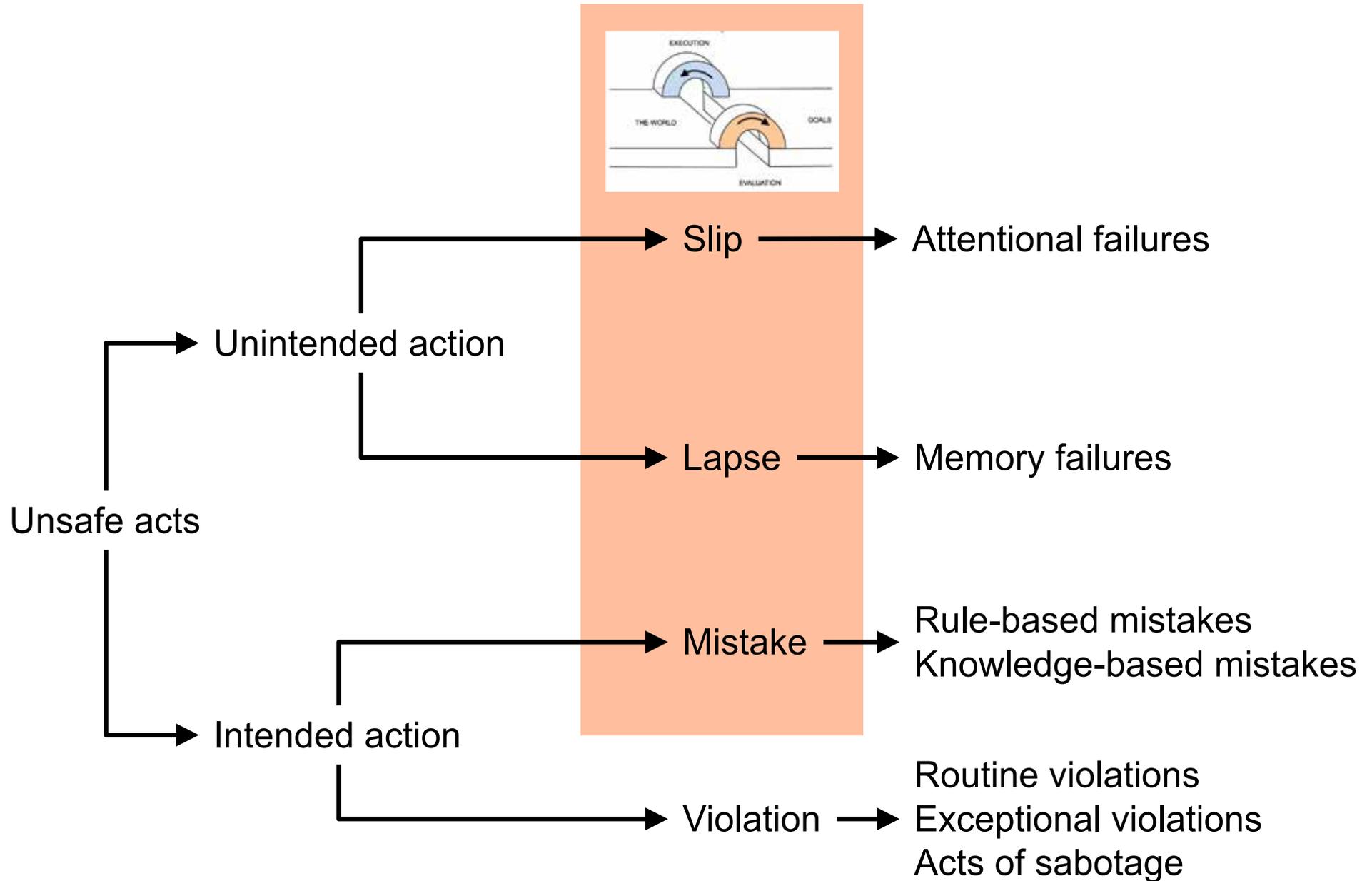


# The gulfs of evaluation and execution



Gulf: Mismatch of system's real state and user's expectations

# Types of human errors in goal-directed action



## **2. Quick look at heuristic evaluation and usability testing**

Heuristic evaluation: by experts, without users

# What do “heuristics” mean?

= “Rules of thumb”

“Any approach to problem solving, learning, or discovery that employs a **practical method, not guaranteed to be optimal, perfect, logical, or rational, but instead sufficient** for reaching an immediate goal.” (Wikipedia)

## Benefits of usability heuristics:

They are quite universal

Can be used with low cost

Can be used **during design** and in **evaluation**

Do not require presence of users

# Usability criteria (Norman)

Use both knowledge in the world and in the head

Simplify the structure of tasks

Make things visible

Get the mappings right

Exploit the power of constraints

Design for error

When all else fails: Standardize!

“Seven principles for transforming difficult tasks into simple ones”;  
Norman (1988). The psychology of everyday things.

# Usability criteria (Nielsen)

Visibility of  
system  
status

Match  
between  
system and  
the real world

User control  
and freedom

Consistency  
and  
standards

Help users  
recognize,  
diagnose,  
and recover  
from errors

Error  
prevention

Recognition  
rather than  
recall

Flexibility and  
efficiency of  
use

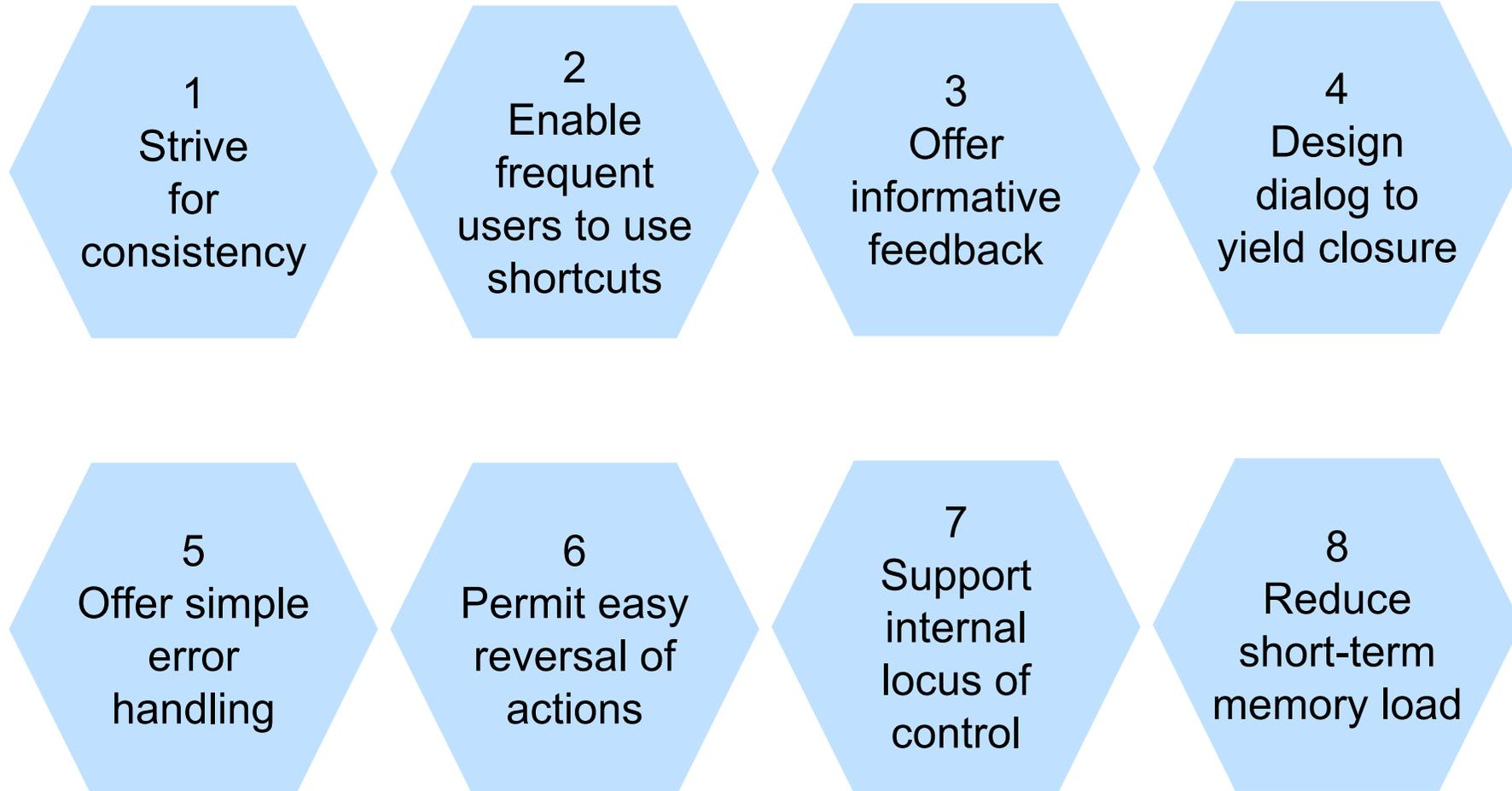
Aesthetic and  
minimalist  
design

Help and  
documen-  
tation

"Usability heuristics"; Nielsen (1993). Usability engineering.

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

# Usability criteria (Shneiderman)



”Eight golden rules”; Shneiderman (1988). Designing the user interface.

# Usability criteria (Shneiderman)

Easy to learn

Efficient

Memorable

Designed for  
error

Satisfaction

Usability testing / evaluation: with users

# Usability evaluation



## Controlled scenario-driven test:

1. Write realistic task scenarios for the features that need evaluation
2. Create mockup materials that make the unfinished system feel real
3. Present the scenario for the participant and ask him/her carry out the tasks.
4. Record with video
5. Repeat with more participants until findings saturate

# 3. Practical issues about the course

# Course communication

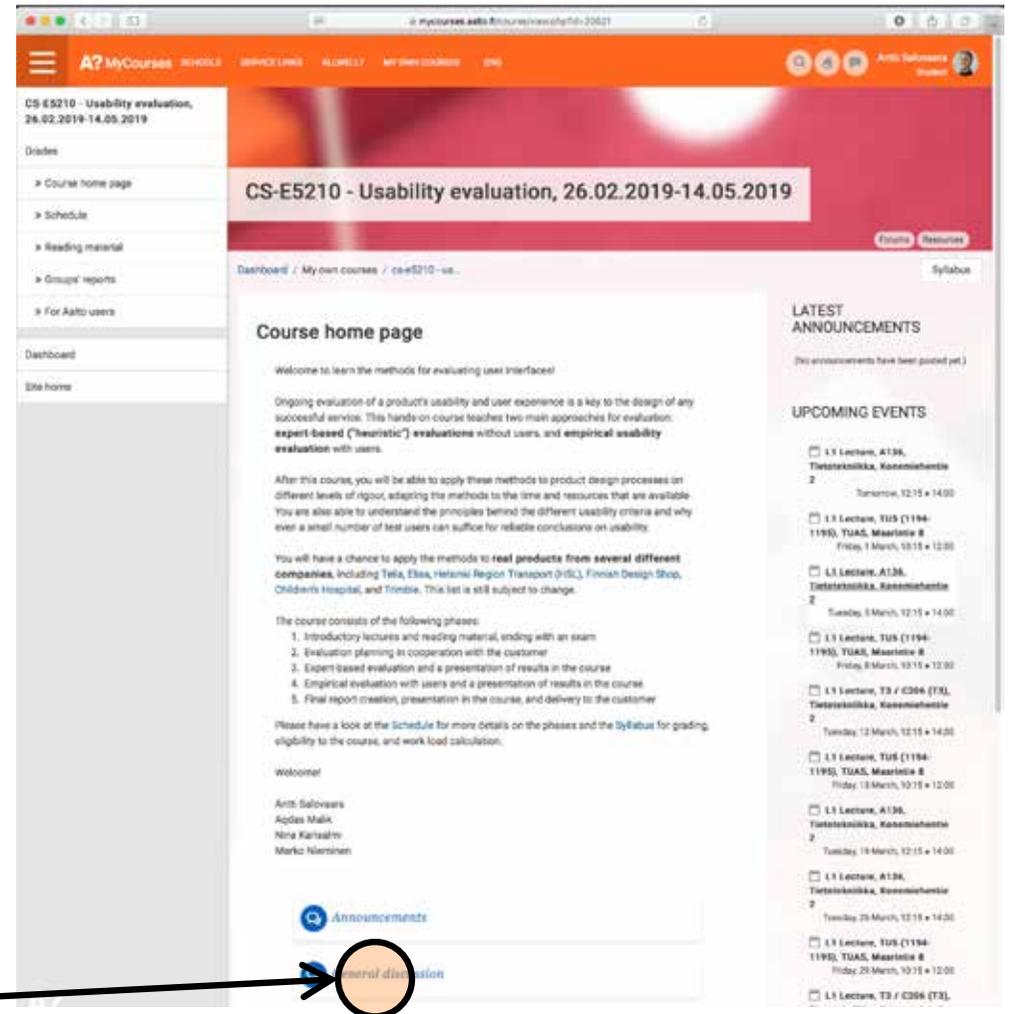
## MyCourses

Returning of assignments, grading, schedule etc.

When you have a question:

General questions: use the "[General discussion](#)" area

Otherwise: email to [antti.salovaara@aalto.fi](mailto:antti.salovaara@aalto.fi)



<https://mycourses.aalto.fi/course/view.php?id=20621>

# Course team



**Antti Salovaara**



**Aqdas Malik**



**Jussi Jokinen**

Guest lecturer  
ELEC, User Interfaces group



**Marko Nieminen**



**Nina Karisalmi**



**Esko Kurvinen**

Guest lecturer  
Service Design Lead, Elisa

# Main course milestones

26 Feb – 4 introductory lectures

8 March

12 March **Exam** on introductory lectures + reading material

19 March Guest lecture: Usability evaluation in a corporate context (by Esko Kurvinen, Elisa)

----Start of group work on companies' products ----

Heuristic evaluation

Usability evaluation (with users)

21 May Deadline for final evaluation report

23 May Deadline for individual learning diary

More detailed schedule: [See MyCourses page](#)

# Grading

30% pre-examination (individual)

50% group work

- Project plan

- Heuristic / expert evaluation results

- Empirical / usability test results

- Final presentation

- Final report

20% learning diary (individual)

# Pre-examination (30 points)

12 March 12.00–14.00

Focuses on the fundamentals of usability evaluation methodology

Is based on lecture contents and [reading material \(available in MyCourses\)](#)

Helps you get prepared for the group work and the work with a customer

**Exam must be passed in order to continue in the course!**

# Group work (50 points)

Consists of 5 phases:

Project plan, Heuristic / expert evaluation results, Empirical / usability test results, Final presentation, Final report

10 points each

Evaluations address companies' real commercial products

Groups (4–5 students) will be formed by teachers

Groups will be announced on 2<sup>nd</sup> lecture (this Friday)

Groups can express a wish on which product they evaluate

Every group will have a tutor (Antti, Aqdas, Nina or Marko)

## Learning challenge:

Each group chooses a **challenge** and focuses on it in the project

Possible learning challenges: see e.g., Hornbæk (2006), pp. 97–98

# Learning diary (20 points)

Is completed individually

**Purpose:**

Lets you analyse methodological challenges in usability evaluation on a deeper level.

Can address both your group's learning challenge but also other topics.

**Minimum contents:**

Section on heuristic evaluation

Section on empirical evaluation

**Deadline 2 days after the final report deadline (23 May)**

# Products / services

Telia

Elisa

Helsinki Region Transport (HSL)

Finnish Design Shop

Children's Hospital

Trimble (2 topics)

Ajeco

# How groups will be created

Telia



# MINUN TELIA

Pekka Jääskeläinen, UX Lead,  
[pekka.z.jaaskelainen@teliacompany.com](mailto:pekka.z.jaaskelainen@teliacompany.com),  
040 302 4834



# MINUN TELIA CASE

Product: Minun Telia mobile app

Self-service mobile app which main functionalities are:

- View all Telia products a user has purchased
- Follow usage of a mobile subscription
- Update subscription or product
- Pay invoices
- Connection speed test
- Access to eShop via commercial banners
- Customer care Chat and Bot (new functionalities will be revealed soon)

Users:

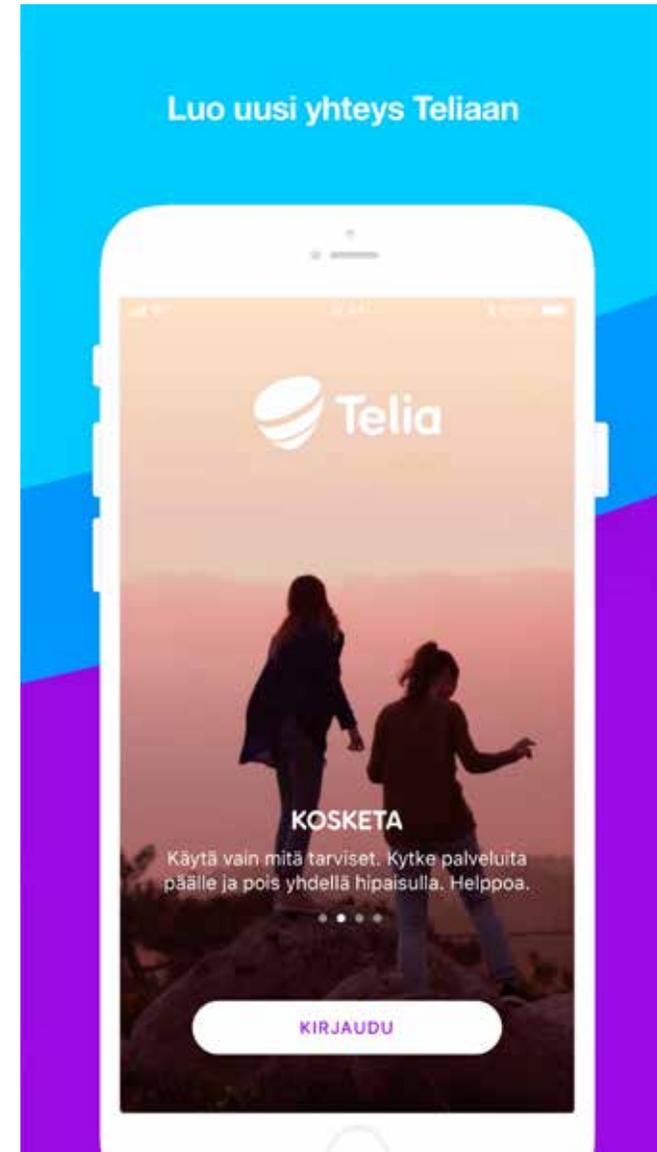
- Telia's consumer customers and employees of B2B customers

Focus:

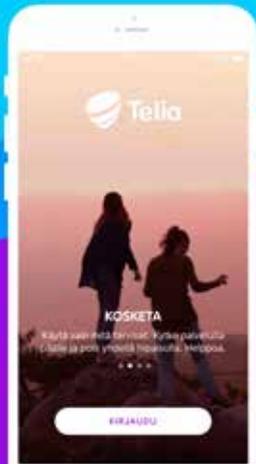
- New functionalities chat and bot usage should be validated especially
- In frontpage feed there is horizontally scrolli component "PALVELUT NETISSÄ", we would like to hear can users find Yhteisö or Kanavaopas services at all

App's UI is only in Finnish. Comms towards me can be in English or Finnish.

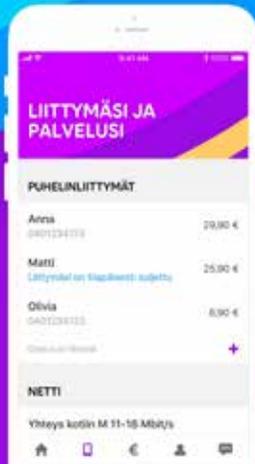
Pekka Jääskeläinen, UX Lead,  
[pekka.z.jaaskelainen@teliacompany.com](mailto:pekka.z.jaaskelainen@teliacompany.com), 040 302 4834



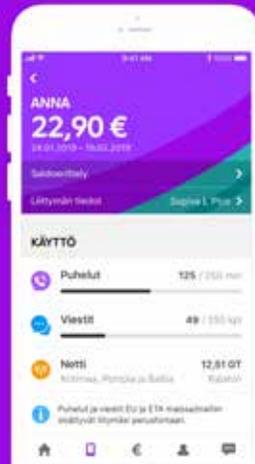
Luo uusi yhteys Telloon



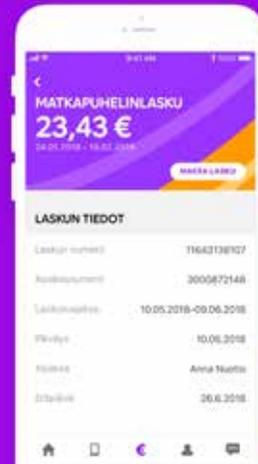
Hallinnoi kaikkia liittymiäsi ja palveluitasi



Seuraa käyttöä ja kytke palveluita päälle tai pois silloin kun haluat



Selaa ja maksa laskut kätevästi



Parhaat tarjoukset ja vinkit yhdellä silmäyksellä



Chat löytyy nyt myös sovelluksesta



Elisa

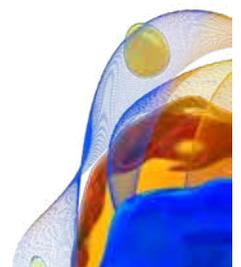
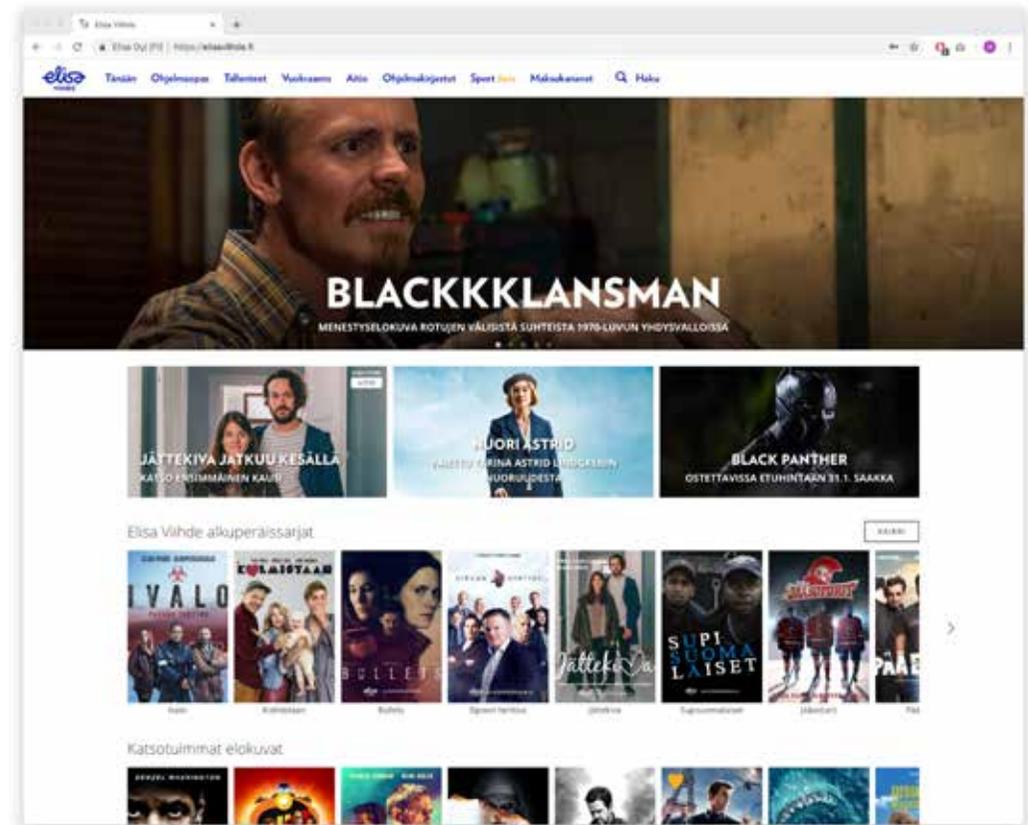


[elisaviihde.fi](https://elisaviihde.fi)

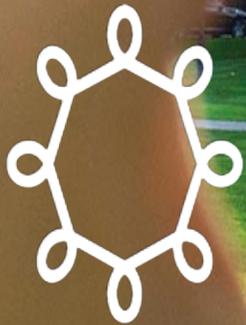
Usability & accessibility evaluation

# Elisa Viihde

- Elisa Viihde has 300000+ customers in Finland
- Multi-million original series: Ivalo, Bullets, Kaikki synnit (4/2019), Konttori, Jättekiva...
- Usability and accessibility test for [elisaviihde.fi](https://www.elisaviihde.fi)
  - elisaviihde.fi can be used for watching movies and series (such as rental movies and original series), live sports, recording and watching TV content, ...
  - Last year the front-end was renewed to React, using Elisa's design system ([stylebook.elisa.fi](https://stylebook.elisa.fi))
  - How to implement accessibility to the design system UI elements? (HTML+CSS)
- The service is in Finnish, so moderate Finnish knowledge required for most of the group
- Let's discuss more! Contact [miika.ruissalo@elisa.fi](mailto:miika.ruissalo@elisa.fi)



# Helsinki Region Transport (HSL)



**HSL**  
**HRT**

Parhaat matkat  
tehdään yhdessä

Helsingin seudun liikenne



# Transitlog

For Käytettävyyden arviointi / Aalto

Sami Räsänen 22.1.2019

## Transitlog

Share FI SE EN

CHOOSE DATE AND TIME

2019-01-22

09:25:00

SEARCH LINE AND ROUTE

550

2550 - suunta 1, Itäkeskus, läht. 22 - Westendinasema

FILTER BY VEHICLE

12/1322

SEARCH STOPS

**550** 2550 12/1322

2019-01-22 09:25:00

Itäkeskus-Westendinasema

Planned start time	Observed start time
08:46:00	+02:44 08:48:44
08:51:00	+00:23 08:51:23
08:56:00	-09:45 08:55:15
09:01:00	-03:51 09:04:11
09:07:00	+00:31 09:07:31
09:13:00	+00:34 09:13:34
09:19:00	-06:57 09:23:17
09:25:00	+00:45 09:25:45
09:31:00	+01:42 09:32:42
09:41:00	+00:35 09:41:35
09:51:00	+00:12 09:51:12
10:01:00	+02:37 10:03:37
10:11:00	+00:24 10:11:24
10:21:00	+00:28 10:21:28
10:31:00	+00:31 10:31:31
10:41:00	+17:01 10:58:01

Terminal time 3 min -00:01

Recovery time 4 min 07:35

Requested equipment C, HSL-orans  
C, HSL-orans

Itäkeskus (M) 1453287 (H 4322)

Arrival 09:22:00\* -00:01 09:24:56  
\* departure time - terminal time

Departure 09:25:00 +00:45 09:25:45

37 stops hidden

Westendinasema 2231213 (E 2313)

Arrival 10:23:00 +07:35 10:30:35

# Purpose and intended users



- Transitlog enables visual exploration of observed public transport and how it compares to the intended traffic. The time scale is from years past until right now. The focus is on the movement of individual vehicles.
- The initial users will be HSL customer service, traffic reimbursement with public transport operators and traffic planners.

# Evaluation needs and requirements



- How usable it is from a UI/UX perspective
- Help make UI usable with only short introduction
- English language is fine
- Agile development, quick changes and experiments are possible
- Welcome to join projects Slack channel

# Contact

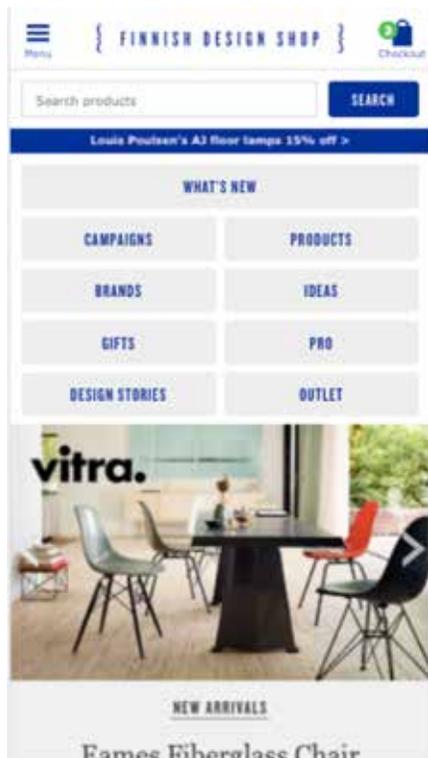


- Product owner Sami Räsänen
- [sami.rasanen@hsl.fi](mailto:sami.rasanen@hsl.fi)
- +358407537622
- <https://www.facebook.com/HSLdevcom/>
- <https://twitter.com/HSLdevcom>
- <https://github.com/HSLdevcom/transitlog>

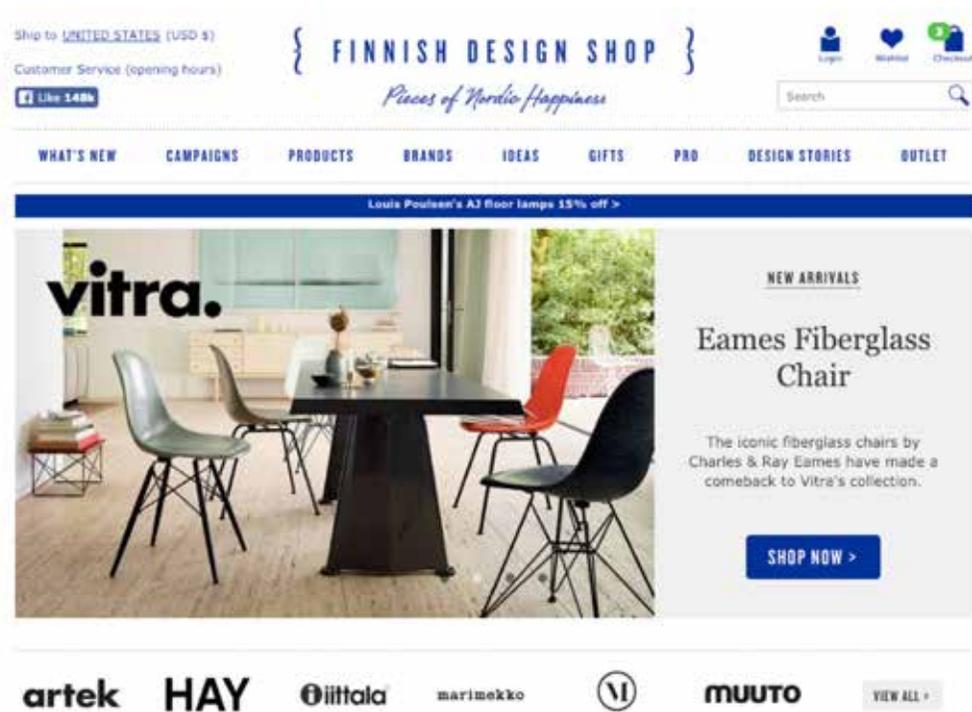
# Finnish Design Shop

# A screenshot

Mobile view (primary for evaluation)



Desktop view



**The name of the product to be evaluated**

Finnish Design Shop is an ecommerce site selling design items to homes and offices

Finnish Design Shop delivered to 86 different countries in 2018

Finnish Design Shop was selected as the most internationally expanding company amongst it's peers by Business Finland

**URL to the service:**

<https://www.finnishdesignshop.com>

**Who are the intended users?**

People around the world who appreciate good quality design items to home and office

**Is there a particular aspect in the product that especially needs evaluation?**

Product selection and buying with a mobile device

**Special requirements for the task**

English language and mobile device are required

# New Children's Hospital



# Patient Experience in the New Children's Hospital

Course instructors

Nina Karisalmi, M.Sc.(Tech)  
Doctoral Candidate

Johanna Kaipio, D.Sc.(Tech.)  
Postdoctoral research fellow

## **The name of the product to be evaluated**

Registration Avatar at the New Children's hospital in Helsinki

## **WWW link preferably to a page containing information in English**

General information about the hospital:

<http://www.hus.fi/en/medical-care/hospitals/newchildrenshospital/Pages/default.aspx>

Video: Digital design solutions to support care pathway at the New Children's hospital in Helsinki

<https://www.youtube.com/watch?v=eIIeGblNys8>

Provider of the product to be evaluated:

<https://www.x-akseli.fi/?lang=en>





## The purpose of the product

This device is used at the main lobby for registration of the patient. By showing the individual Kela-card to the device, it registers the patient as arrived and guides the child and the family further. The child can choose one Avatar instead of a queue number. The child patient receives a wristband and the wristband serves as the identification in the following steps of the patient path. The patient is supposed to show the wristband to similar devices in all of the following touchpoints (physician, laboratory, X-ray etc.)

## Is there a particular aspect in the product that especially needs evaluation?

What aspects hinder the deployment of the product from the perspective of the patients, families and personnel?

What aspects would support the deployment of the product from the perspective of the patients, families and personnel?



## Special requirements for the task (e.g., how critical is Finnish language?)

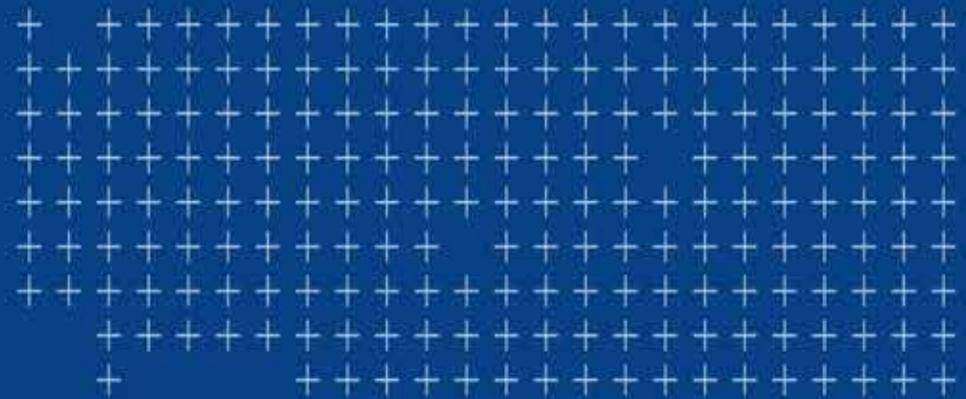
Finnish language is mandatory.

## Contact person name and email address.

*Pekka Lahdenne, MD, PhD  
Head of Digital and Innovation Services,  
Associate Professor of Paediatrics  
HUS Helsinki University Hospital  
Children and Adolescents  
Tel. 0504285521, pekka.lahdenne@hus.fi*



Trimble (2 topics)

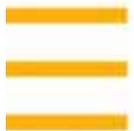


February 2019

Project work topics for Usability evaluation course at Aalto University



# Tekla Structures





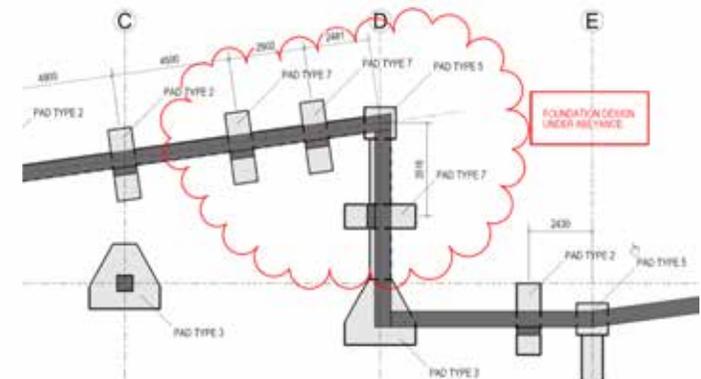
# Tekla Structures introduction

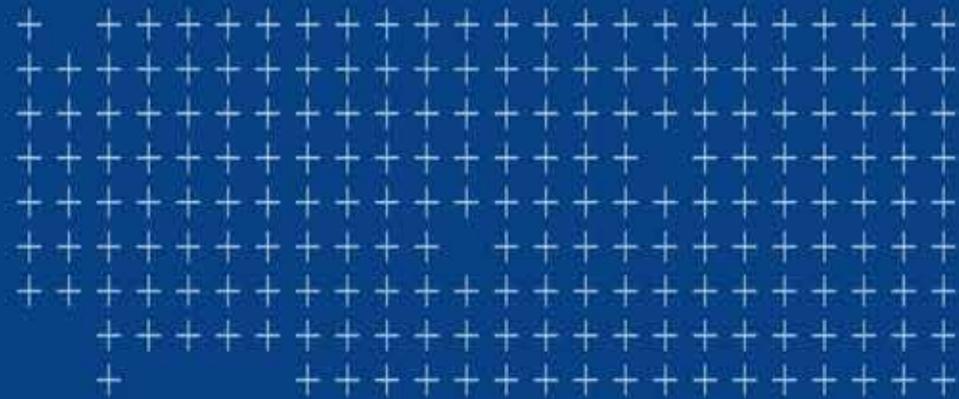
- Used Globally by Civil engineers, Structural designers and Bridge designers
- Users' main task is to design building structures in a 3D model
- From the 3D model drawings are created to be used on construction site



More information available:

<https://www.tekla.com/us/products/tekla-structures>

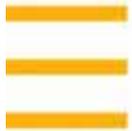




February 2019

Project work Topic 1

# Getting started with Tekla Structures

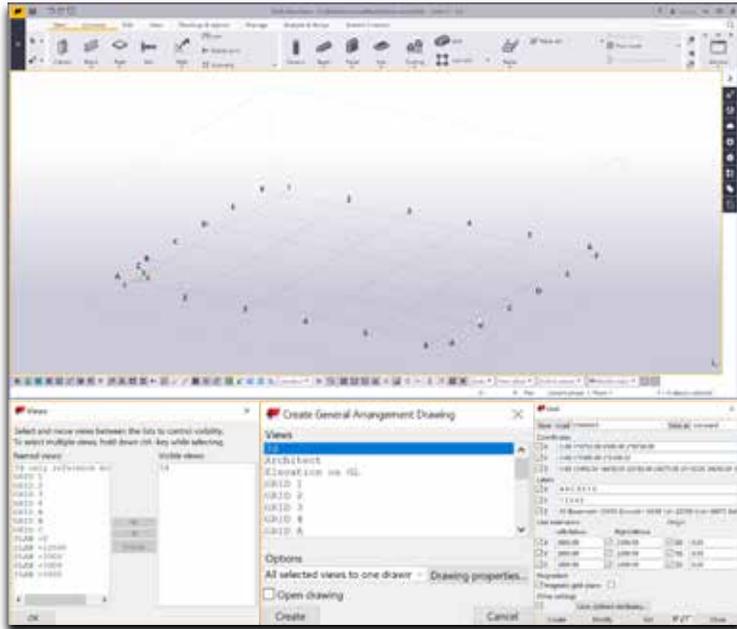




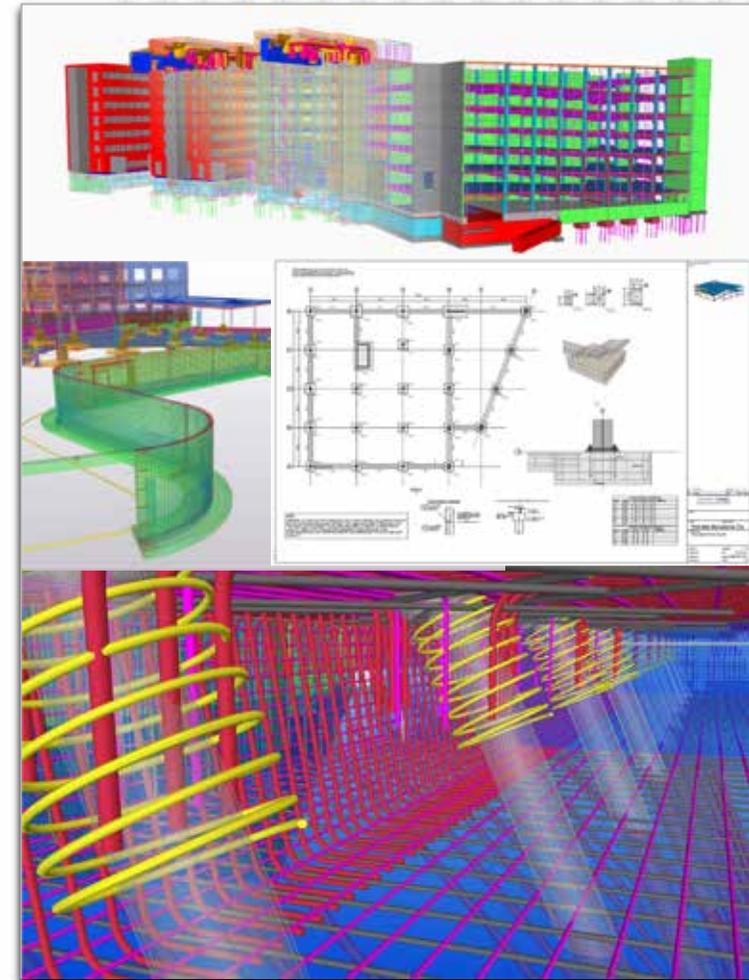
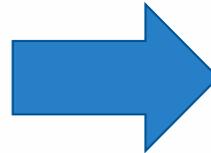
# Getting started with Tekla Structures

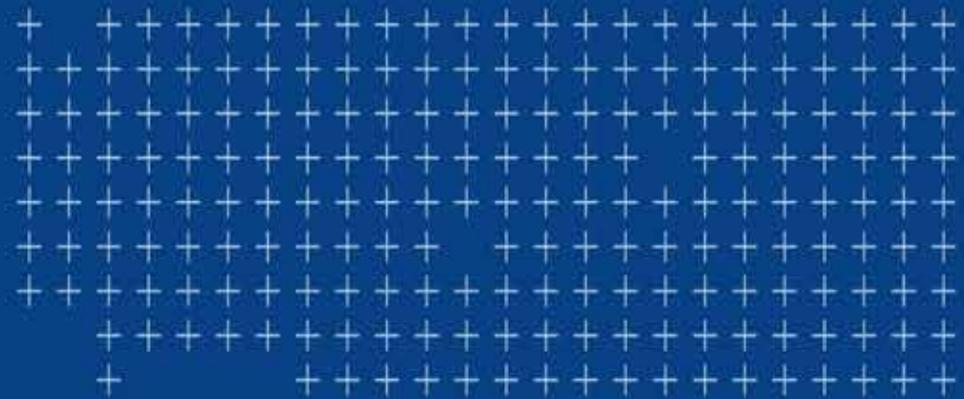
- Project work topic:  
Evaluate the first-time use scenario with Tekla Structures -  
A new user installs Tekla Structures, creates their first 3D model, and creates sample deliverables (drawings) from the model.
  - What is difficult to understand from a new user perspective?
  - What things in the workflow do not go smoothly?
  - What is working well?
  - What should be improved?
- We would especially like to get feedback about these workflows:
  - Creating and modifying grids (=aids for placing objects)
  - Creating and managing 2D and 3D views of the model
  - Creating basic deliverables (drawings) from the model





How to get started?

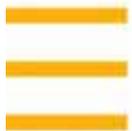




February 2019

Project work Topic 2

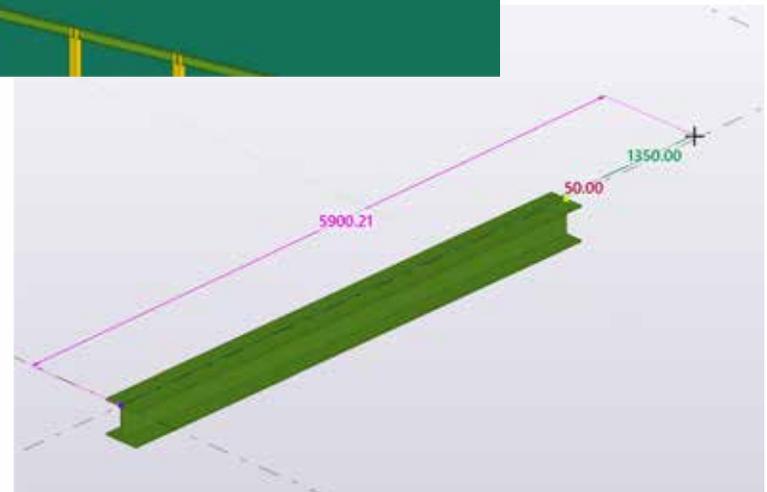
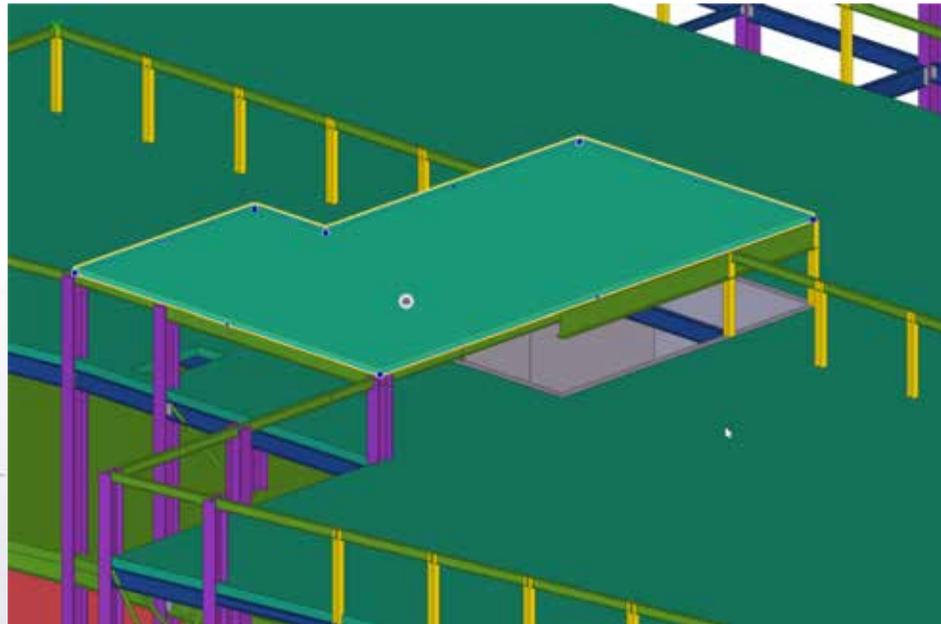
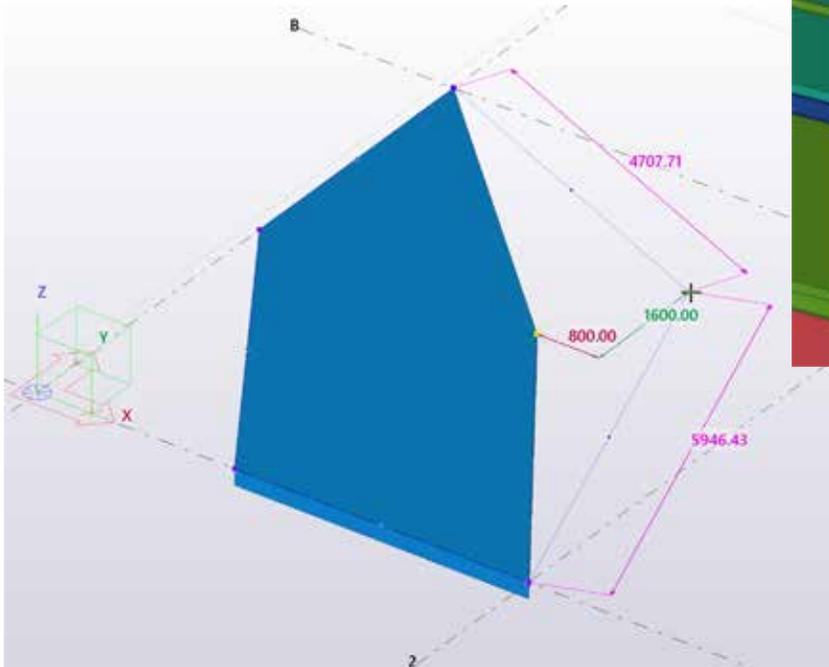
# 3D interaction in Tekla Structures





# 3D interaction in Tekla Structures

- Project work topic:  
Evaluate 3D interactions in Tekla Structures
  - What is difficult to understand from a new user perspective?
  - What things in the workflow do not go smoothly?
  - What is working well?
  - What should be improved? How would you develop these features further?
- We would especially like to get feedback about these workflows:
  - Creating parts in 3D space
  - Navigating in 3D view
  - Snapping - how to pick correct points in 3D space with mouse
  - Modifying part geometries with Direct modification by dragging handles





Contact persons:

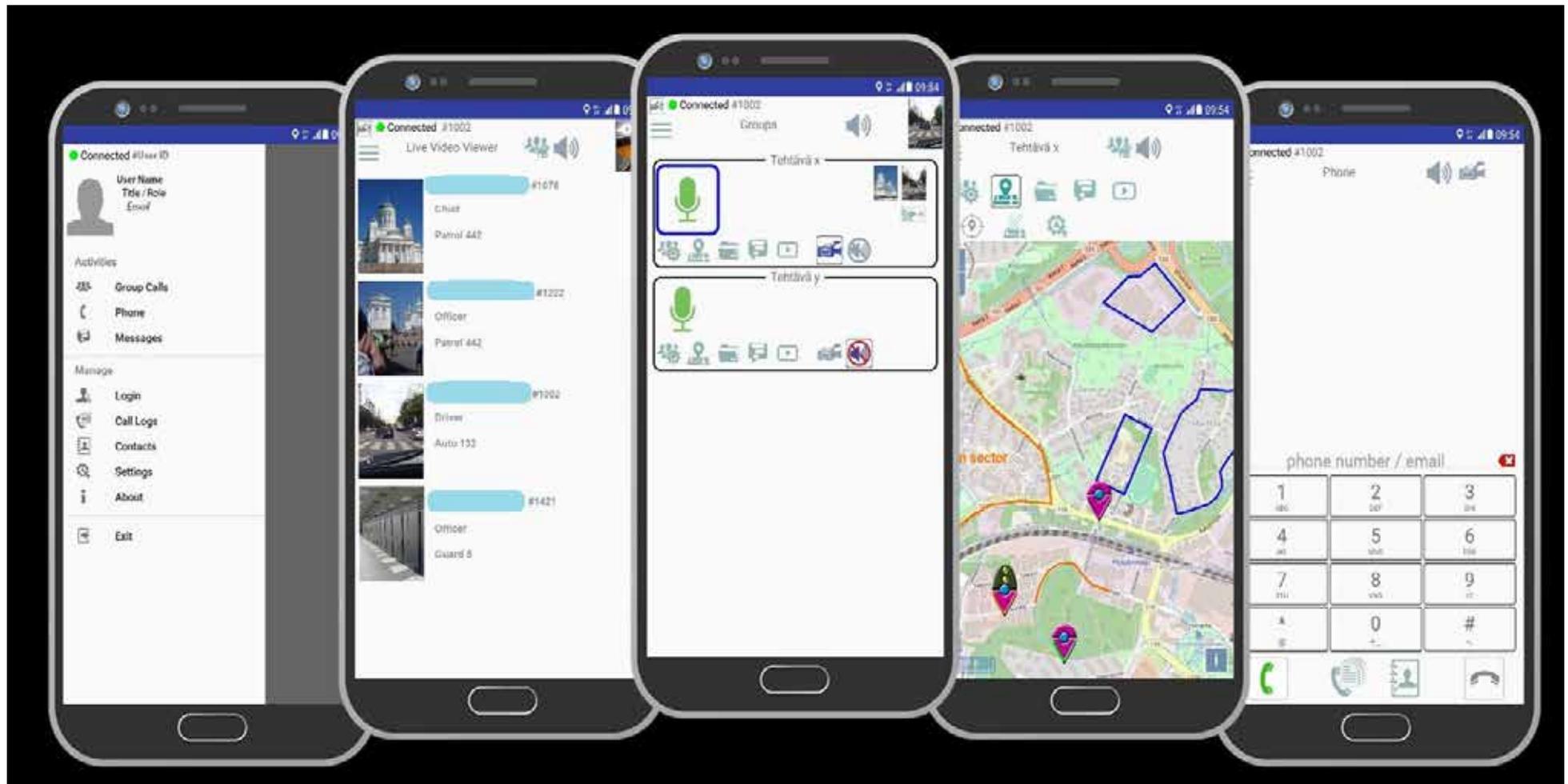
Topic 1 [osmo.tolvanen@trimble.com](mailto:osmo.tolvanen@trimble.com), [minttu.linja-aho@trimble.com](mailto:minttu.linja-aho@trimble.com)

Topic 2 [osmo.tolvanen@trimble.com](mailto:osmo.tolvanen@trimble.com),  
[taru.laakko@trimble.com](mailto:taru.laakko@trimble.com)

Ajeco

# *Ajeco Oy's secure mobile group coordination software*

- ◆ New product: names shortlisted, decision soon, customer testing starts May-June 2019
- ◆ Focus of usability evaluation: frontend UI, runs on COTS Android phones & tablets
- ◆ Purpose: coordinating mobile group work in challenging environments & situations
  - ◆ group voice calls, augmented real-time video, annotated photos, maps & geolocation, text notes & more
- ◆ Data can be guaranteed to stay in e.g. Finland or EU
- ◆ Inbuilt end-to-end security, including non-repudiation
  - ◆ if such security / accountability not needed, works with standard Internet technology & any cloud service



# Questions & discussion