

The Teaching Makerspace – Building a Better Classroom

Speaker(s): Kjell Are Refsvik
[çel:][a:ˈrø] [refsvi:k]
(https://folk.ntnu.no/kjellref/Kjell-Are_Refsvik.mp3)



Employer: Norwegian University of Science and Technology
Faculty of Architecture and Design
Department of Design, Gjøvik

Event: Learning Safari, NTNU



Rights: CC: BY-SA4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>)

Date: January 5, 2023



URL: https://folk.ntnu.no/kjellref/misc/20230105_laringssafari.pdf

Preface

Oral language = Norwegian

- I will speak **Norwegian** during this presentation
- I am basing this decision on the **law of Norwegian Universities** and NTNUs existing, as well as new **language policy**
- To balance the use of **Norwegian language** with **inclusion**, the notes are in English
- Please feel free to **comment** or ask **questions** in **English** if you want

utdanningen. Studentevalueringer skal inngå i systemet for kvalitetssikring.

0 Endret ved lov [17 juni 2016 nr. 69](#) (ikr. 1 juli 2016 iflg. [res. 17 juni 2016 nr. 683](#)).

§ 1-7. Ansvar for vedlikehold og videreutvikling av norsk fagspråk

(1) Universiteter og høyskoler har ansvar for vedlikehold og videreutvikling av norsk fagspråk.

(2) Universiteter og høyskoler skal gi skriftlig eksamen på det norske språket, nynorsk eller bokmål, som studenten ønsker. Departementet kan fastsette nærmere regler og gi unntak fra plikten i forskrift.

0 Tilføyd ved lov [19 juni 2009 nr. 96](#) (ikr. 1 aug 2009 iflg. [res. 19 juni 2009 nr. 676](#)), endret ved lov [17 juni 2022 nr. 68](#) (i kraft 1 aug 2022 iflg. [res. 17 juni 2022 nr. 1067](#)).

Kapittel 2. Nasjonalt organ for kvalitet i utdanningen - NOKUT

Lov om universiteter og høyskoler

<https://lovdata.no/dokument/NL/lov/2005-04-01-15>

20. Master's theses written in Norwegian must have a summary in English. Master's theses written in a non-Scandinavian language must have a summary in Norwegian.

Chapter 3. Research

21. All employees must master the **main terminology in Norwegian in their specific field**. The development of Norwegian academic language, including relevant discipline-specific terminology, is a collective responsibility in all the academic communities.

22. Employees can choose the language in which they publish in scientific channels.

23. All PhD theses must have a summary in both Norwegian and English.

Chapter 4. Dissemination and outreach

NTNUs language guidelines

https://i.ntnu.no/documents/portlet_file_entry/1305837853/Spr%C3%A5kpolitiske+retningslinjer+v5_EN.pdf/4654a649-1342-c12e-c87c-26a65d98a98a

Preface

- This presentation is part of **my action research activities** on my road to qualify as an Associate Teaching Professor (førstelektor)
- I will use this opportunity to describe and reflect on my contribution to the department of design (Gjøvik) **teaching makerspace(s)** so far

undervisning og veiledning på universitets- og høyskolenivå).

Ferdighetene skal dokumenteres i form av en systematisk og samlet fremstilling som vurderes ved institusjonene.

De som ikke oppfyller kravene ved ansettelsen, skal pålegges å oppfylle dem innen to år etter ansettelsen.

Institusjonene kan etter [§ 1-1](#) fastsette høyere krav og bestemme at disse skal gjelde i bedømming og rangering av søkere.

0 Endret ved [forskrift 12 sep 2018 nr. 1322](#) (i kraft 1 sep 2019).



§ 1-5. Kriterier for ansettelse i stilling som førstelektor

(1) Dokumentert omfattende forsknings- og utviklingsarbeid som i kvalitet og omfang tilsvarer arbeidsmengde og nivå for en doktorgradsavhandling

eller

(2) Dokumentert omfattende kunstnerisk utviklingsarbeid som i kvalitet og omfang tilsvarer arbeidsmengde og nivå for en doktorgradsavhandling

og

(3) Spesielle kvalifikasjoner innenfor undervisning eller annen pedagogisk virksomhet skal tillegges stor vekt

og

(4) Dokumentert relevant praktisk-pedagogisk kompetanse på grunnlag av utdanning eller undervisning og veiledning.

§ 1-6. Kriterier for ansettelse i stilling som høyskolelektor eller universitetslektor

(1)

a. Høyere grads eksamen ved universitet, høyskole eller tilsvarende

b. Relevante forskningskvalifikasjoner utover mastergrads- eller hovedfagsnivå og/eller relevant yrkespraksis

eller

Welcome

- With this **presentation**, I am using autoethnography to describe my contribution to establishing a **Teaching Makerspace** culture at Department of Design, Gjøvik
- According to the traditions of **autoethnography**, I will follow this up with deeper reflections on this work, later



The image shows a screenshot of the Wikipedia article for "Autoethnography". At the top right, there are navigation links: "Not logged in", "Talk", "Contributions", "Create account", and "Log in". Below these is a search bar with the text "Search Wikipedia" and a magnifying glass icon. The article title "Autoethnography" is prominently displayed, with a sub-header "From Wikipedia, the free encyclopedia". The main text defines autoethnography as a form of ethnographic research where a researcher connects personal experiences to wider cultural, political, and social meanings. It lists various disciplines where autoethnography is used, such as anthropology, education, and sociology. A table of contents is provided, listing sections from "Definitions" to "Rethinking traditional criteria". On the right side, there is a sidebar titled "Part of a series on Research" with a list of related topics like "List of academic fields", "Research design", and "Philosophy", each with a "[show]" link. An image of a desk with a laptop and papers is also present in the sidebar.

Article [Talk](#) Read [Edit](#) [View history](#)

Autoethnography

From Wikipedia, the free encyclopedia

Autoethnography is a form of [ethnographic research](#) in which a researcher connects personal experiences to wider cultural, political, and social meanings and understandings.^{[1][2][3][4]} It is considered a form of [qualitative](#) and/or [arts-based research](#).^[1]

Autoethnography has been used across various disciplines, including [anthropology](#),^[5] [arts education](#), [communication studies](#),^[6] [education](#),^{[5][7][8]} [educational administration](#), [English literature](#), [ethnic studies](#), [gender studies](#), [history](#), [human resource development](#),^[9] [marketing](#), [nursing](#), [organizational behavior](#),^[10] [paramedicine](#), [performance studies](#), [physiotherapy](#), [psychology](#),^{[11][12]} [social work](#), [sociology](#),^[13] and [theology and religious studies](#).

Contents [hide]
1 Definitions
2 History
 2.1 Mid-1800s
 2.2 Early- to mid-1900s
 2.3 1970s
 2.4 1980s
 2.5 1990s to present
3 Epistemological and theoretical basis
4 Process
5 Types of autoethnography
 5.1 Analytic autoethnography
 5.2 Evocative autoethnography
6 Goals of autoethnography
7 Uses of autoethnography
8 Storyteller/narrator
9 Evaluation
 9.1 Rethinking traditional criteria

Part of a series on **Research**



- [List of academic fields](#) [show]
- [Research design](#) [show]
- [Philosophy](#) [show]
- [Research strategy](#) [show]
- [Methodology](#) [show]
- [Methods](#) [show]
- [Tools and software](#) [show]

[Philosophy portal](#)

V T E

First steps towards a Teaching Makerspace

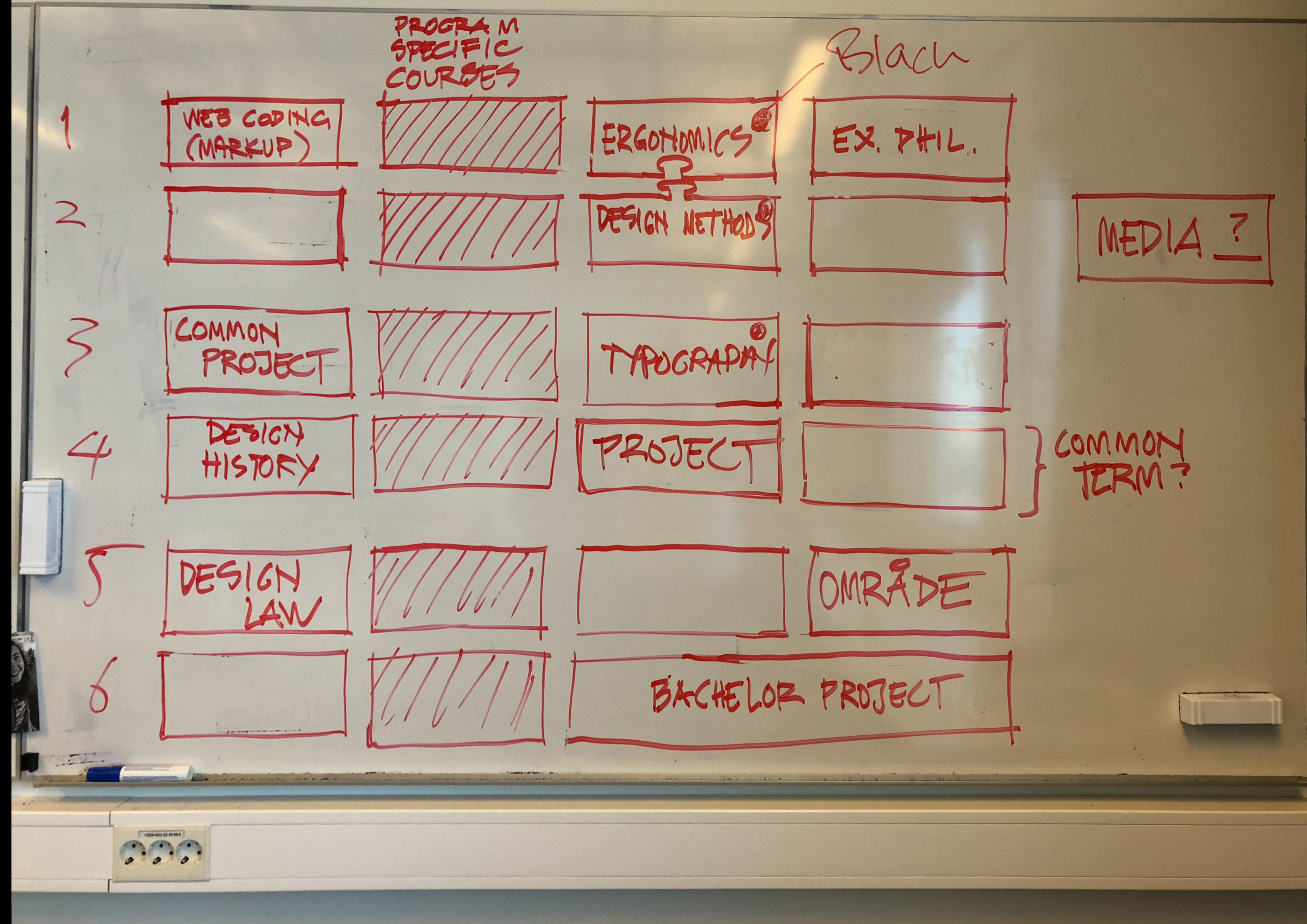
January 1st, 2016

- After several years of investigations and negotiations, Gjøvik University College together with Ålesund University College and Sør-Trøndelag University College, formally merged with NTNU on January 1st 2016
- Media Section at Gjøvik University College in which I was employed, started looking for a Faculty and Department to belong to



2016

- Merging with AD/ID, quickly meant **rebuilding** a number of our study program offerings and professional focus
- ...and transition over from a 10 study point course sizing regime to 7.5
- I was a part of closing down Bachelor in media production and be part of a team that built Bachelor in Interaction Design (BIXD)
- ,,while adjusting Bachelor in Web Development (BWU) to fit better at a design department



One of many whiteboards on the path to create BIXD

Foto: Kjell Are Refsvik

Faculty of Architecture and Design

- After investigating several alternatives, we found a new home at the **Department of Design** at the new **Faculty of Architecture and Design** that formally opened in November of 2017
- By that time, we had already restructured the programs and cancelled the old ones

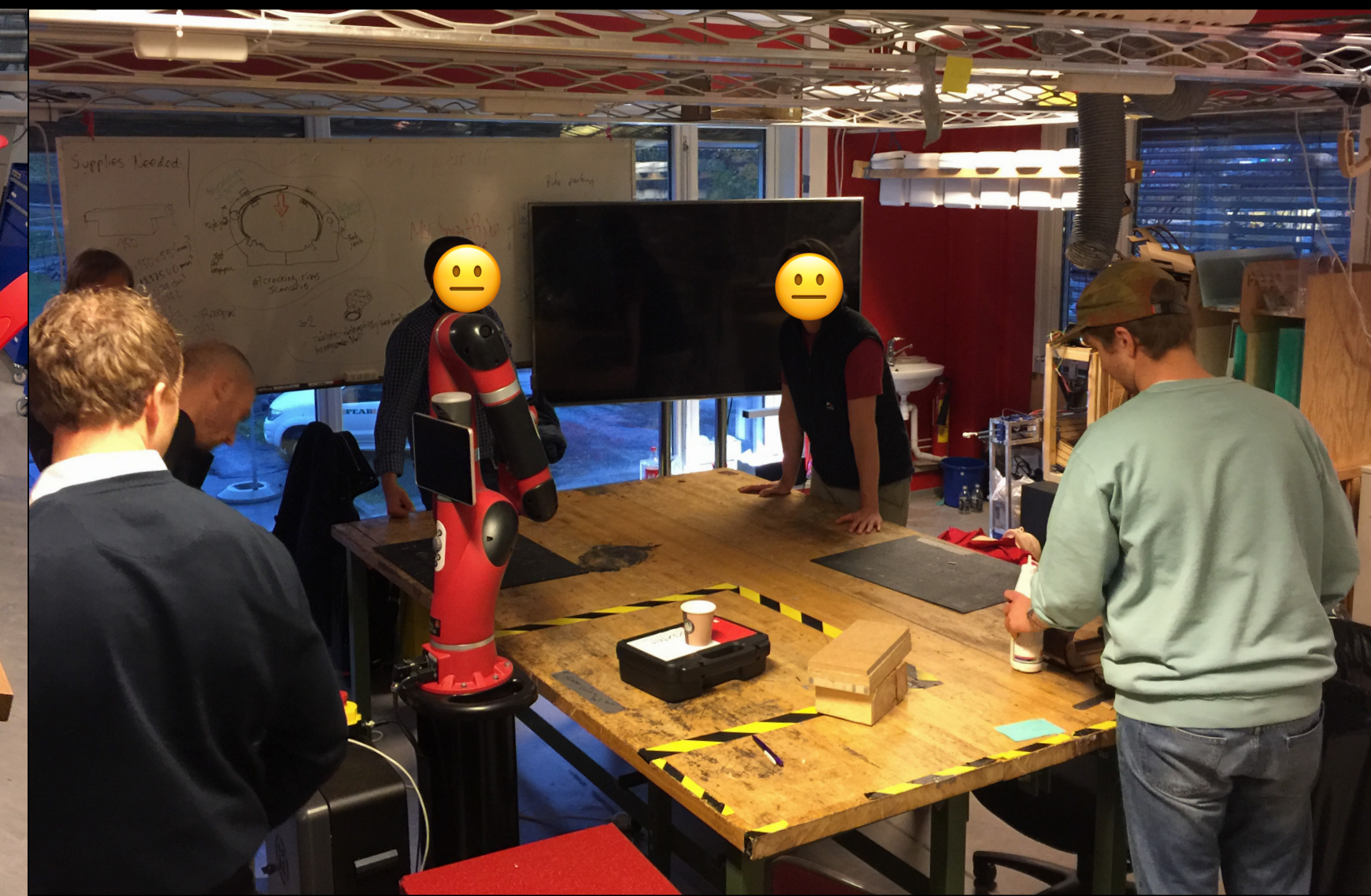
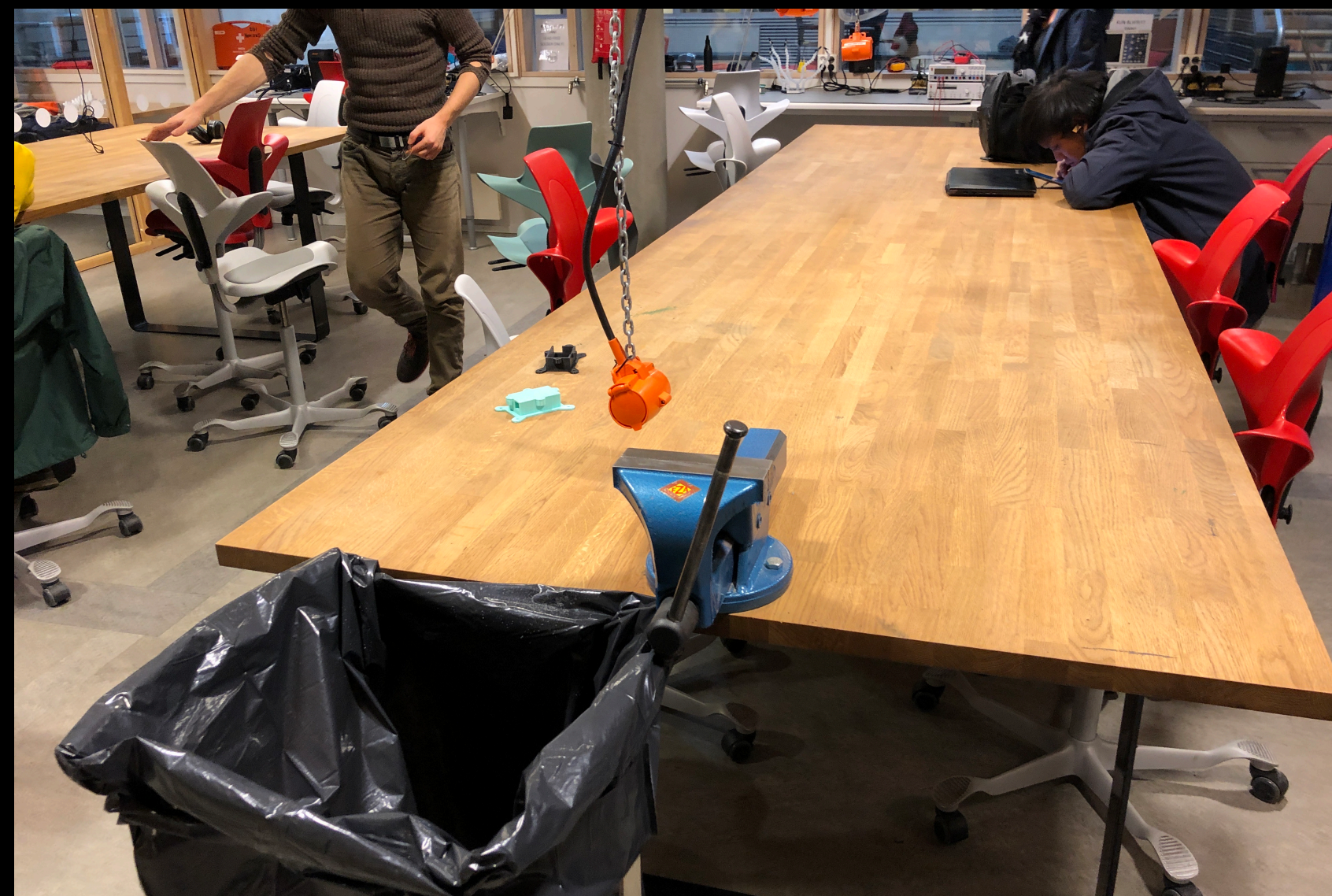


Fredrik Schetelig åpner NTNUs nye fakultet for arkitektur og design

Studentersamfundet, Trondheim, 2. november 2017

Collecting inspiration

- Me and my colleagues went on several trips
- Partly to investigate what a new study program in Interaction design should offer
- ...and partly what a teaching makerspace may look like and how it could contribute to the education of design students



Painting a picture...

- This is a picture of a group of design students that I took the end of 2016
- Me and my colleague Anders-Petter Andersson wanted to capture the spirit and practices of the new bachelor program in interaction design (BIXD), as well as the existing master in interaction design (MIXD). So we arranged this scene
- (Angled from above to avoid model releases, and so that the picture could work both in landscape and in portrait orientation)



A Picture of Bachelor in Interaction Design

Photo: Kjell Are Refsvik

My (then) four main arguments for a Promoting a Teaching Makerspace

- As an study program manager, I had four main arguments for promoting a teaching makerspace:

1. Have a highly **flexible** space for varied, active, authentic, problem-based and explorative **learning**

2. Have a highly **flexible** space for varied, active, authentic, problem-based and explorative **teaching**

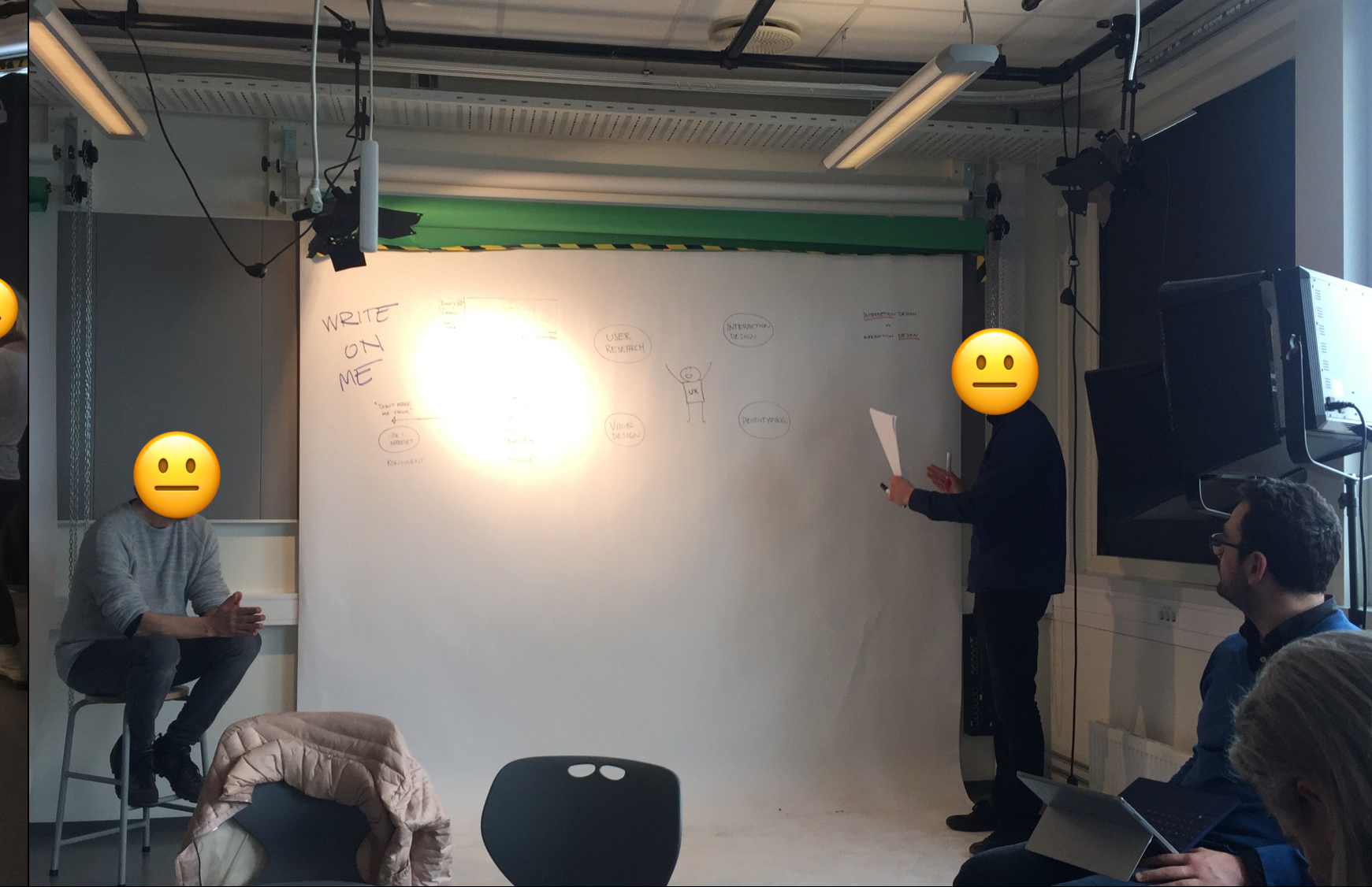
3. Have a space that could support **cross-, intra- and inter-disciplinary learning**, together with students from other disciplines. Having some unique tools/materials/competences, and requiring our students search for supplementing ones elsewhere on campus

4. Lean into the long **academic, department and faculty traditions** of using workshops as one of its signature pedagogies



Varying, active, authentic and explorative learning

Photo: Kjell Are Refsvik



Varying, active, authentic and explorative teaching

Photo: Kjell Are Refsvik



Cross-, intra- and inter-disciplinary learning

Photo: Kjell Are Refsvik



Bauhaus

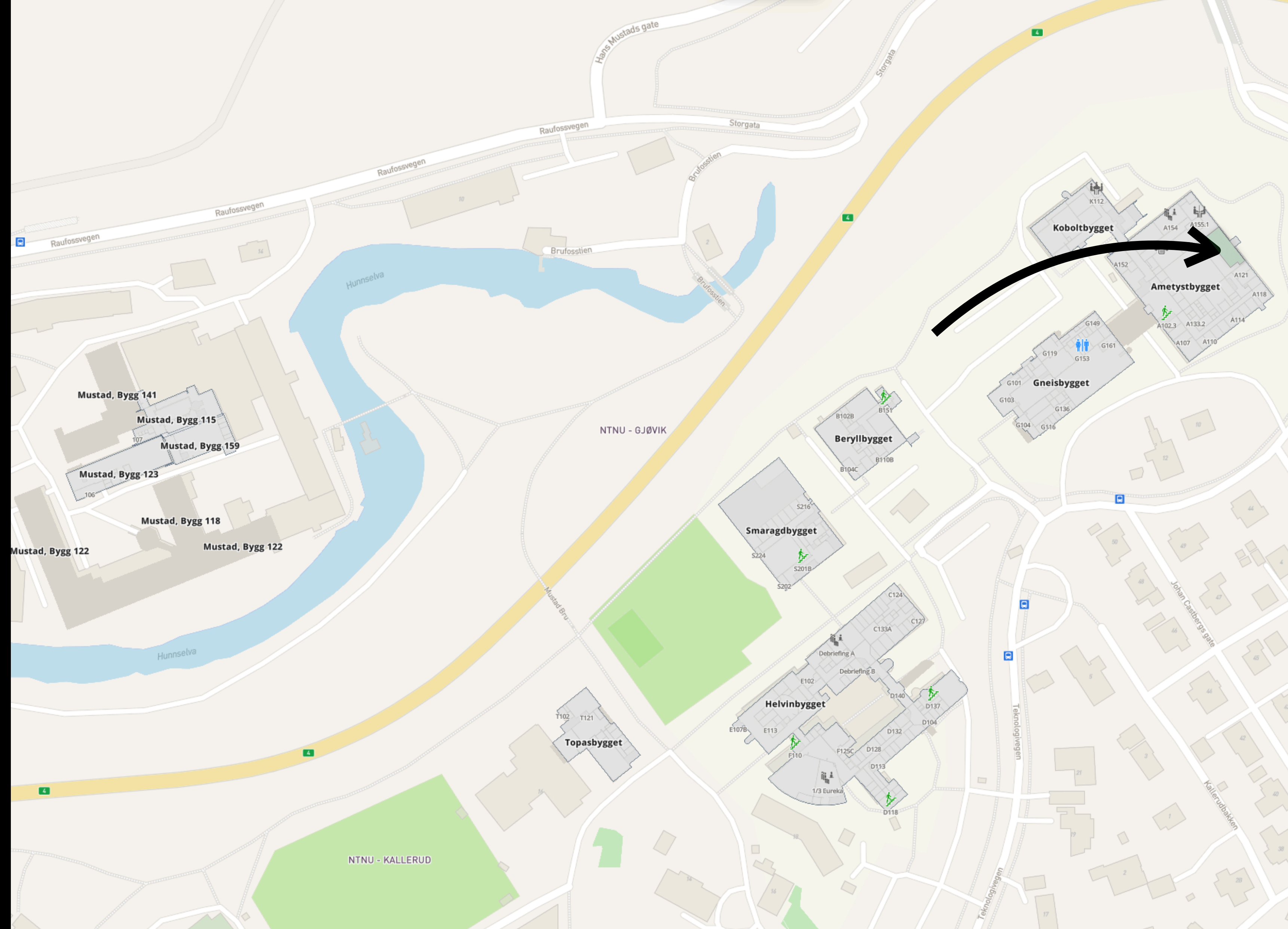
Photo: [Spyrosdrakopoulos](#). CC: BY-SA4.0

The Teaching Makerspace

Version 1.0

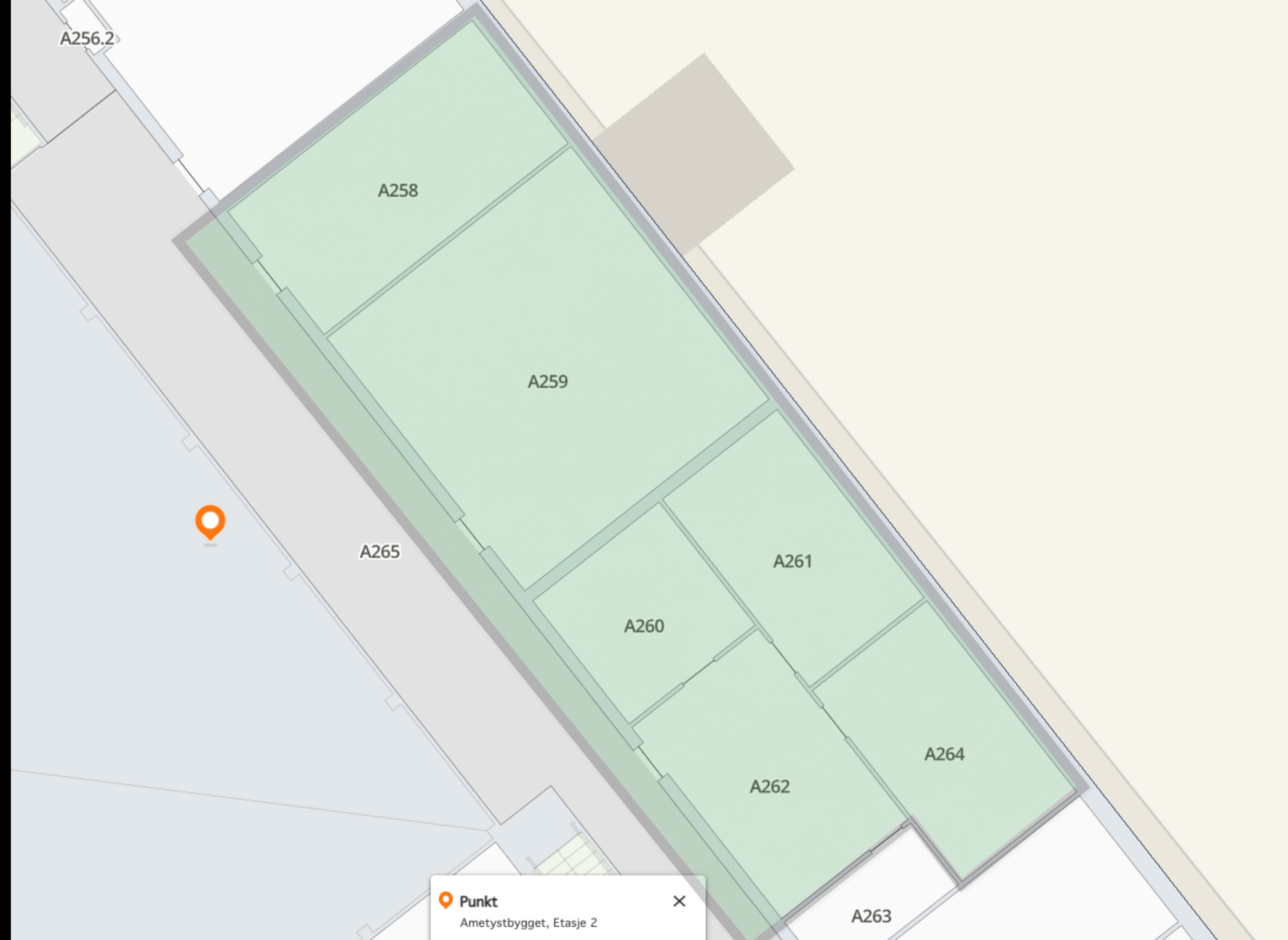
A new type of physical space for learning...

- Two adjacent rooms in the A-building on campus Kallerud



A cluster of rooms

- A258 Makerspace
- A259 Teaching
- A265 Exhibition/group work
- A260 Group room
- A261 Master room
- A265 Formal meeting room
- A262 Informal meeting room



Teaching interests guiding me...

- I have always been drawn to using **enabling** technology and materials to facilitate **problem-based, cross-collaborative** and **authentic** social learning activities
- Among other things, I believe such activities can provide **flexibility** and **variation**, needed to make learning **accessible** to all students
- Focusing on letting students (A) solve problems (preferably hard) or (B) create new opportunities for someone, or both

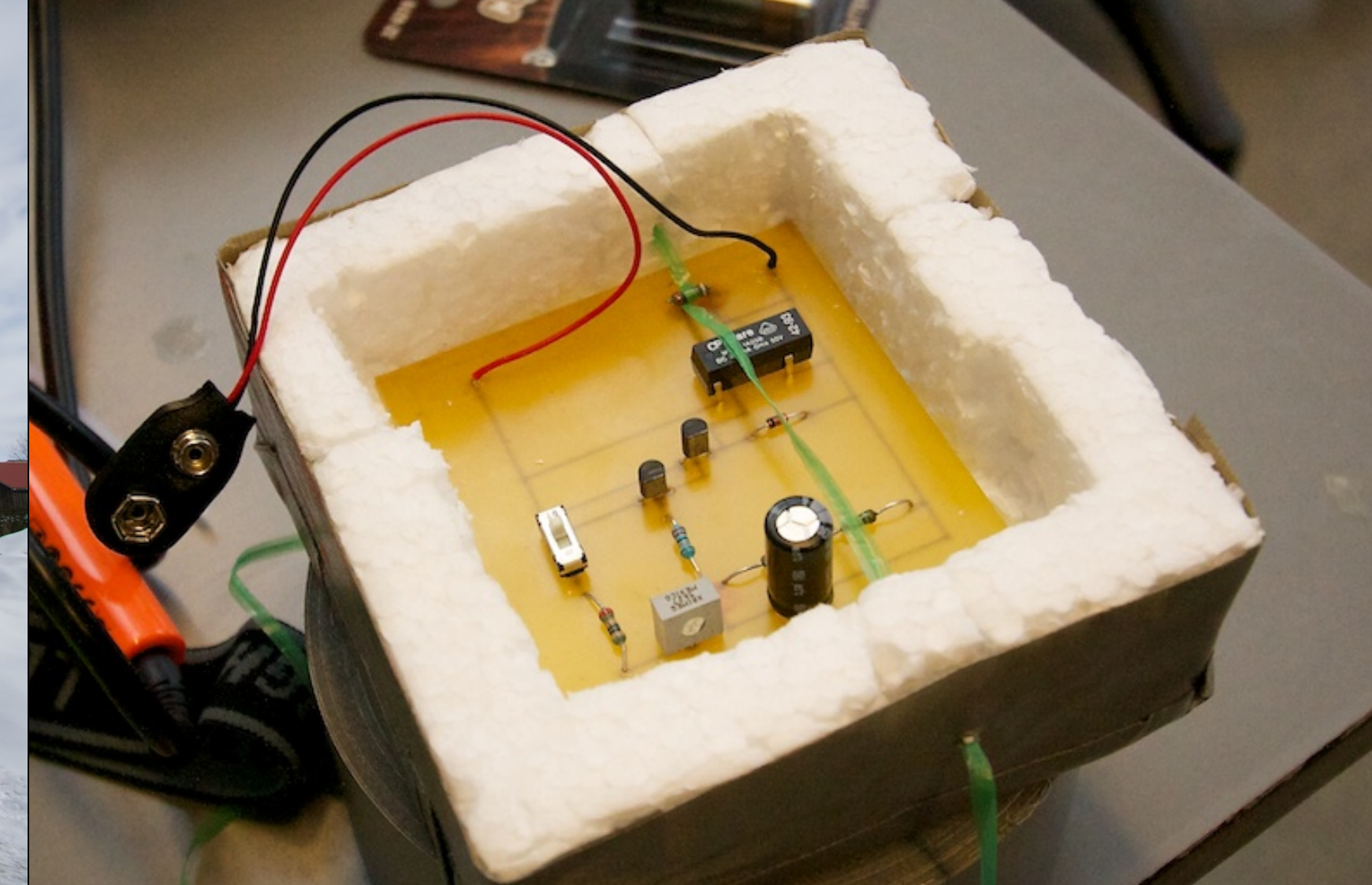


Example 1

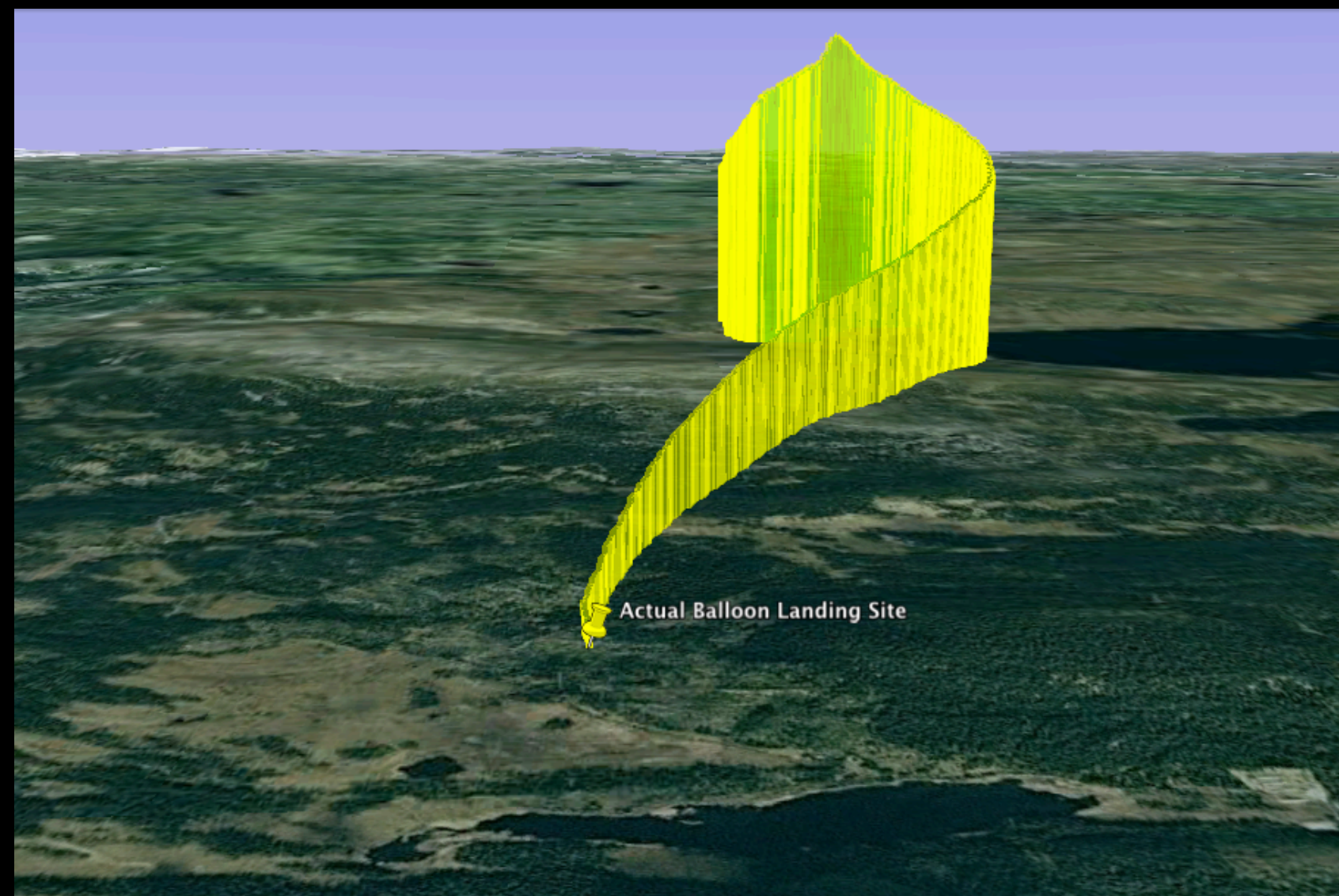
- **MOSCUS** – **MO**bile **S**olutions and data **C**ollection in the **U**pper **a**tmo**S**phere
- Cross-collabotation between two classes in the fall of 2011
- Class of students in mobile technology, with the task of building a weather balloon with near-space capabilities that could collect data
- Carrying a (Android) **smartphone** to collect some kind of data and send data to help the class retrieve it upon landing
- Class of media production students tasked with telling the whole story (photo, text, video, feeding news outlets)



Student measuring the lifting force of the weather balloon using a newton meter



Electronic components that could cut the tether between balloon and the smartphone packet



GPS data from the phone showing the trajectory



Local newspaper article about the project

Example 2

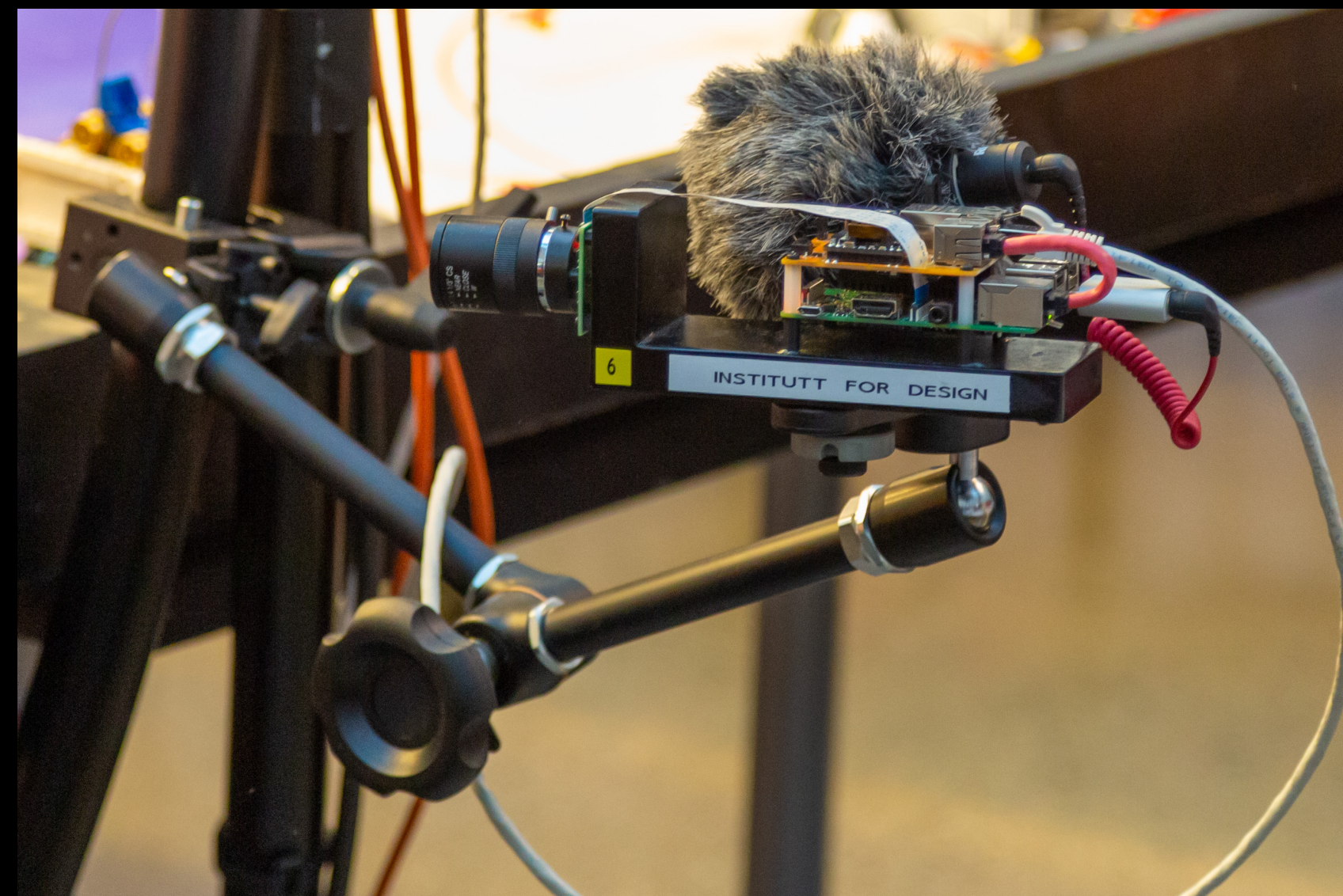
- First LEGO League
- 2009 – 2017 Media Production
 - Planning, organizing, producing Social media postings, interviews, video streams, web pages and more
- 2018 – Interaction design
 - Prototyping, designing and testing miscellaneous tangible prototypes, artefacts and systems to help make a better competition



Producing content for social media platforms
2009-2017



Planning live streaming
2009-2017



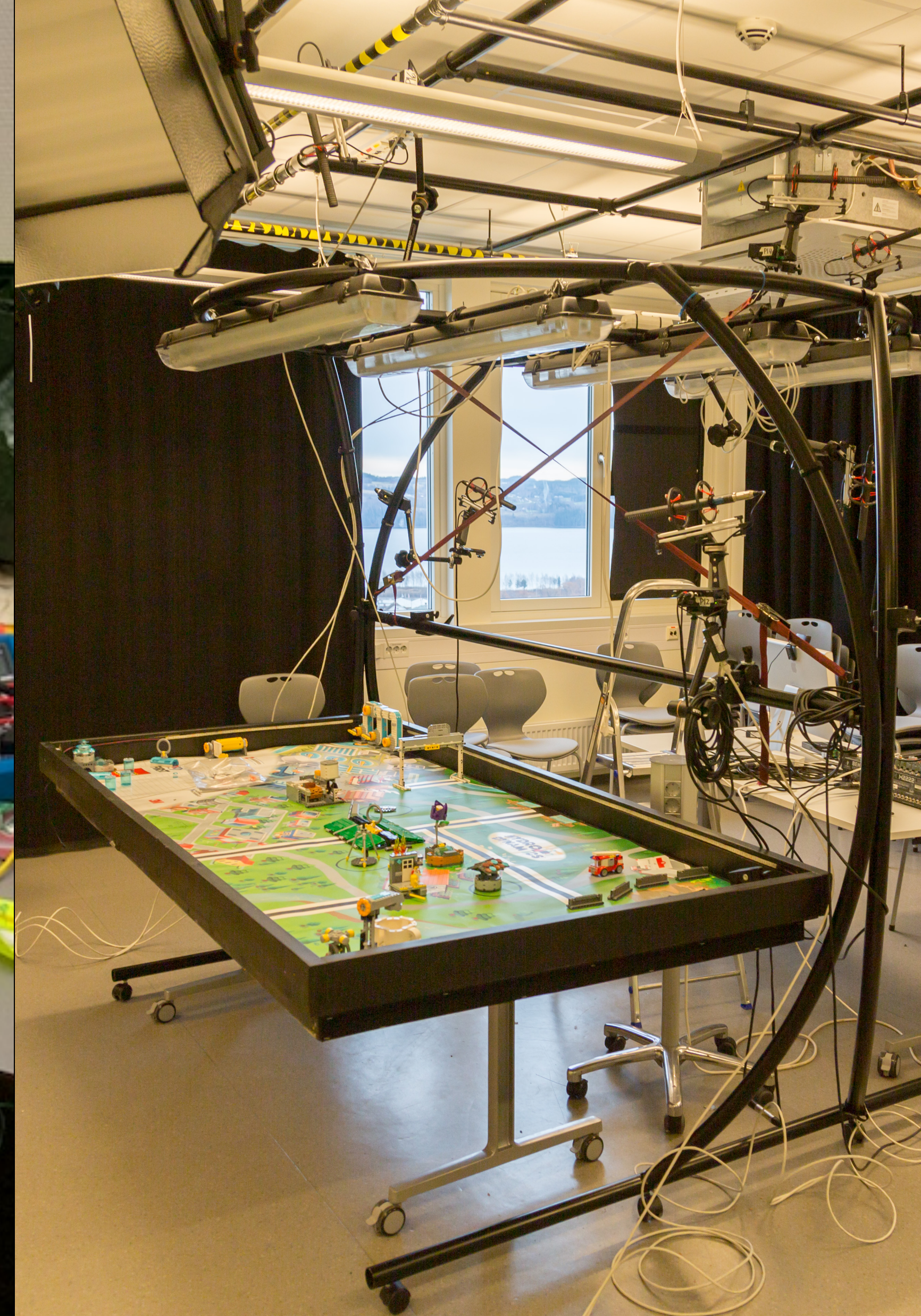
Experimental video multistreams to YouTube
2018-2019



Designing a new competition table and lighting rig
2019-2022

MOSCUS + First LEGO

- So, starting the work of creating a teaching makerspace...
- ...I wanted a classroom and facilities to support teaching and learning activities like MOCUS and First LEGO League



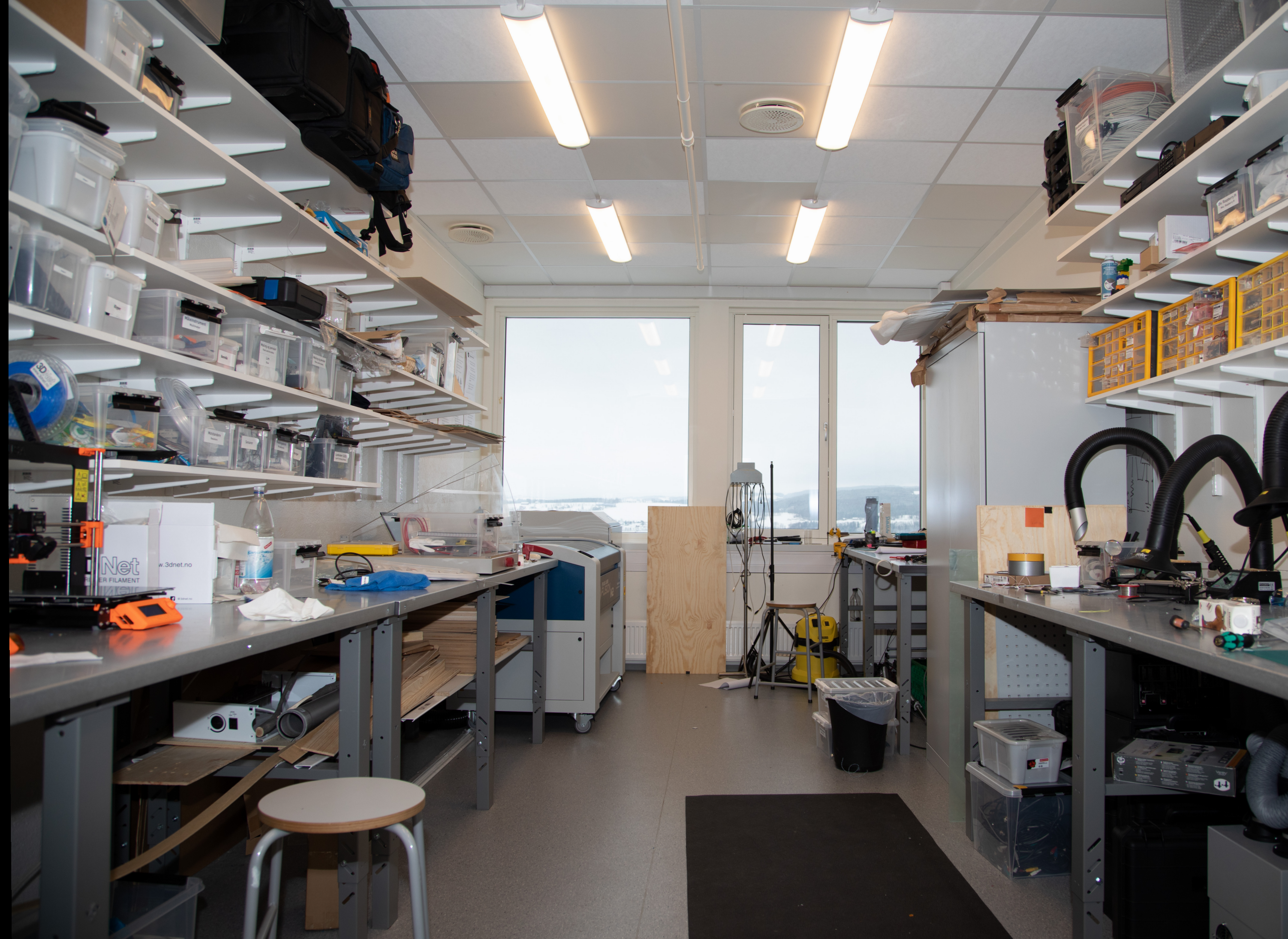
Teaching...

- A small classroom (around 65 square meters)
- With some flexible fixtures and cabling from when the room was used as a studio



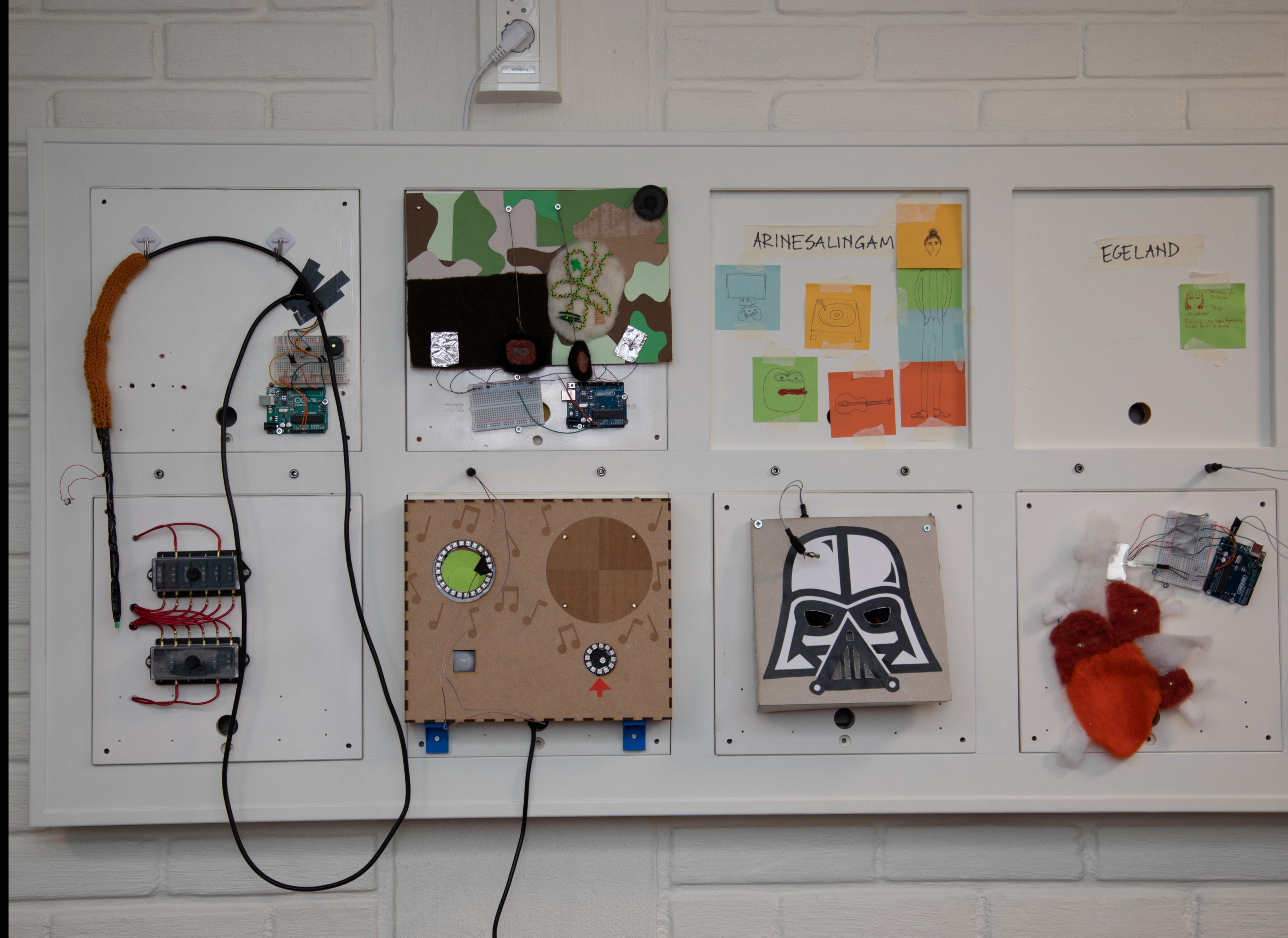
...Makerspace

- A small workshop (around 25 square meters)
- Workbenches
- Electronics, textiles, Wood
- 3D-printers and a laser cutter
- Common hand tools



Digital and physical spaces of exhibition

- Me and my colleague Anders-Petter Andersson (APA) have both promoted the practices of students exhibiting/sharing their work with fellow students over the years
- APA have led the work to find and use a digital platform for web portfolios, testing out MediaWiki, Wix, Wordpress, Research Catalogue and more
- Digital web portfolios: Mixed results. Lacking a user-friendly common technical platform, a program-wide strategy and student confidence to share what they create
- Physical project wall: I designed and built a physical project wall with mixed results. A number of students described it as a "Wall of Shame" and expressed unwillingness to put their work on display, publicly in the corridor for all to see



The Teaching Makerspace

Version 2.0

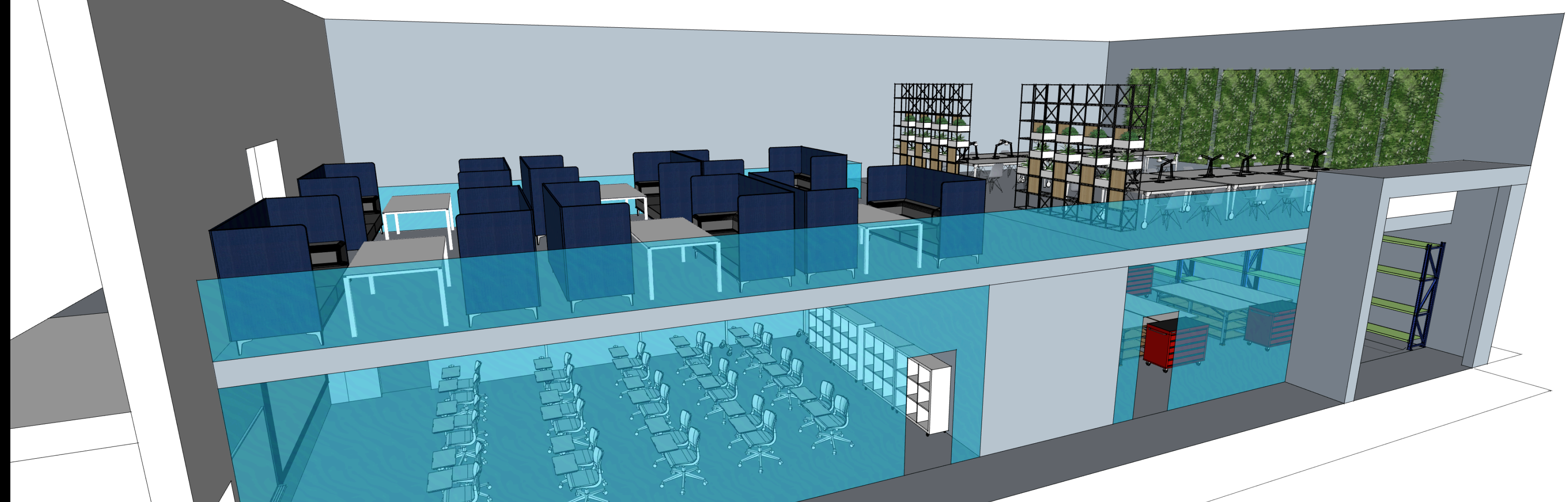
2019

- Moving ID Gjøvik from one part of campus to another gave new opportunities to re-frame what a teaching makerspace is



Sketching as a method

- I created a number of sketches in 2018 after it was decided that we would move the department to Mustad
- To contribute to the debate about how we wanted the new space to work and look



A multi-purpose room

- As flexible as possible
- Signature teaching space for design students
- Day, evening and weekend activities
- Divided in a workshop space (right) and a teaching space (left)



The Design Factory with the Teaching Makerspace 2.0

- Offices ready by 2019
- New teaching facilities used for teaching first time in August of 2020



Flexibility

- Has the potential of supporting different teaching and learning styles
- Movable furniture and equipment adds to flexibility
- The Teaching Makerspace have equipment/material found at other departments and works to include students from other departments



A Series of makerspace-centric courses...

- Before leaving the position as study program manager for BIXD, I took part in creating a series of interconnected makerspace-centric courses
- So that we could offer an alternative to designing for/on screens
- IDG1006: Technology, frameworks, and methods. Entry-level electronics. Largely individual, signature course for BIXD-students only
- IDG3750: Tangible interaction, WoT intro, Accessibility. PBL, Group-based, international
- IDG3006: Web of Things, Intra-disciplinary, collaborative, WoT Electronic systems, Group-based, international
- IDG3800: Improvements, communicating the story behind the projects, Exhibition. Individual/Groups

Bachelor in Interaction design 2022-2023

IDG1000 Grafiske verktøy, prinsipper og metoder	IDG1000 Introduction to User-Centered Design	IDG1292 Web Coding	IDG1006 Fysisk prototyping
EXPH0100 Ex.Phil.	IDG1004 Farge i Grensesnittdesign	IDG1200 Grunnleggende psykologi	SMF1007 Prosjektstyring
IDG2000 Områdeemne: Design i helsetjenester	IDG2009 Kommunikasjon	IDG3009 Informasjonsarkitektur	Valgemne
IDG2200 Design og prototyping for digitale produkter	IDG3002 Tjenestedesign	SMD2290 Etikk, bærekraft og samfunnsansvar	IDG3750 Sensorisk og berøringsvennlig design
IDG3541 Designpraksis i bedrift		IDG3101 Fordypningsprosjekt	IDG3006 Tingenes Web
IDG3910 Bacheloroppgave BIXD			IDG3800 Mappe og utstilling

A Matrix of rectangles, signifying the courses in Bachelor in Interaction Design at NTNU Gjøvik for 2022-2023. Four highlighted ones: "[1]Fysisk prototyping, [2]Sensorisk og berøringsvennlig design, [3]Tingenes web og [4]Mappe og utstilling".

Inviting Authentic Learning into our classroom

- Design of Safety-Critical systems with Carly Grace Allen in the spring of 2022
- Inviting in an ambulance in to the makerspace
- To look at how life-saving systems and interactions have been designed, implemented and used



Design of Safety-Critical systems

Unconventional Teaching and Learning Styles

- We also use the space for unconventional and practical learning activities
- Like re-potting plants for the physical prototyping course



Exhibitions

- I have designed a second version of a exhibition board for physical student projects
- Providing much needed vertical space for student projects
- Could be turned into horizontal space with shelves using holes as fixing points
- A set of lasercut and 3D printed fixtures to create different kinds of mounting points
- No physical or digital exhibition space/platform in use among students yet as of the beginning of 2023



Prototype 1, office version

Photo: Kjell Are Refsvik, 2019



Prototype 2, makerspace Version

Photo: Kjell Are Refsvik, 2021

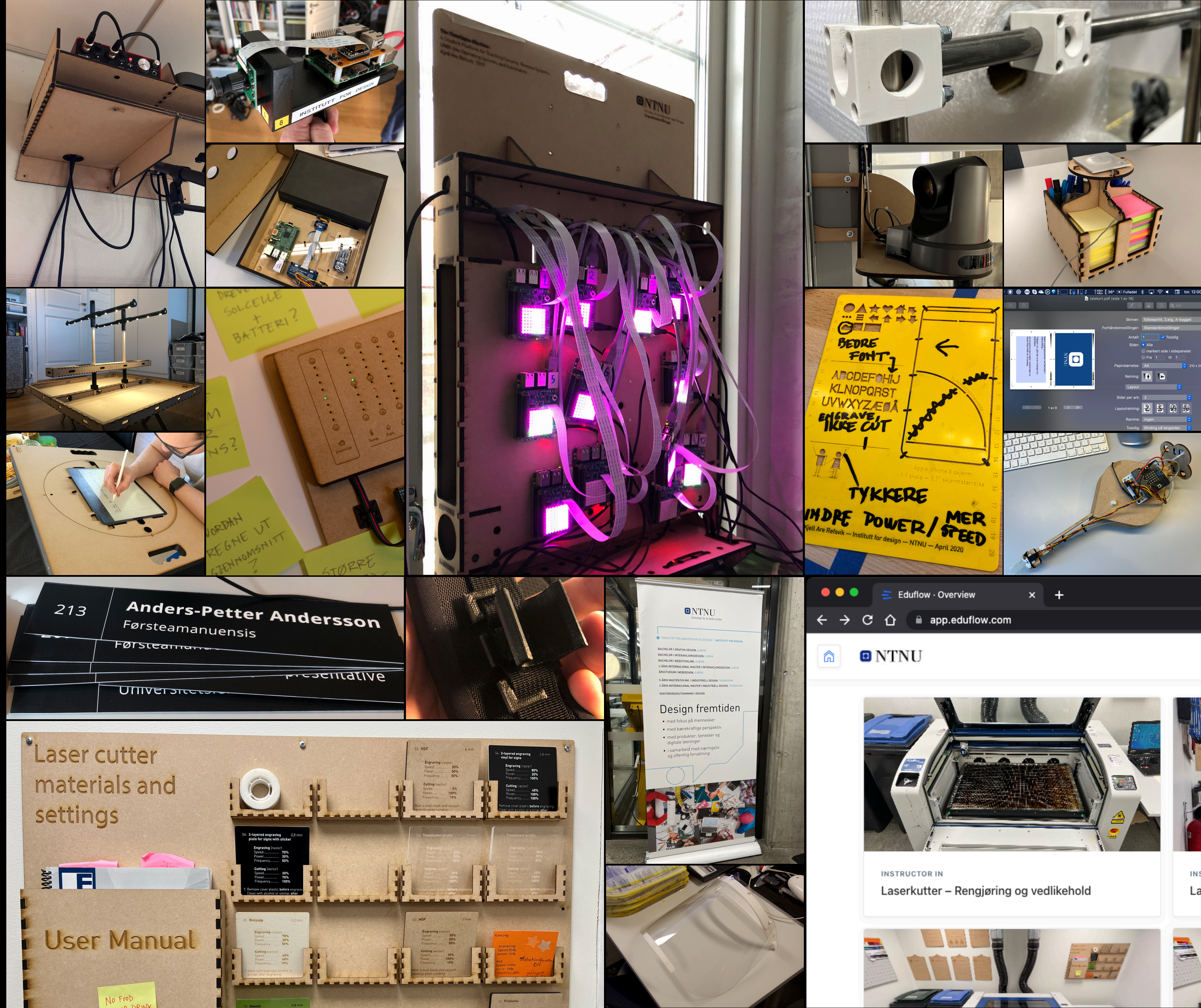


Prototype 3, Digital model projected in the workshop using Augmented Reality Technology from Apple

Photo: Kjell Are Refsvik, 2021

Designing and producing artefacts

- I have created a number of artefacts over the last 6 years
- Digital, electronic, additive and subtractive, combined
- **To explain** the use of enabling design technology, principles and software
- **To inspire and inform** students about usability, accessibility, sustainability and more in a physical surrounding
- **To extend and improve** or create new opportunities for the department
- Files and reflections on these to be shared on refsvik.design later...



Teaching Makerspace Council

- After increasing challenges to organise its use and continued development, a Makerspace Council was established in the fall of 2022
- The Council is led by the Department Office Manager
- ...and with representatives from Health and safety, Study programs, Teaching/research Staff, the local makerspace manager and a student representative
- To help balance the different interests, needs, actors and activities and manage the practicalities

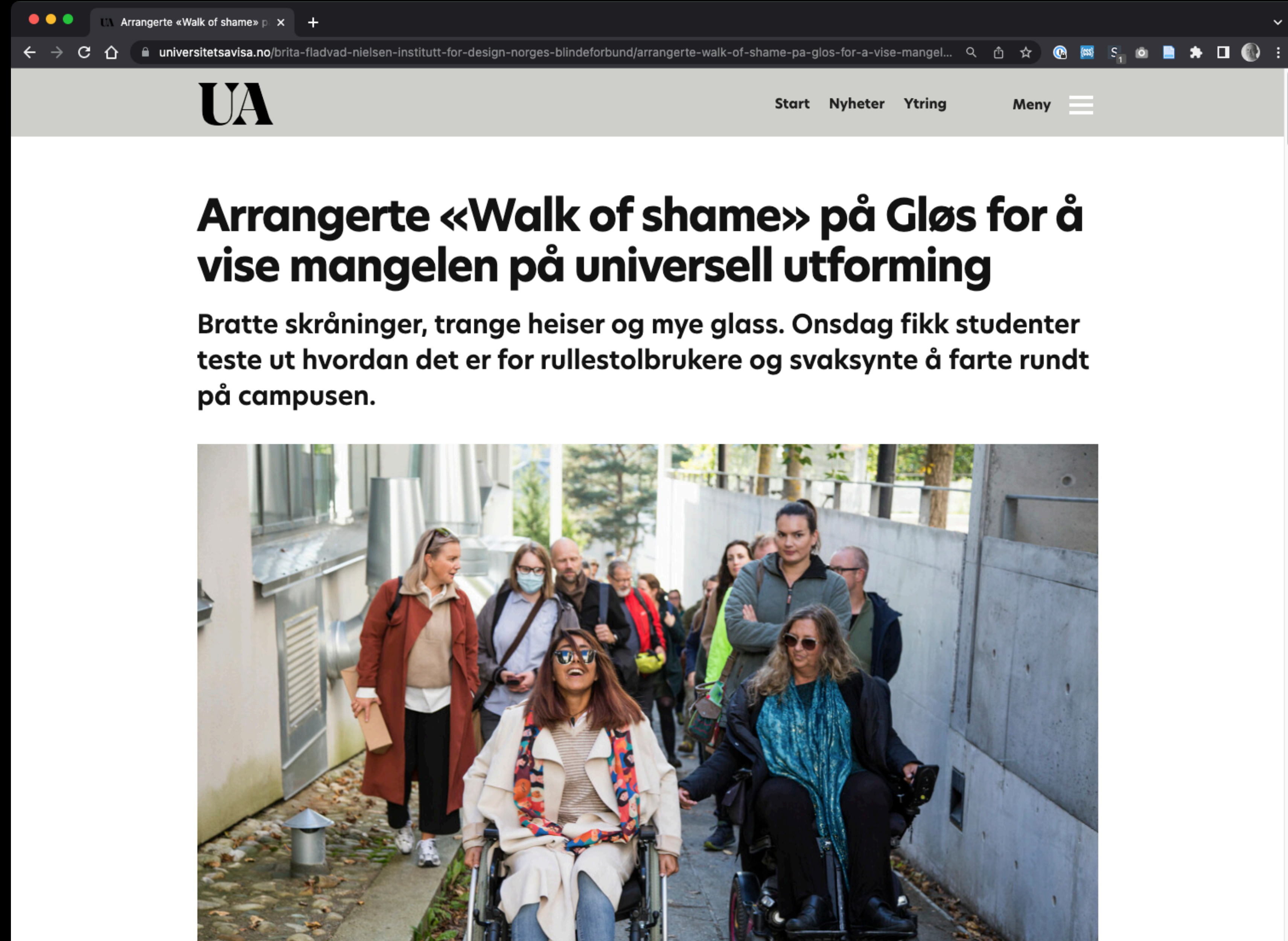


Alt-text: Four icons with a female human form.

Moving forward...

A walk of shame...

- In 2021, design students and staff organised a **"Walk of shame"** at NTNU Gløshaugen, Trondheim
- Identifying a number of (embarrassing) accessibility challenges in the built environment on campus Gløshaugen, Trondheim
- The reporting from the walk gave us interesting insights into accessibility challenges that we may not be aware of on a daily basis
- Ane gave me an idea for my own **action research project**




UA Arrangerte «Walk of shame» p x +

universitetsavisa.no/brita-fladvad-nielsen-institutt-for-design-norges-blindeforbund/arrangerte-walk-of-shame-pa-glos-for-a-vise-mangel...

UA Start Nyheter Ytring Meny

Arrangerte «Walk of shame» på Gløs for å vise mangelen på universell utforming

Bratte skråninger, trange heiser og mye glass. Onsdag fikk studenter teste ut hvordan det er for rullestolbrukere og svaksynte å farte rundt på campusen.



My (new) role

- I was leading study programs in design and advocating a Teaching Makerspace from 2016-2021
- From 2021, I started working towards qualifying as an **Associate Teaching Professor** (Førstelektor)
- Needing a more narrow scope, I am now to be found in our Teaching Makerspace that I help create, investigating the overlap between the Teaching Makerspace and UDLHE (Universal Design for Learning in Higher Education)
- Looking closer into how I teach, tutor and evaluate in a teaching makerspace so as to include all students



Alt-text: Two overlapping circles named "Teaching Makerspace and "UDLHE Universal design for learning in higher education"

Research-based teaching – Teaching-based research

- I am working together with my students to improve the universal design of my courses
- Using established frameworks and guidelines for UDLHE
- Part of the work feels like my own personal «walk of shame» through my own teaching, tutoring and evaluation practices

CAST på norsk.numbers — Rec

75 % Zoom

Legg til kategori Pivottabell

Sett inn Tabell Diagram Tekst Figu

Ark 1

CAST rammeverk (2018) - Retningslinjer for universelt designet læring,

	Tilby flere måter å involvere seg på Affektive nettverk Læringens "HVORFOR"	Tilby flere representasjonsmidler Gjenkjenningsnettverk Læringens "HVA"
Tilgang	7. Gi alternativer for å rekruttere interesse	1. Tilby alternativer for persepsjon
	7.1 Optimalisere individuelle valg og autonomi (i tilstrekkelig grad)	1.1 Tilby måter å tilpasse visningen av informasjon
	7.2 Optimaliser relevans, verdi og autentisitet	
	7.3 Minimer trusler og distraksjoner (til en viss grad)	
Utvikle	8. Tilby alternativer for å opprettholde innsats og utholdenhet	2. Tilby alternativer for språk og symboler
	8.1 Øk fremtredende og mål og målsettinger	2.1 Tydeliggjør ordforråd og symboler
	8.2 Varier krav og ressurser for å optimalisere utfordringen	2.2 Avklar syntaks og struktur
	8.3 Fremme samarbeid og fellesskap	2.3 Støtte for dekoding av tekst, matematisk notasjon
	8.4 Øk mestringsorientert tilbakemelding	2.4 Fremme forståelse på tvers av språk
		2.5 Illustrér gjennom bruk av flere medier
	9. Tilby muligheter for selvregulering	3. Tilby alternativer for forståelse

7.2 Optimaliser relevans, verdi og autentisitet

7.2 Optimaliser relevans, verdi og autentisitet (i liten grad)

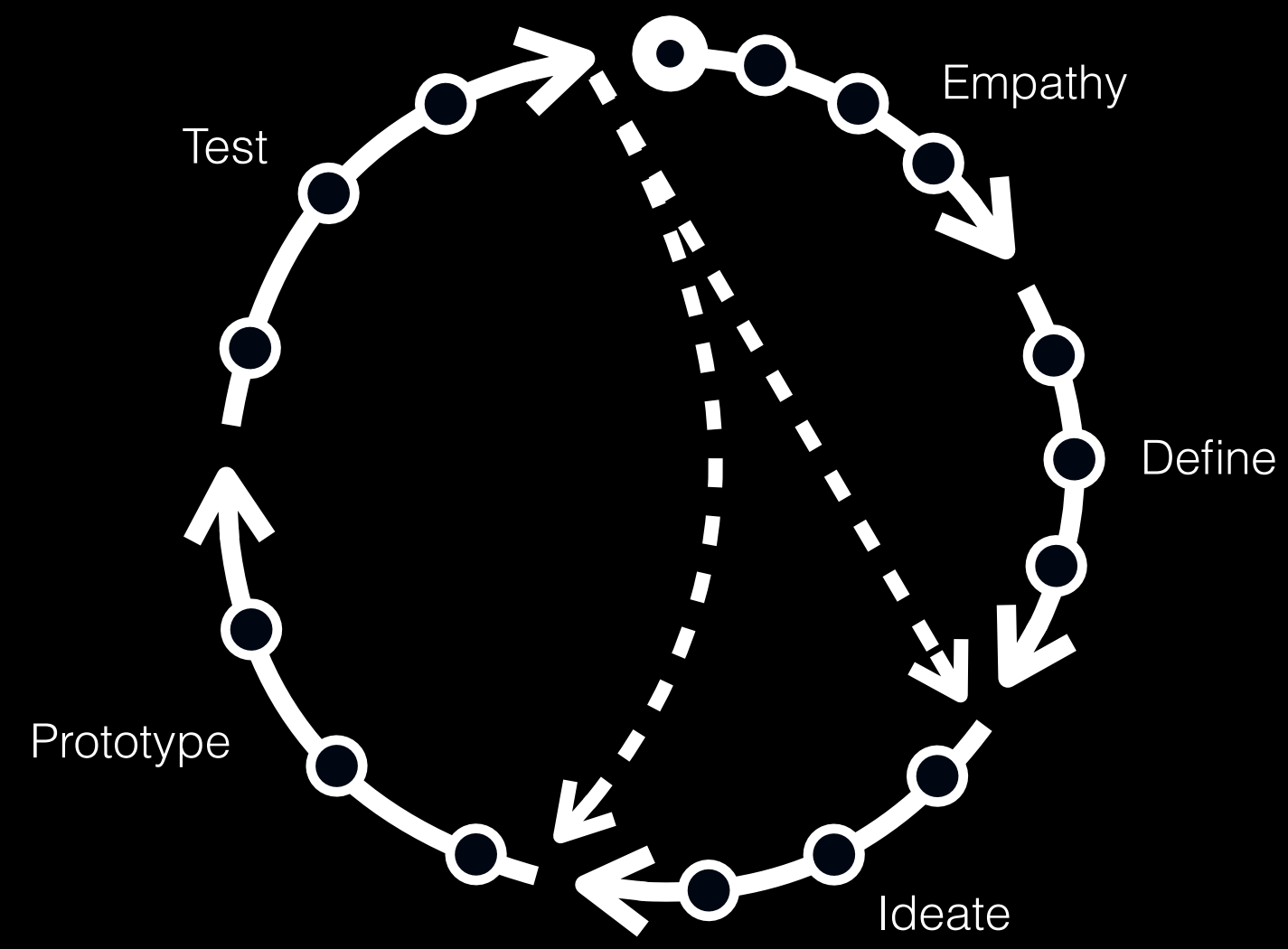
✓ 7.2 Optimaliser relevans, verdi og autentisitet (til en viss grad)

7.2 Optimaliser relevans, verdi og autentisitet (i tilstrekkelig grad)

IDG1006

Physical Prototyping

- Students get to learn about design **frameworks** and design **methods**
- After collecting **insight** and developing **empathy**...
- ...students define a **problem**, create **concepts** and build and test a plant-centric **prototype**
- Using additive, subtractive and electronic parts



Alt-text: Circle divided into five parts with each part having an arrow to signify a clockwise direction.



IDG3750


Tangible Interaction

- Problem- and project- based course
- Students gets to investigate and try to solve a tangible challenge
- Projects often rooted in our physical surroundings
- Students write a report, create a prototype/model and grant a Creative Commons license to enable future students to extend the project

Tangible and Sensorial Interaction Design 2023 ☆ 📁 Lagret i Disk
Fil Endre Visning Sett inn Format Verktøy Utvidelser Zotero Hjelp Sist rediger...

100% Normal tekst Arial - 11 + B I U A

Stained glass window in the design workshop at ID Gjøvik (learning aid, wellbeing)



Preliminary project synopsis

An earlier student project in this course, identified the window of the design workshop as a possible area for placing a teaching/learning aid. The group identified the possibility of using paint/vinyl or other materials to create symbols/messages/colours to signify the importance of key attributes of our education, e.g. the UNs sustainability goals on the window panes.

The project goal is to find a way to build a prototype and test the viability of this idea and the experiences and usefulness of such an artefact among students and staff using scientific methods. Any prototypes involving the window panes may need approval from the building owner, and need to be non-permanent.

Future Technology Studies (FTS)

- From 2019 to 2021 NTNU ran the **Future Technology Studies** (FTS) project
- Initiated by the pro Dean and led by Geir Øien and Nils Rune Bodsberg it looked at the challenges for the educating the technology student of the future at NTNU
- The reports that came out of the project pointed to a number of challenges and suggested solutions
- Including a list of principles to guide the development of facilities and programs...

Fremtidens teknologistudier

Fremtidens teknologistudier



Prosjektet Fremtidens teknologistudier ble avsluttet 31. desember 2021, og resultatene og anbefalingene fra prosjektet vil bli behandlet og fulgt opp av ulike organer i NTNU.

Fremtidens teknologistudier skulle legge til rette for at NTNUs studieportefølje i teknologi er samstemt med teknologiutviklingen, samfunnsutfordringene og nærings- og arbeidslivets behov i perioden fra 2025 og fremover.

Fra august 2019 og ut 2021 utredet og utviklet prosjektet et anbefalt rammeverk for NTNUs fremtidige studieportefølje innenfor teknologi på bachelor-, master- og ph.d.-nivå. Det omfatter de klassiske teknologistudiene, hovedsakelig sivilingeniør- og ingeniørfag, samt realfag og arkitektur-, design- og planleggingsfag.

Prosjektet eies av prorektor for utdanning og er en del av NTNUs utviklingsplan for Fremtidens studietilbud, som også omfatter prosjektet [Fremtidens HUMSAM-studier](#).

Offisielle prosjektleveranser

[Se prosjektets sluttrapport](#)

Kontakt



Geir Egil Dahle Øien Professor
93455408 geir.oien@ntnu.no
Institutt for elektroniske systemer



Nils Rune Bodsberg Seniorrådgiver
93089836 nils.r.bodsberg@ntnu.no
Avdeling for utdanningskvalitet



Mads Saurstrø
Kommunikasjonsrådgiver,
Eiendomsavdelingen
73595411 99445017

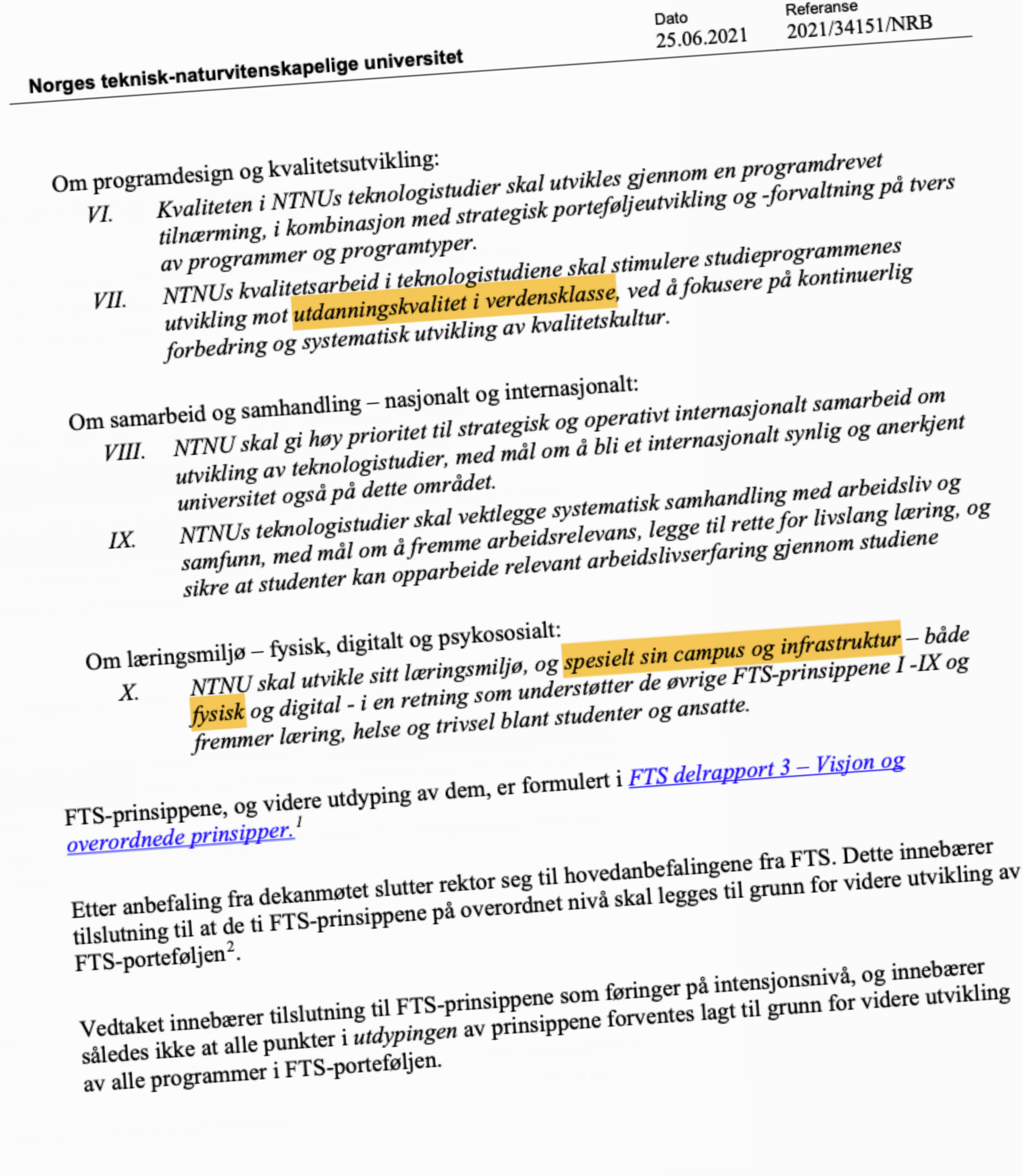
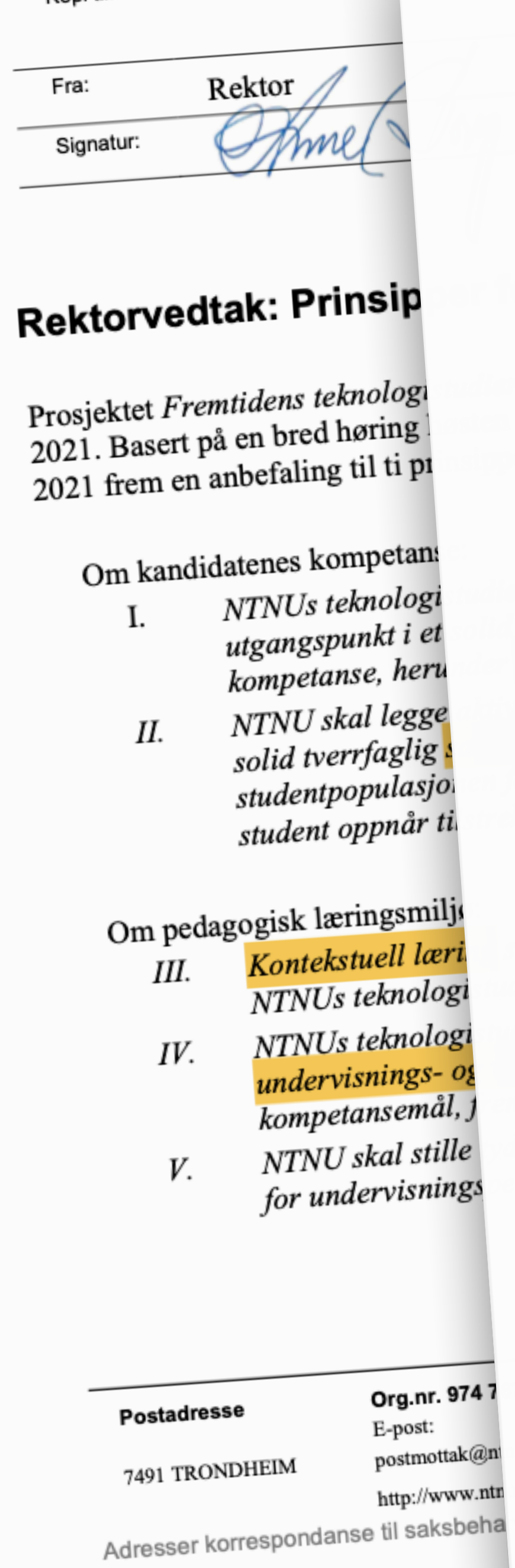
mads.saurstro@ntnu.no
Servicesenter for eiendom

Organisering, mandat og prosjektplan

- [Prosjektorganisasjonen](#)
- [Delprosjekt 1](#)
- [Delprosjekt 2](#)
- [Pilotprosjekter](#)
- [Utredningsgrupper](#)
- [FTS' støtte til sentrale NTNU-prosesser](#)
- [Mandat](#)
- [Prosjektplan](#)

Ten FTS Principles

- In 2021, the Dean at NTNU pledged that NTNU would support the ten principles stated by the FTS project
- My interpretation is that our Teaching Makerspace could play an important role in supporting several of the ten principles of educating the technology student of tomorrow



Thank you for attending.

Questions or comments?

**Name and rank and
role**

Kjell Are Refsvik, M.Sc.
University Lecturer

**Online points of
contact**

Email: kjell.Refsvik@ntnu.no
<https://www.ntnu.no/ansatte/kjell.refsvik>

Employer

Norwegian University of Science and Technology
Faculty of Architecture and Design
Department of Design