

Faculty of Design

2021

Autonomous Technologies and the Challenges of Probabilistic Design

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AUTONOMOUS TECHNOLOGIES AND THE CHALLENGES OF PROBABILISTIC DESIGN

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Professor in Post-industrial Design
@elisagiaccardi

RSD10, Delft, The Netherlands





Positionality





Overview

- + **Probabilistic design** (or why we also need improvisation)
- **Co-performance** (or why technologies are not autonomous)
- **Ethics** (or why functionality becomes less central)



PROBABILISTIC DESIGN

Why we also need
improvisation



- +
-

Using machine learning to support improvisation and resourcefulness

 **TU Delft**
avans
hogeschool
TU/e
PHILIPS



Connected Resources

The logo for the NGI Awards 2019, featuring three overlapping squares in light blue, teal, and dark blue, with the text 'NGI AWARDS 2019' in white on the dark blue square.

NGI
AWARDS
2019

Prof. dr. Elisa Giaccardi / TU Delft, Netherlands

@elisagiaccardi

RSD10, Delft, The Netherlands



















































“Hi Dad, I see you’re not using the
smart cane today. Hope all ok? xxx”

Gina



Hacking objects of everyday use



<p>Digital Affordances</p>  <p>ACTIVATES LIGHT</p>	<p>Digital Affordances</p>  <p>WRAPS AROUND YOU</p>	<p>Digital Affordances</p>  <p>EXTENDS</p>	<p>Digital Affordances</p>  <p>ABSORBS DATA</p>	<p>Digital Affordances</p>  <p>TURNS OFF</p>	<p>Digital Affordances</p>  <p>GIVES YOU DIRECTIONS</p>	<p>Digital Affordances</p>  <p>KNOWS YOUR LOCATION</p>	<p>Analog Materials</p>  <p>HANGER</p>	<p>Analog Materials</p>  <p>STONE</p>	<p>Analog Materials</p>  <p>CLIP</p>	<p>Analog Materials</p>  <p>BOX</p>	<p>Analog Materials</p>  <p>MAGNET</p>
<p>Digital Affordances</p>  <p>SHARES DATA</p>	<p>Digital Affordances</p>  <p>MAKES TIME</p>	<p>Digital Affordances</p>  <p>MEASURES</p>	<p>Digital Affordances</p>  <p>TURNS ON</p>	<p>Analog Materials</p>  <p>STICKER</p>	<p>Analog Materials</p>  <p>ELASTIC BAND</p>	<p>Analog Materials</p>  <p>MIRROR</p>	<p>Analog Materials</p>  <p>TAPE</p>	<p>Analog Materials</p>  <p>BOWLS</p>	<p>Analog Materials</p>  <p>PAPER</p>	<p>Analog Materials</p>  <p>MARKER</p>	<p>Analog Materials</p>  <p>CHALK</p>
<p>Analog Affordances</p>  <p>HANGING</p>	<p>Analog Affordances</p>  <p>INSERTING</p>	<p>Analog Affordances</p>  <p>STICKING</p>	<p>Analog Affordances</p>  <p>MAGNETIZING</p>	<p>Analog Affordances</p>  <p>DIVIDING</p>	<p>Analog Affordances</p>  <p>MIRRORING</p>	<p>Analog Affordances</p>  <p>ORGANIZING</p>	<p>Analog Affordances</p>  <p>SUPPORTING</p>	<p>Strategies</p>  <p>MULTIPLE INSTANCES</p>	<p>Strategies</p>  <p>PROXIMITY</p>	<p>Strategies</p>  <p>COMMUNICATION THROUGH OBJECTS</p>	<p>Strategies</p>  <p>LABELING</p>
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REMOTE BELL TRACKER

When one bell detects sound or movement, the other bell plays sound.

VISUAL SPEAKER

Based on content of Frame, Bell plays relevant music.

PROXIMITY SPEAKER

When Clip detects proximity, Bell plays sound.

GEO-MESSAGE

Compass navigates to closest location where geo-messages are stored and you can listen to them.

SOUND VISUALIZER

Based on sound input in Bell, Frame collects images.

VISUAL LINKER

Based on images of one Frame, another Frame sets relevant URL link.

PROXIMITY VISUAL LINKER

When Clip detects proximity, Frame changes to relevant URL link in list created by user.

GEO-VISUALIZER

Compass collects images relevant to the location where you are.

VOICE LINKER

Based on voice input in Bell, Frame sets relevant URL link.

SOUND DETECTOR

If Bell detects sound, Clip starts glowing.

UPDATE NOTIFIER

When the content linked in Frame is updated, Clip glows.

REMOTE PROXIMITY TRACKER

When one Clip detects proximity, the other glows.

LIGHT NAVIGATOR

Clip suggests navigation with the compass.

GEO-MESSAGE RECORDER

You can record voice messages at different locations.

IMAGE NAVIGATOR

Based on a location an image in Frame is taken, Compass navigates.

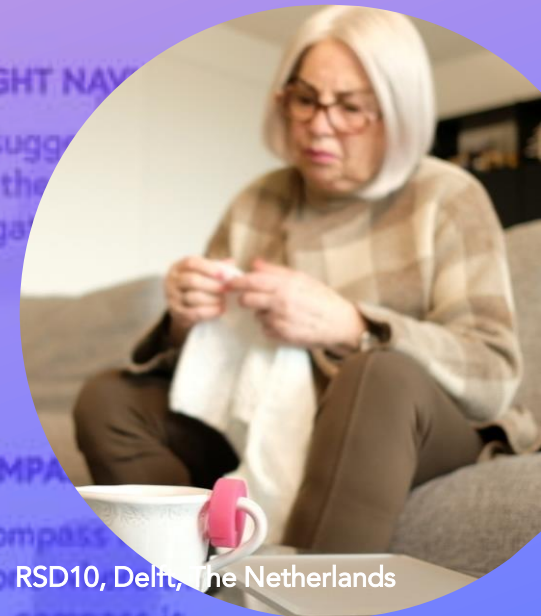
PROXIMITY NAVIGATOR

Compass navigates to location where one of your Clips detects proximity.

COMPASS

One compass can navigate to location where compass is.

(Re)combining sensors and actuators



Dimensions of openness and variety



NGI
AWARDS
2019

Algorithms to detect/encourage co-usage

Prof. dr. Elisa Giaccardi / TU Delft, Netherlands

@elisagiaccardi

RSD10, Delft, The Netherlands

Household A

Arranged by **probability**, from most probable 0 to less probable 9.



Kitchen chair



Fridge



Garden door



Remote control



Tray



Spider stick

Photos: Iohanna Nicenboim. Data visualization: Philips

Technology as a resource to improvise



- ML and AI will require designers to move into the uncharted territory of probabilistic
- + design and integrate capabilities and doings +
 - uniquely human and uniquely artificial, such •
 - as *improvisation* and *foresight* ◦

Elisa Giaccardi (2019). Histories and futures of research through design: From prototypes to connected things. *International Journal of Design*, 13(3), 139-155.



CO- PERFORMANCE

Why technologies are not
autonomous

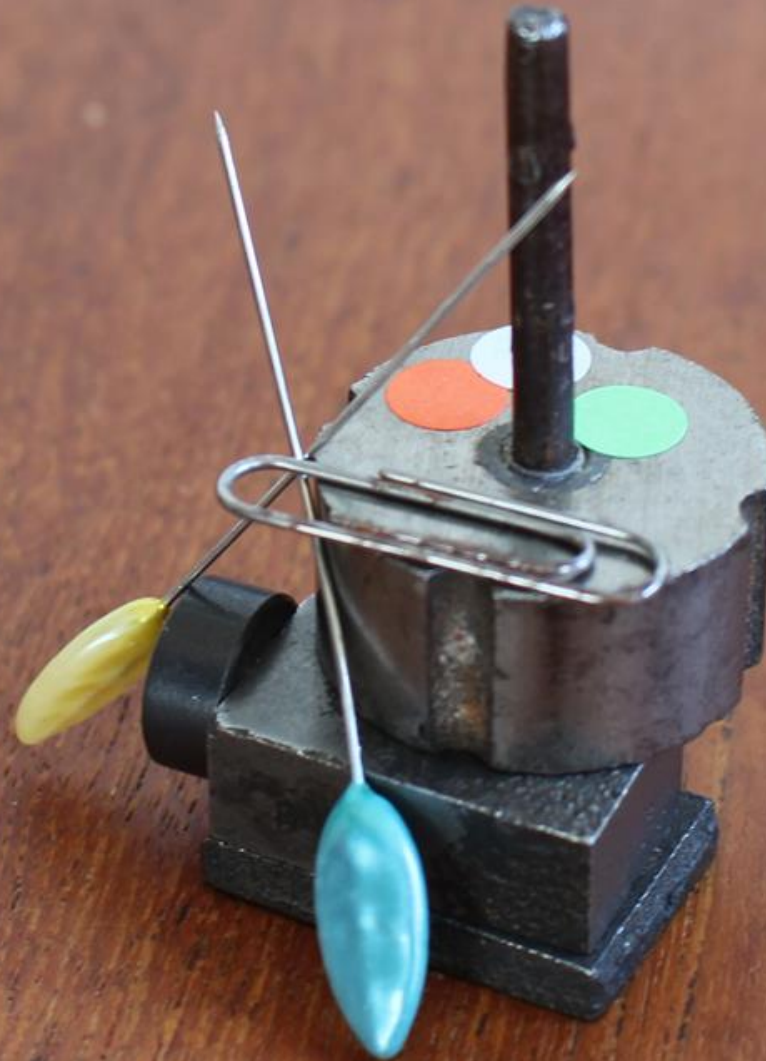




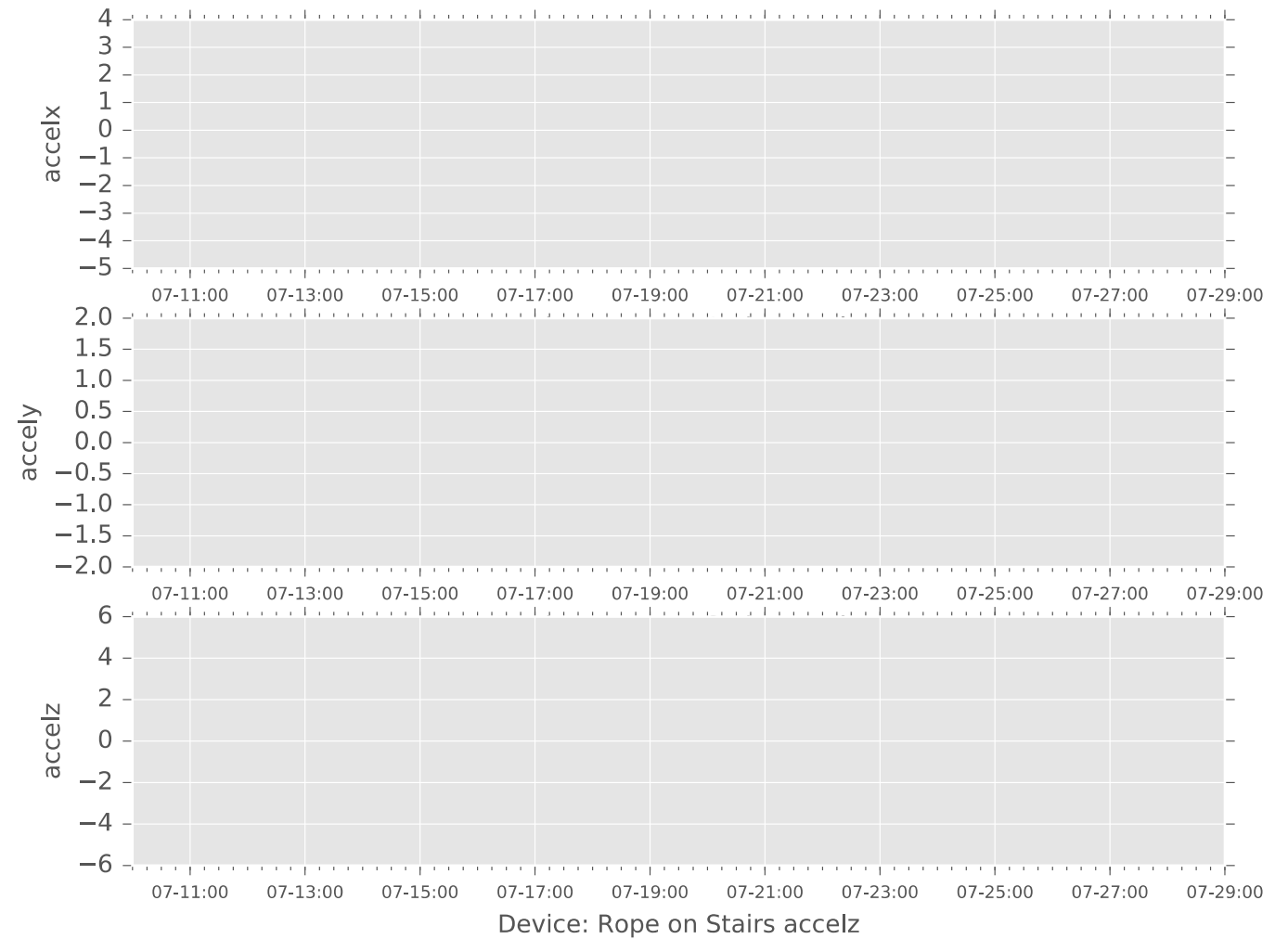
A living lab of people and things



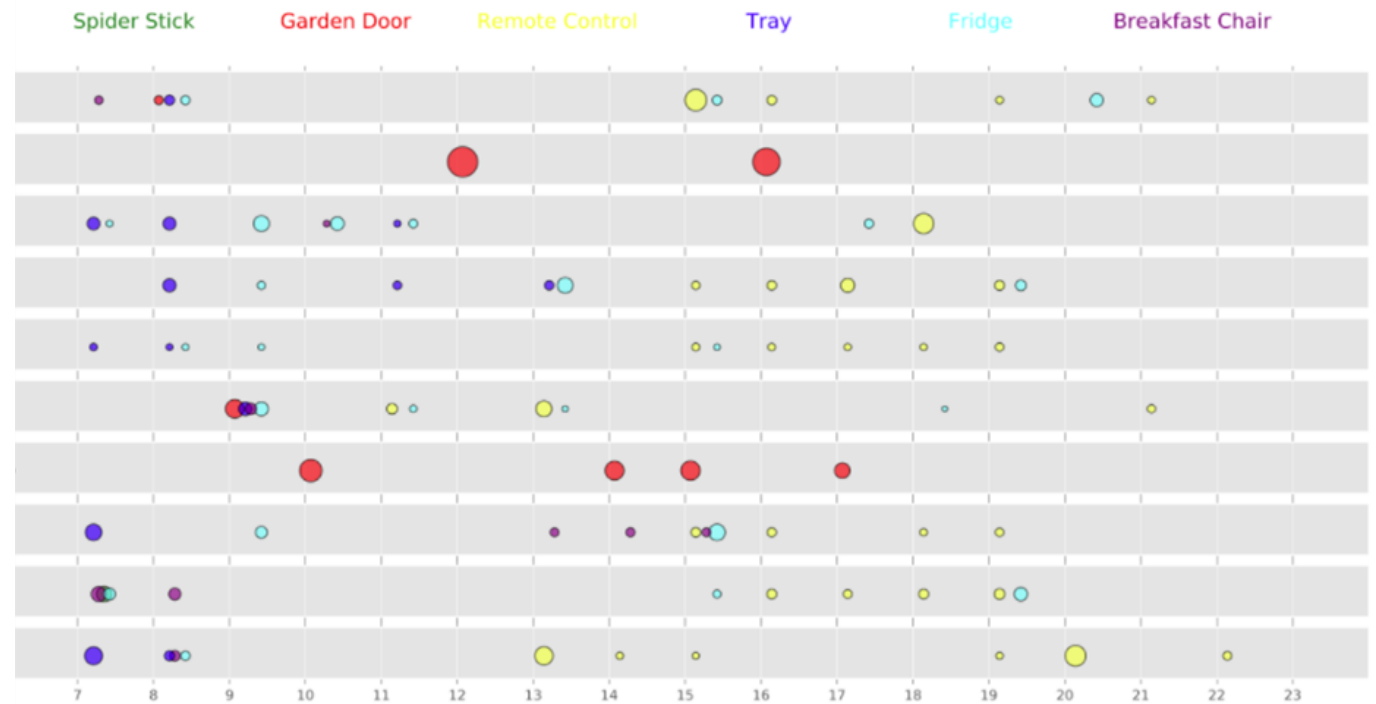
WHAT THINGS HAVE SEEN

















































WHAT SENSORS HAVE SEEN



WHAT THE ALGORITHM HAS SEEN



<p>Digital Affordances</p>  <p>ACTIVATES LIGHT</p>	<p>Digital Affordances</p>  <p>WRAPS AROUND YOU</p>	<p>Digital Affordances</p>  <p>EXTENDS</p>	<p>Digital Affordances</p>  <p>ABSORBS DATA</p>	<p>Digital Affordances</p>  <p>TURNS OFF</p>	<p>Digital Affordances</p>  <p>GIVES YOU DIRECTIONS</p>	<p>Digital Affordances</p>  <p>KNOWS YOUR LOCATION</p>	<p>Analog Materials</p>  <p>HANGER</p>	<p>Analog Materials</p>  <p>STONE</p>	<p>Analog Materials</p>  <p>CLIP</p>	<p>Analog Materials</p>  <p>BOX</p>	<p>Analog Materials</p>  <p>MAGNET</p>
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(reflection)

- For digital things that exchange data and connect, affordance and performance are
- + the results of mutual arrangements within
 - the non fully predictable boundaries of
 - *unfolding relations*



Elisa Giaccardi (2020). Casting things as partners in design: Toward a more-than-human design practice. In Heather Wiltse (ed.) *Relating to Things: Design, Technology and the Artificial*. Bloomsbury, London.



ETHICS

Why functionality is less
central



+

●

Time for bed

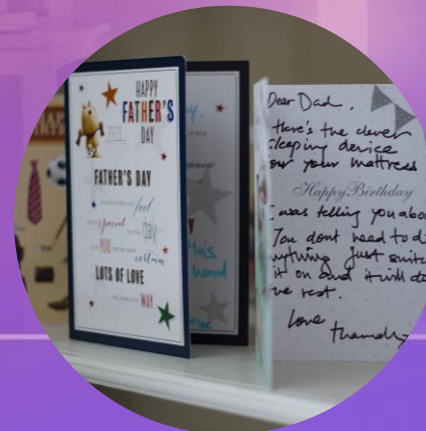
○

Stepping away from ideas of monitoring and control

21:50

Prof. dr. Elisa Giaccardi / TU Delft, Netherlands

"Dad, isn't it late there? Would be good
for you to get a proper night's sleep. x"
Mandy



@elisagiaccardi

RSD10, Delft, The Netherlands
Source: Uninvited Guests by Superflux

Inviting and enabling resourceful arrangements



Stepping away from Western narratives of fuel efficiency





Inviting and enabling culturally sensitive mobility lifestyles



- The ethical point of gravity for probabilistic design is in the co-performance of human and nonhuman actors (the *how* of the relation)

Elisa Giaccardi and Johan Redström (2020). Technology and more-than-human design. *Design Issues*, 36(4), 33-44.



CALL FOR ACTION

FACEBOOK DATA & ELECTION INTERFERENCE

CHRISTOPHER WYLLIE
Former Cambridge Analytica Research Director

C-SPAN
c-span.org
@cspan

Why we need to rethink design

We are rethinking Design

to open pathways toward inclusive,
sustainable, digital futures





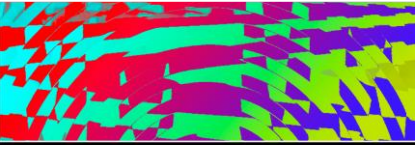


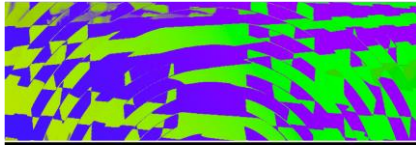
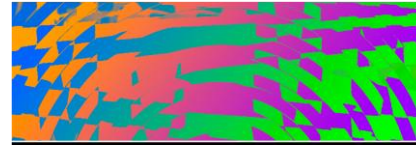
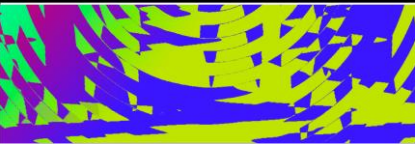

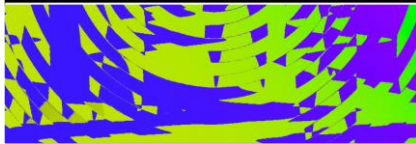
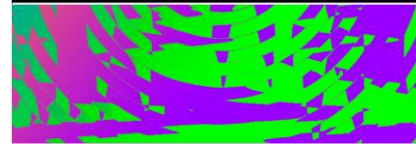
40 researchers

20 countries

**6 summer/winter schools
as innovation hubs**

5 graduation labs

prototeams

How Will You DESIGN FOR HUMAN- MACHINE RELATIONS?	How Will You MAKE DECENTRALIZED SYSTEMS WORK FOR SOCIETY?	How Will We CO-CREATE SUSTAINABLE BUSINESS MODELS IN A DIGITAL SOCIETY?	How Will You ENABLE PUBLIC DELIBERATION ON DATA AND ALGORITHMS?	How Will You PROTOTYPE RESPONSIBLE DESIGN PRACTICES IN THE DIGITAL SOCIETY?
				
Design pathways to INCLUSIVE DIGITAL FUTURES	Design pathways to TRUSTED INTERACTIONS	Design pathways to SUSTAINABLE SOCIO- ECONOMIC MODELS	Design pathways to DEMOCRATIC DATA GOVERNANCE	Design pathways to FUTURE DESIGN PRACTICES
				

ESR4 

DESIGNING FOR MULTI- INTENTIONAL INTERACTION

Delft University of Technology, Faculty of Industrial
Design Engineering, The Netherlands

This project is focused on the challenges of decentralized interaction with data-driven systems, and the development of novel design principles for multi-intentional interaction. In this project we will explore how future interfaces can manifest the potentially conflicting needs of the many users of a data-driven product-service system ("multi-intentionality"), and focus on the use of techniques that can provide an additional layer of legibility of the system's behaviour and enable trust.

Supervisory team: Prof. Elisa Giaccardi, Dr. Dave Murray-Rust, Prof. Johan Redström
Inquiries: e.giaccardi@tudelft.nl



ESR5 

DESIGNING CO-PREDICTIVE RELATIONS

Delft University of Technology, Faculty of Industrial
Design Engineering, The Netherlands

This project is focused on the challenges of delegation in the relationship between people and predictive systems, and the development of novel design principles for predictive relations. In this project we will explore how different forms of recursive interplay between user and system ("co-performance") can provide handles to a more equitable interaction between people and predictive systems, and how such forms of interaction may shape users' sense of futurity.

Supervisory team: Dr. Roy Bendor, Prof. Elisa Giaccardi, Prof. Johan Redström
Inquiries: r.bendor@tudelft.nl



ESR6 

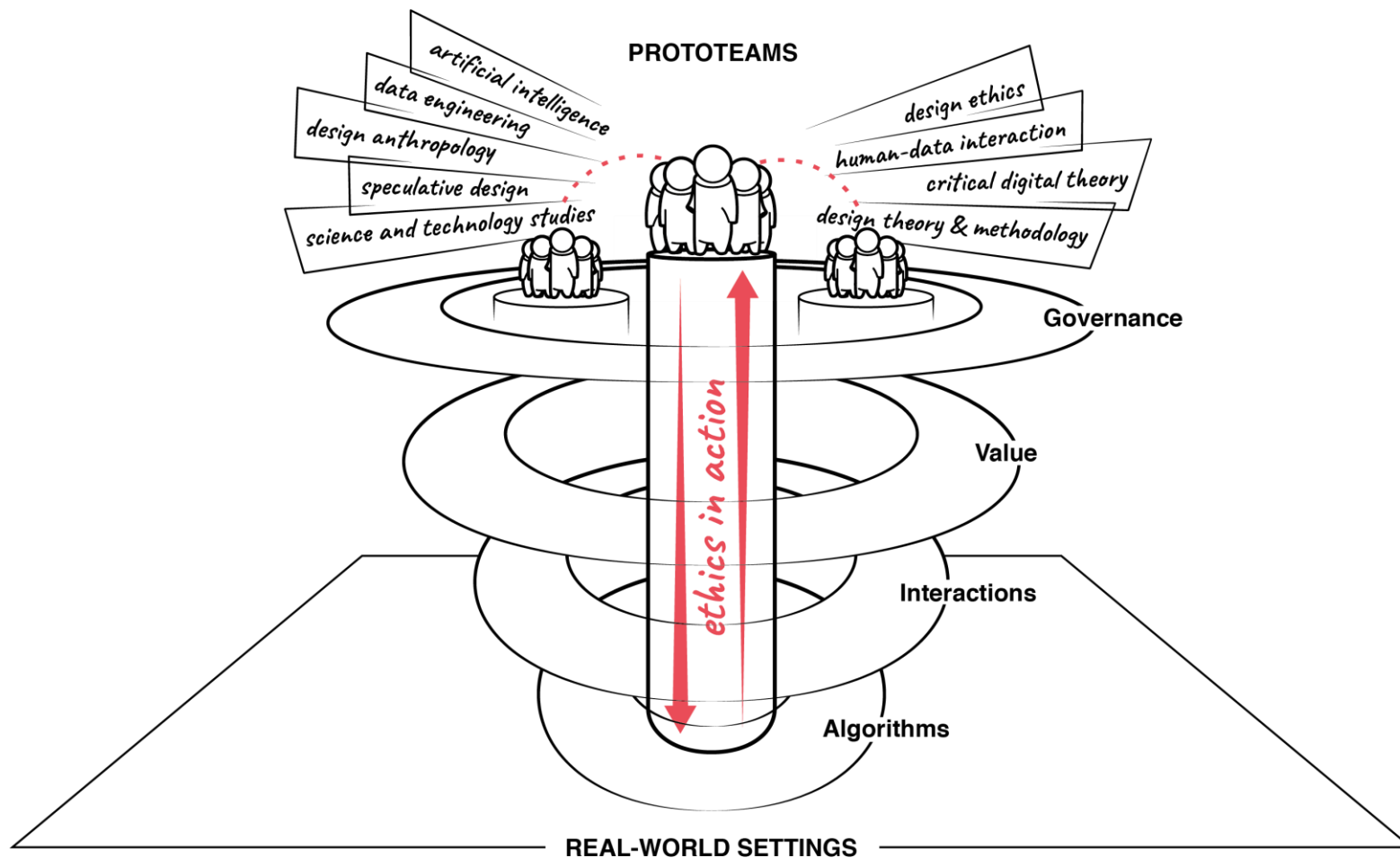
DESIGNING FOR CONTESTABLE SYSTEMS

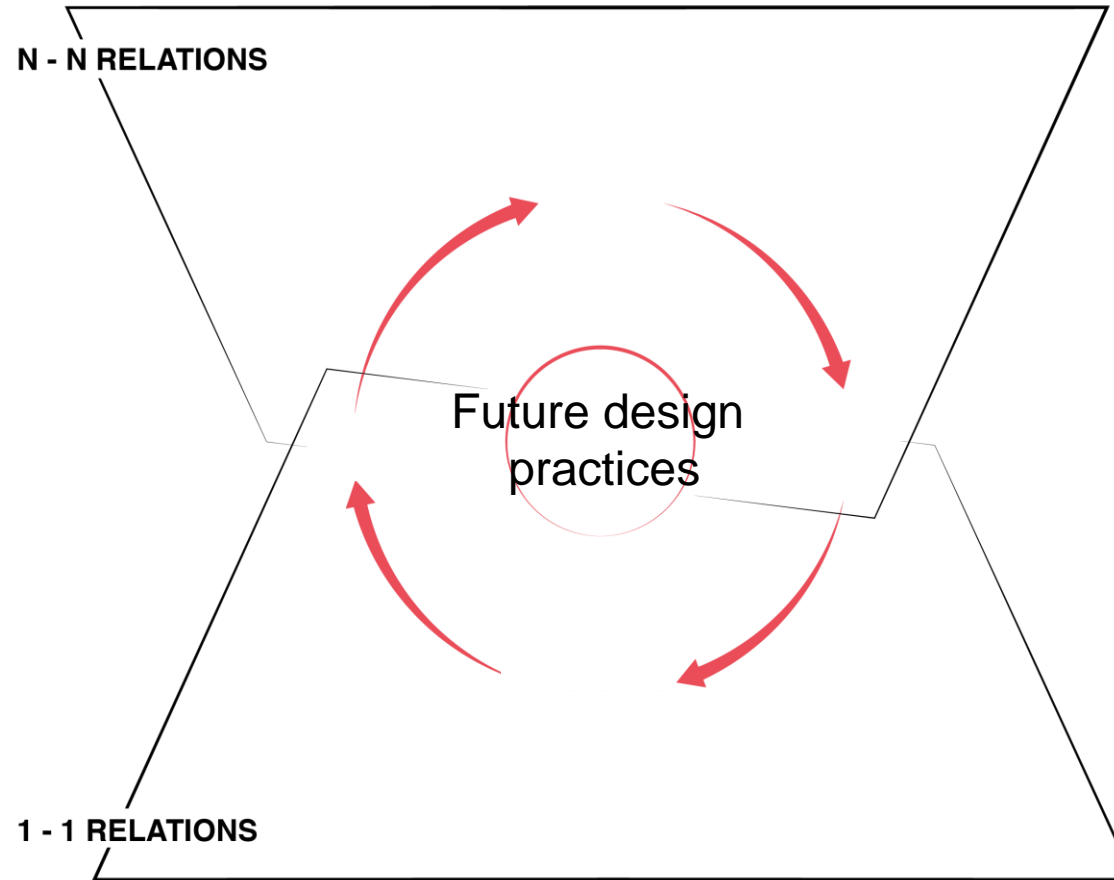
Umeå University, Umeå Institute of Design, Sweden

This project is focused on the challenges involved in making it possible for people to contextualise and negotiate a data-driven system's response ("response-ability") in and through use. In this project we will explore what features, mechanisms and techniques need to be designed and implemented in the front-end for users to understand, contest and possibly repair inappropriate actions by a system. Working with research through design, we aim to create an annotated collection of design examples and interaction features for contestable data-driven systems.

Supervisory team: Prof. Johan Redström, Dr. Marco Rozendaal, Prof. Elisa Giaccardi
Inquiries: jredstrom@gmail.com







Agency should be foundational to
probabilistic design today, as was once the
notion of *function* to industrial design

Thank you