LEARN TO MAKE, MAKE TO LEARN

Camille Moussette, 19.04.2012, DeSForM 2012

UMEÅ UNIVERSITET

PHD STUDENT + TEACHER

UMEÅ INSTITUTE OF DESIGN

PHD IN INDUSTRIAL DESIGN, STARTED IN 2007, ETA FALL 2012

40% TEACHING FOR VARIOUS IXD COURSES

PHD PROJECT

SIMPLE HAPTICS, SKETCHING PERSPECTIVES FOR HAPTIC INTERACTION DESIGN

DANIEL FÄLLMAN, INTERACTIVE INSTITUTE UMEÅ

BILL BUXTON, MICROSOFT RESEARCH

LEARN TO MAKE,
MAKE TO LEARN

Reflections from
4 **Sketching Haptics** Workshops

THE WORLD OF HAPTICS

TYPICAL INTERFACES

THE WORLD OF HAPTICS

COMPLEX AND TECHNICAL

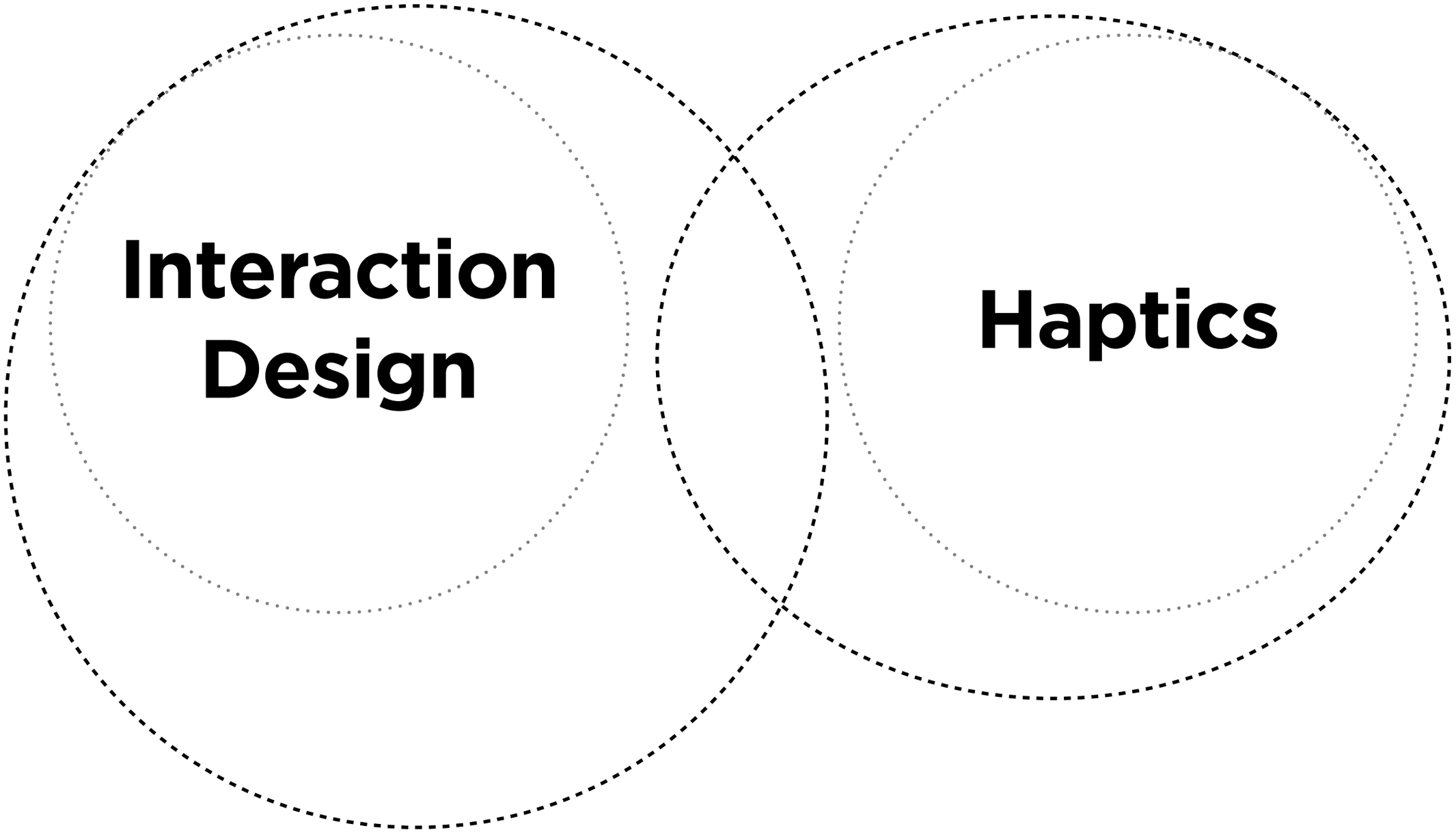
GUI > TUI > NUI > physical

Interaction Design

Haptics

“we need more HCI and Design”

Haptic IxD

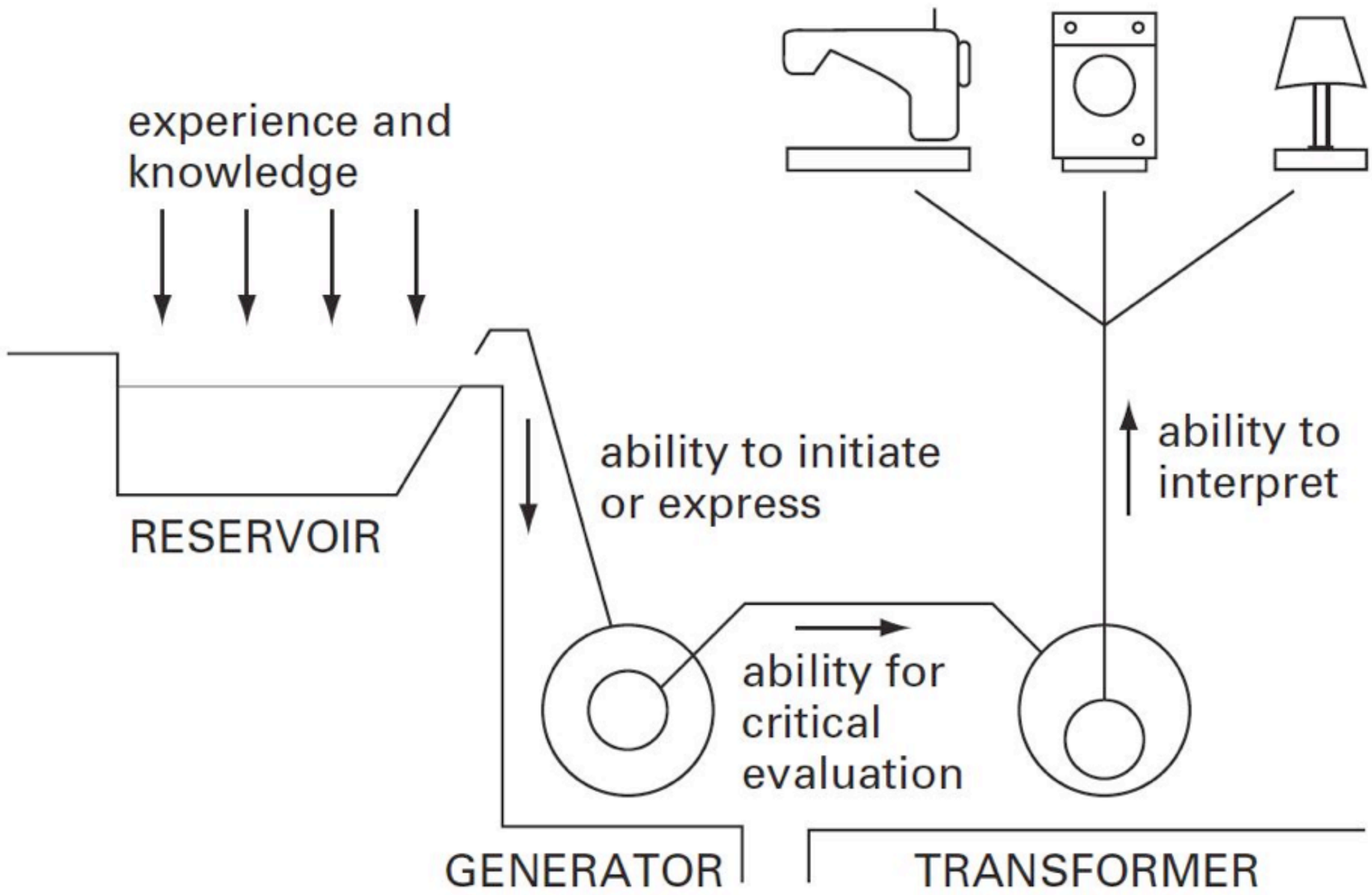


Haptic IxD

Interaction Design

Haptics

Laxton’s 3 design skills model (1969)



from How Designers Think, Bryan Lawson (2005)

DESIGNING IN THE UNKNOWN

PROBLEM-SOLVING WITH DETOURS

(EXPERIENCE) PROTOTYPING

VS

SKETCHING (IN HARDWARE)

(EXPERIENCE) PROTOTYPING

VS

SKETCHING (IN HARDWARE)

PROTOTYPES

VS

SKETCHES

The Anatomy of Prototypes

Lim, Y.-K., Stolterman, E., and Tenenberg, J. 2008

Prototypes are **filters** that traverse a design space and are **manifestations** of design ideas that concretize and externalize conceptual ideas.

A “good” prototype is very dependent on what you are trying to explore, evaluate, or understand.

The Anatomy of Prototypes

Lim, Y.-K., Stolterman, E., and Tenenberg, J. 2008

The Principles of Prototyping

Fundamental prototyping principle

Prototyping is an activity with the purpose of creating a **manifestation** that, in its simplest form, **filters** the qualities in which designers are interested, without distorting the understanding of the whole.

Economic principle of prototyping

The best prototype is one that, in the **simplest** and the **most efficient way**, makes the possibilities and limitations of a design idea visible and measurable.

Characterizing a sketch/prototype?

Fidelity scale (low/hi/mixed)

Audience, materials, resources

“Show & Tell” (sales)

“Show & Ask” (usability)

Prototype as a Hypothesis
(scientific method)

Prototype as a Marketplace
(exchange values, platform for productive collaboration, generation of knowledge/value)

Prototype as a Playground
(serious play, relaxation of rules, play vs serious vs real)

Sketch

Prototype

Sketching vs prototyping

Transaction cost (Coase/Buxton)

When/where can you afford to **really** explore alternatives?

Design calls for multiple equally viable variations

Consideration beyond the common and the expected

Priorities: discovery, sensitivity, non-committal actions, reflective practice

Sketching Haptics Workshops

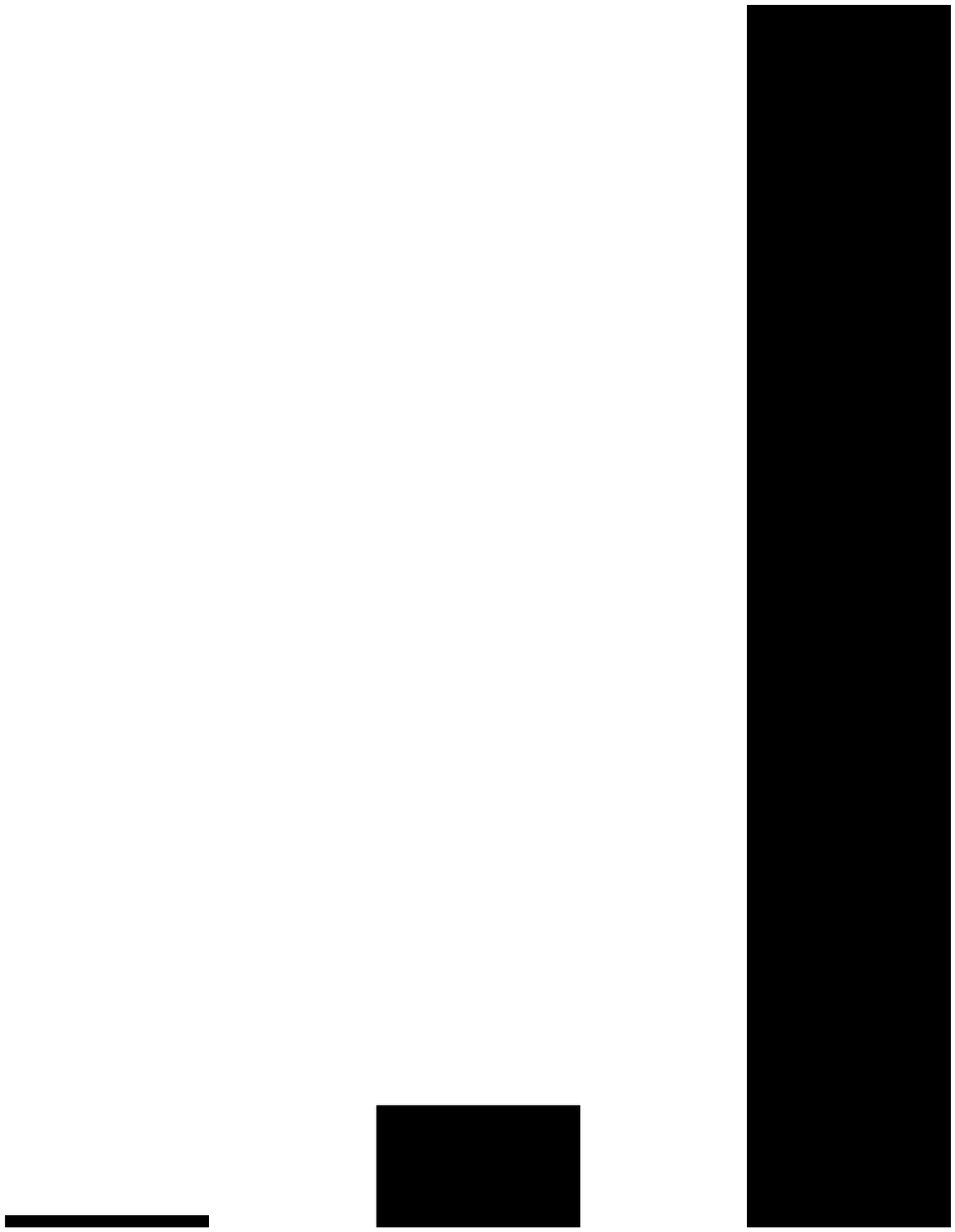
	Host program level	Group size	Location
A	Interaction Design MA level	9	Umeå, Sweden
B	Computer Science MA level	16	Gothenburg, Sweden
C	Computer Science MA, PhD and Post-Doc	9	Vancouver, Canada
D	Interaction Design MA level	11	Umeå, Sweden

Typical schedule

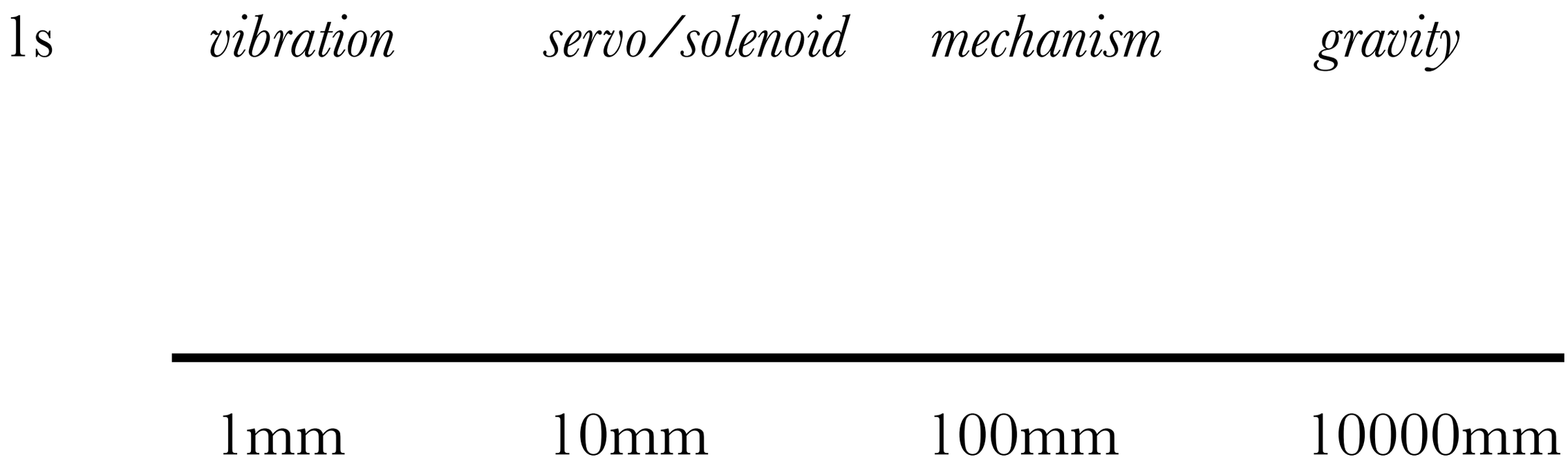
	AM	PM
Day 1	kick-off presentation + what is haptics + intro to movement, mechanisms and actuation	assignment #1 no technology (cardboard, glue, tape, rubber band, etc.)
Day 2	review of assignments #1 + design process lecture + presentation of various actuators + assignment #2 (3 different scales of actuation)	work on assignment #2 + recap Arduino
Day 3	review of assignments #2 + lecture about motors and actuators with Arduino	rework assignment #1 or #2 with Arduino control
Day 4	assignment #3 (significant challenge) + code/hardware clinics	collective literature review/ discussion + work on assignment #3
Day 5	work on assignment #3	final presentations, video documentation and debrief


TECHNO CENTRIC ↔ HUMAN CENTRIC

Orders of magnitude



haptics/actuation



haptics/actuation

1s	*vibration*	*servo/solenoid*	*mechanism*	*gravity*
0.001s	*piezo*	*EAP*	*???*	*???*

1mm	10mm	100mm	10000mm

haptics/actuation

1000s	*mechanism*	*organic growth*	*???*	*???*
1s	*vibration*	*servo/solenoid*	*mechanism*	*gravity*
0.001s	*piezo*	*EAP*	*???*	*???*
	1mm	10mm	100mm	10000mm

grow, explode, shrink, scale, rotate, pulse, flick, rest, disappear, clutch, release, hold, capture, pin, prompt, confirm, repeat, stable, glide, slide, stop, hit, kick, cancel, ease in/out, ramp, augment, increase, decrease, agitate, shake, twist, transform, bounce, cycle, follow, guide, grab, screw, implode, circulate, constrain, channel, force, lead, invite, smooth, hard, harsh, solid, soft, compliant, bounce, spring, break, stop, collide, permute, accelerate, react

SKETCHING HAPTICS

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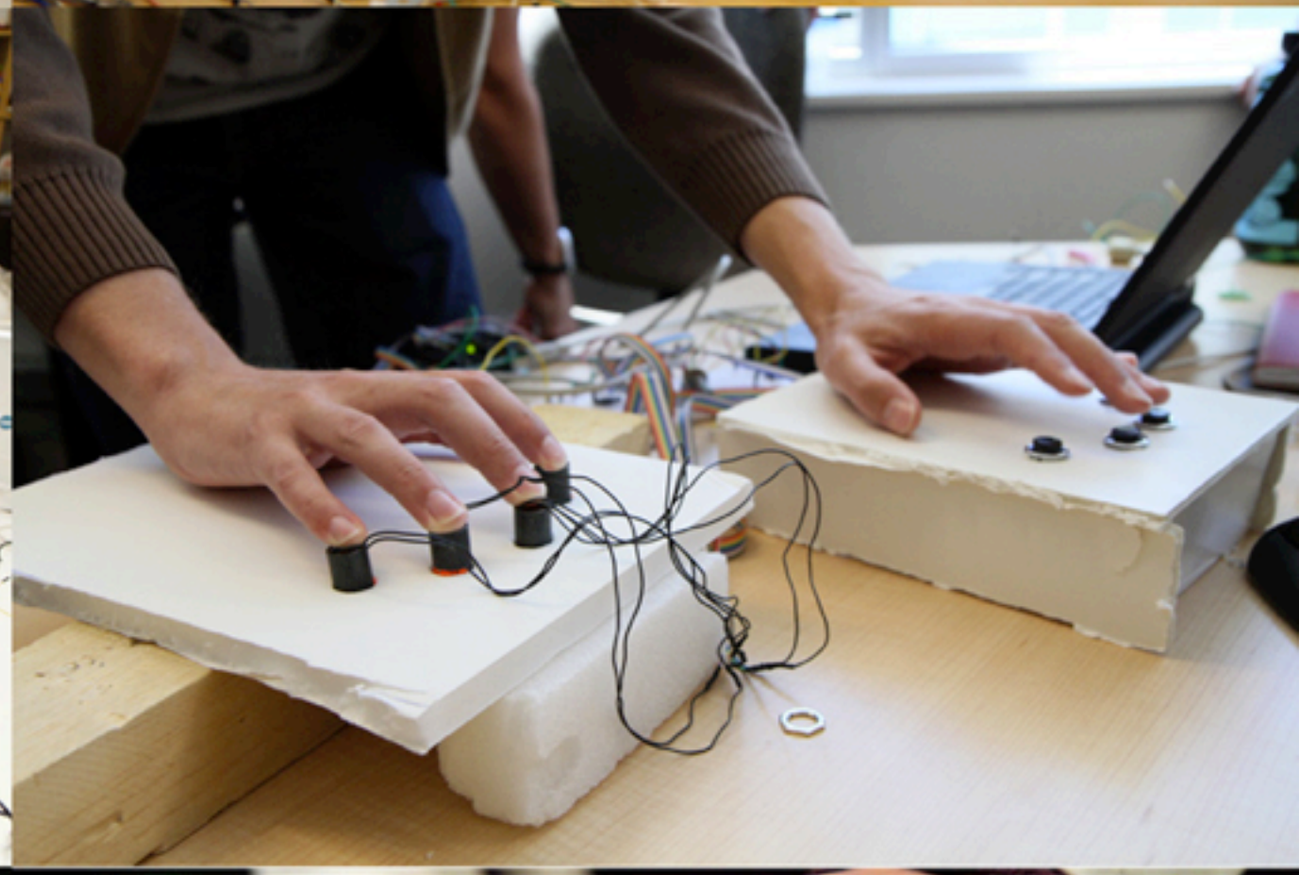

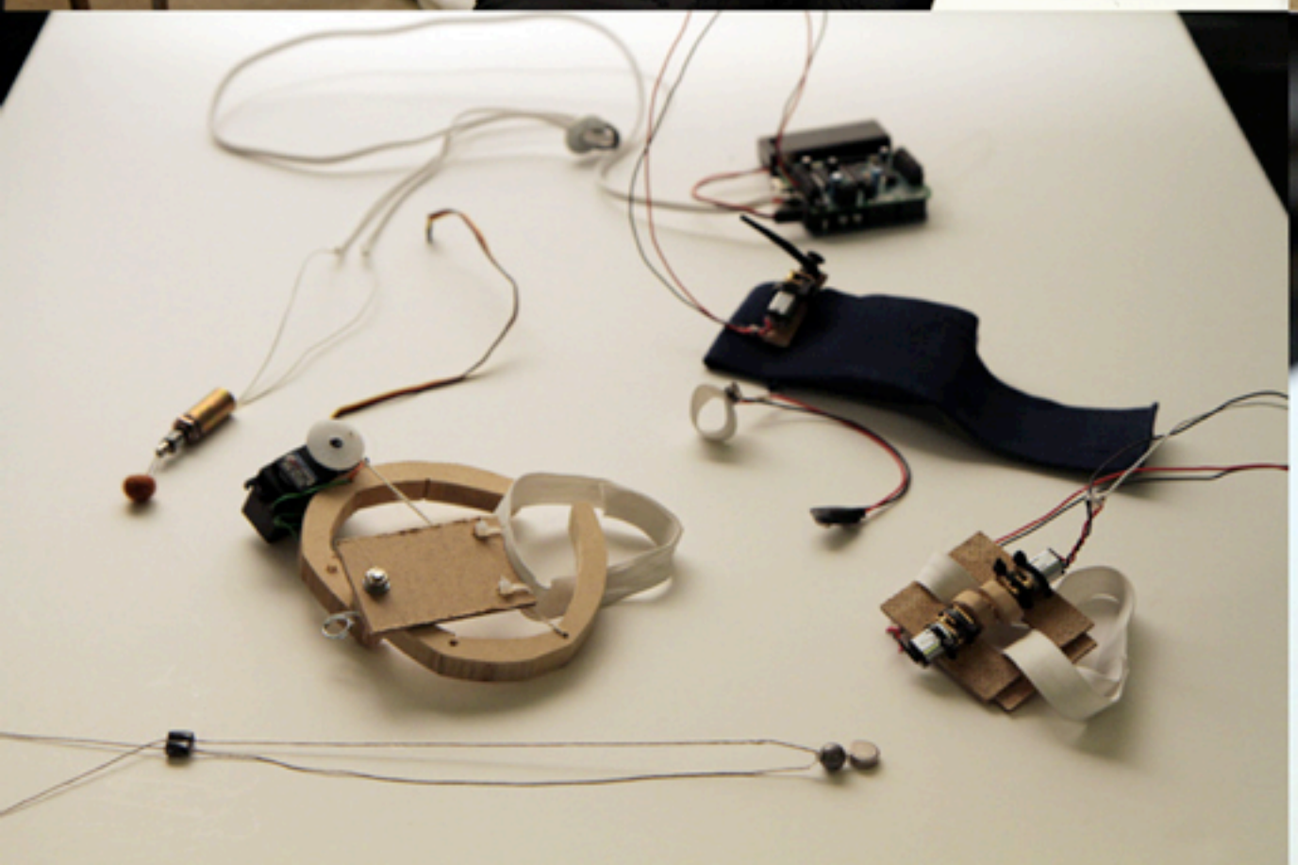

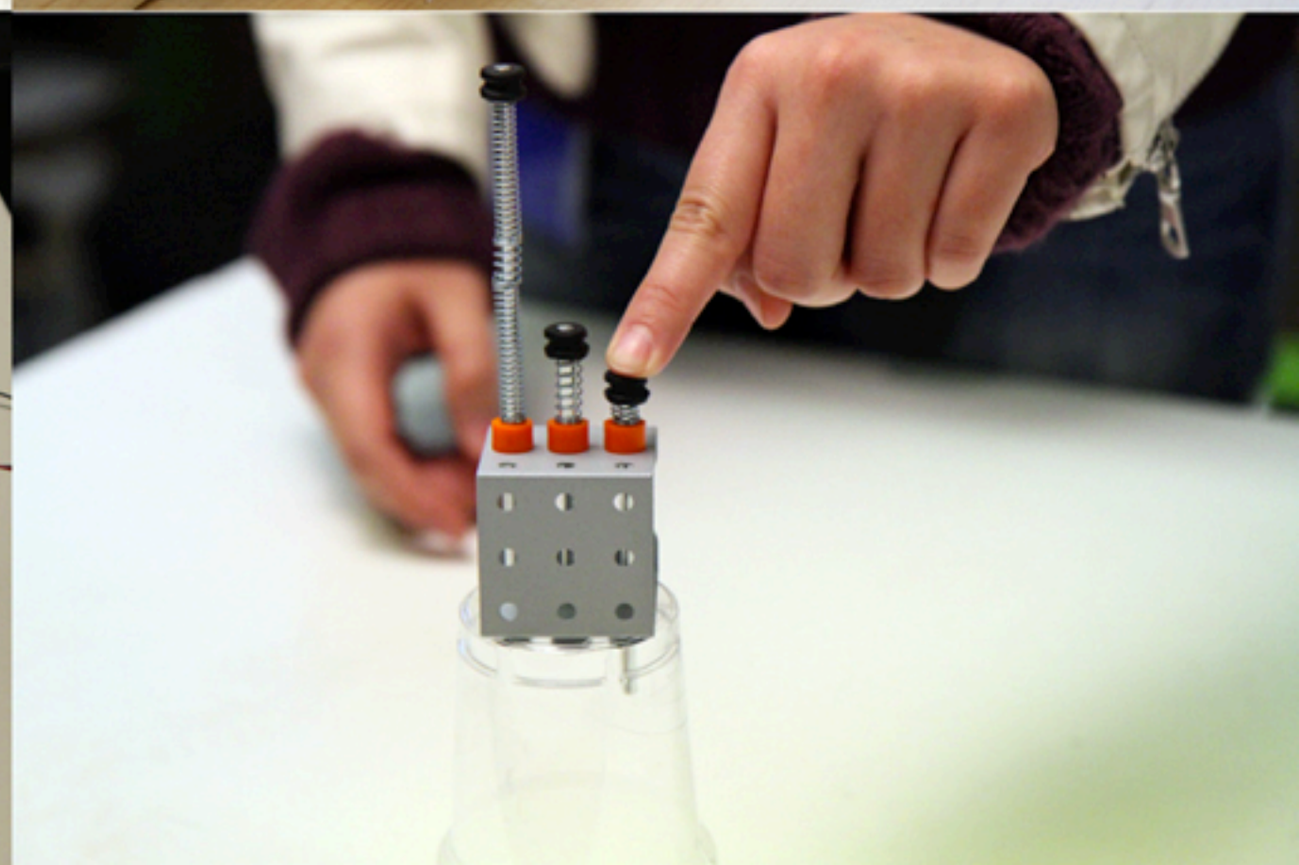

SKETCHING HAPTICS

Reflections and insights

Learn to make

Make to learn

Learn to make

Sensing and moving atoms

Hardware is hard!

Establishing the right sketching level

Make to learn

Always room to grow

Making/building challenges

Learn to make

Sensing and moving atoms

Hardware is hard!

Establishing the right sketching level

Always room to grow

Making/building challenges

Make to learn

Visual equivalent: build your monitor!

Platform to engage/discover haptics

Common/shared understanding

Affinity with your design materials

Exhilarating simplicity!

a. Haptic **qualities** vs available **resources/skills**

b. **Building** haptics to **learn** haptics

c. Actuation **alone** is not haptics

SERIOUS PLAY

Umeå Institute of Design + IDEO

Rapid Prototyping/**Sketching Haptics**

people + hardware + control + psychophysics + context

(design) constraints are stimulating

fail early, fail often, multiple valid alternatives, orders of magnitude

human centric vs technology centric

know and exploit material properties, assembly mechanisms matter

“use the world to control the world”

acknowledge the various limitations of sketching/prototyping

Umeå Institute of Design
Umeå University

THE SWEDISH FACULTY FOR DESIGN RESEARCH AND RESEARCH EDUCATION

“FAIL EARLY AND FAIL OFTEN”

camille.moussette@dh.umu.se - www.partly-cloudy.com