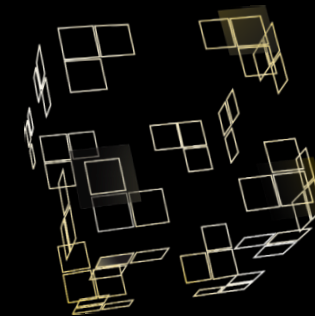
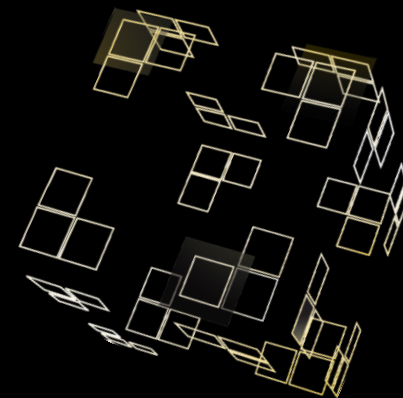
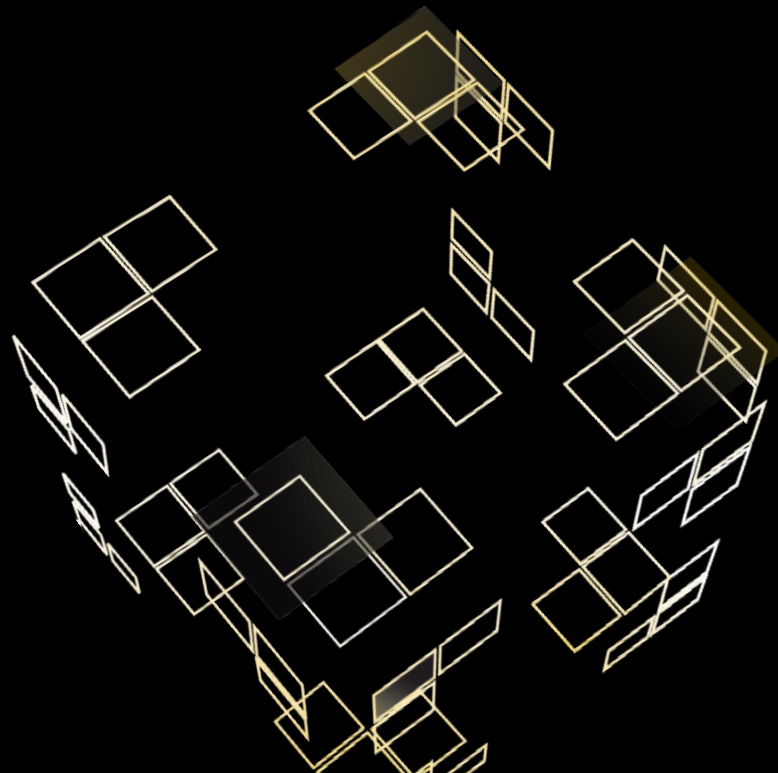




Human factors research at the University of Twente and a perspective on trust in the design of healthcare technology

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UNIVERSITY
OF TWENTE.



Dr. Simone Borsci (s.borsci@utwente.nl)

Assistant professor in human factors and cognitive ergonomics, UT

Honorary Senior Research Fellow at Imperial College of London, NIHR MIC London IVD

Main interest:

- Diagnostics device and assistive/rehabilitation tech
- UX and usability research methods for digital, VR/AR and physical products
- Trust toward and impact of innovation



A PERSONAL NOTE...

I recently moved at Twente University, after 8 years in UK as researcher at:

- UK MATCH project
- Jaguar Land Rover and Nottingham University
- NHRI on IVD at Imperial College of London

Primary research goal :

1. Adapt and develop human factors methodologies to support innovation,
2. Establish multidisciplinary frameworks for the evidence generation to support the development of medical device.

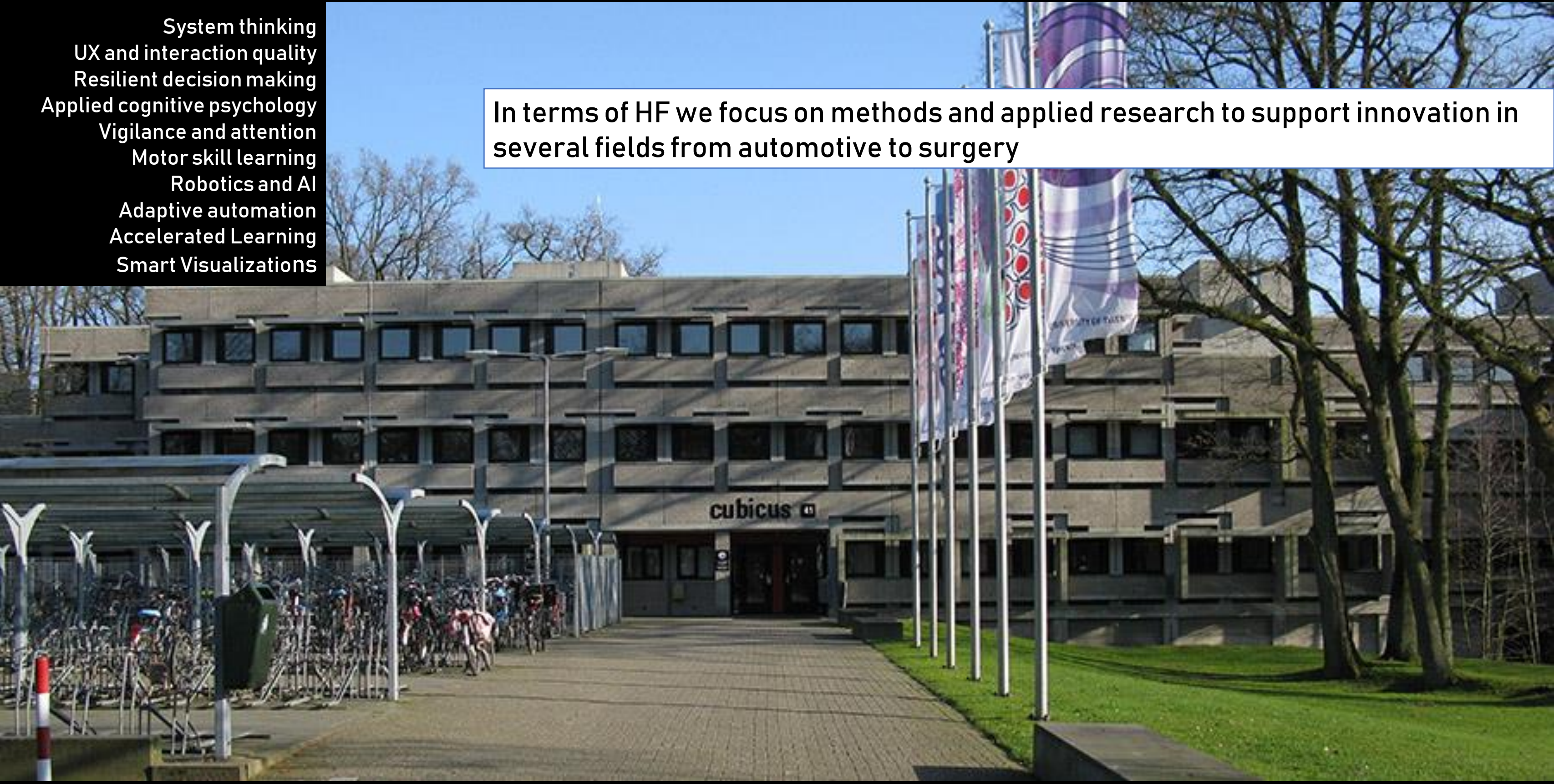
Borisci, S. et al (2018). **Designing medical technology for resilience: Integrating health economics and human factors approaches.** *Expert review of medical devices*



COGNITIVE PSYCHOLOGY AND ERGONOMICS DEPARTMENT

System thinking
UX and interaction quality
Resilient decision making
Applied cognitive psychology
Vigilance and attention
Motor skill learning
Robotics and AI
Adaptive automation
Accelerated Learning
Smart Visualizations

In terms of HF we focus on methods and applied research to support innovation in several fields from automotive to surgery



COGNITIVE PSYCHOLOGY AND ERGONOMICS DEPARTMENT

Applied research on Human Performance with systems from a cognitive point of view to support design of innovation and to investigate emerging and unsolved issues

We believe that collaboration (with researchers and industry) is the key to develop high quality research and to produce scientific advancement



MASTER IN HUMAN FACTORS AND ENGINEERING PSYCHOLOGY

We are offering a very successful MSc and twice a year our students are looking internships (10 weeks) on applied Human factors projects

INTERNSHIP



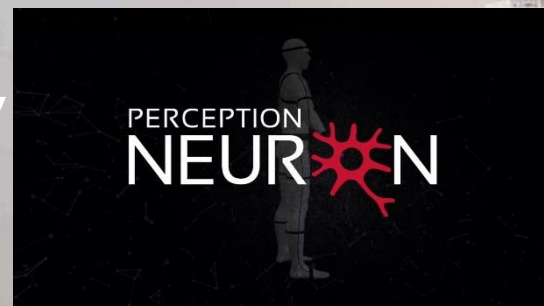
A person with a yellow backpack is seen from behind, standing on a grassy hill and looking out over a vast mountain range. The sun is low on the horizon, creating a warm, golden glow and long shadows across the landscape. The sky is filled with soft, wispy clouds.

THE BMS LAB

TECH4PEOPLE

UNIVERSITY OF TWENTE.

BMS Faculty laboratory
>400m² of high-tech facilities



Level
01

- Support projects
- Equipment
- Educational courses
- Store data & applications

Let's talk about Trust

What trust is?

Definition and things we know

Trust

<<...the willingness of a party to be vulnerable to the actions of another party, based on the expectation that the other will perform a particular action>>

Mayer, et al (1995) An integrative model of organizational trust.



Trust Toward Systems

Empirical studies suggest that people do have a sense of “trust” toward systems (TTS)



6 things we know about TTS from literature



- 1 Human-to-Human Trust and TTS are different types of trust
- 2 Our general TTS changes with the use of technology – Experience with specific products change trust toward a class products
- 3 We learn to recognize trustworthy features and design elements experientially based heuristics to judge/assess (even before use) a product.

Thatcher, J.B. et al (2011) The Role of Trust in Postadoption IT Exploration: An Empirical Examination of Knowledge Management Systems. IEEE TEM 58, 56-70
Lankton, N.K., McKnight, D.H., Tripp, J.: Technology, humanness, and trust: Rethinking trust in technology. JAIS 16, 880 (2015)

6 things we know about TTS from literature



- 4 TTS correlates with perceived qualities of a technology – High trust because of high perceived quality e.g., usability, aesthetics, usefulness etc.
- 5 TTS could be shaped by design
- 6 Trust could be misplaced and violated
Dark patterns, communication techniques

Shneiderman, B. (2000) Designing trust into online experiences. Communications of the ACM 43, 57-59
Pengnate, S., & Sarathy, R. (2017). An experimental investigation of the influence of website emotional design features on trust in unfamiliar online vendors. Computers in Human Behavior, 67, 49-60.
Gigerenzer, G., Brighton, H. (2009) Homo heuristicus: Why biased minds make better inferences. Topics in cognitive science 1, 107-143

**Trust toward systems,
deception and manipulation**

Trust could be design: Designing for trust

“...methodology that attempts to design our perception of trust in a system” Cofta, P. (2009). Designing for trust.



Transparency



Control

Trust could be design: Designing for trust

To make visible and recognizable certain features of the design that people want to control/experience to trust a product

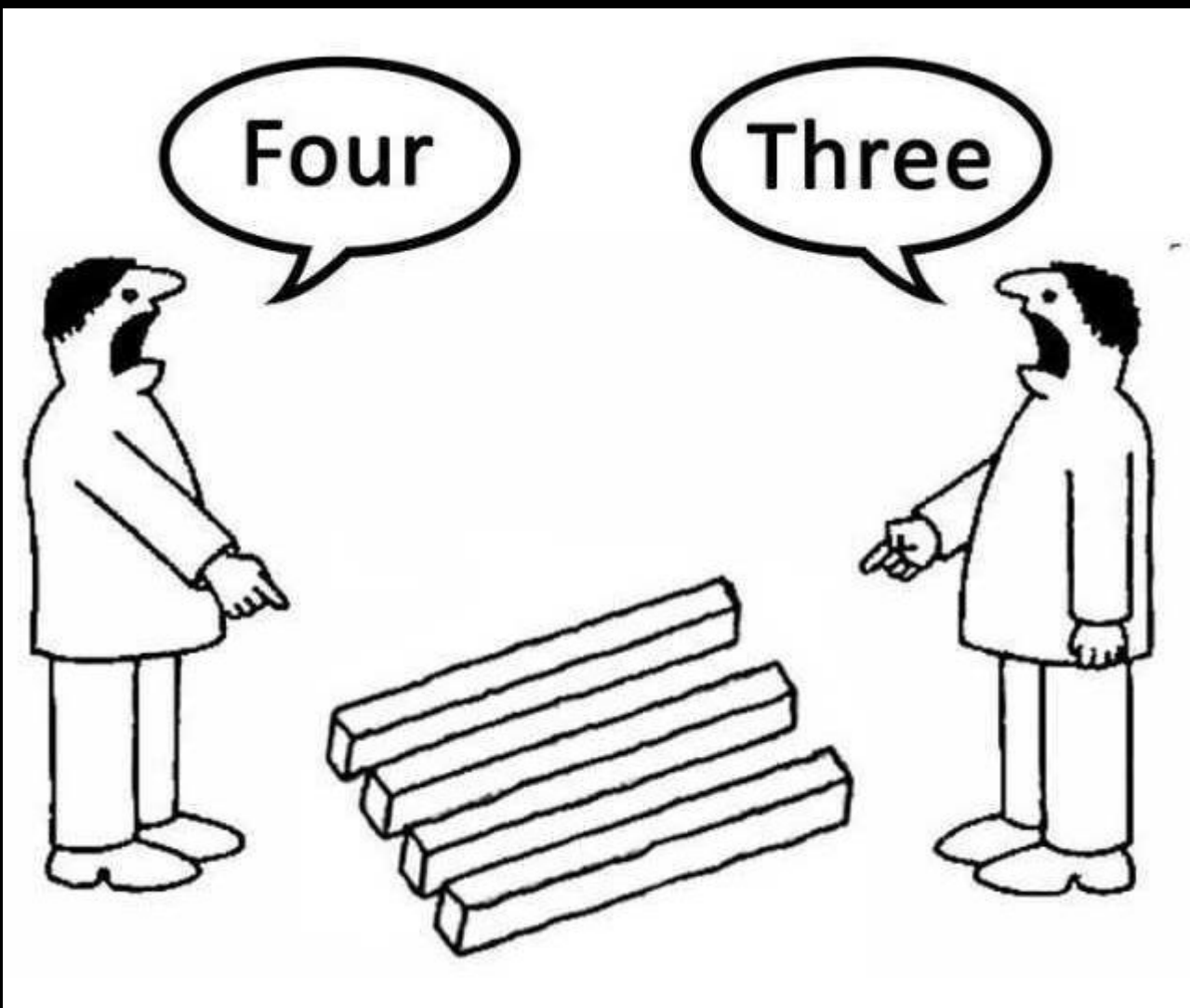


Transparency



Control

Designing for trust and violation



If trust may be designed, then it may also be manipulated

- Ambiguous design elements
- Some product's features more visible than others (less appealing)

Bad design behind a good appearance

It is the right way to insert the key?



Deceptive design: Dark patterns

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Including this small amount and selecting the Gift Aid option at the checkout means we can treat your whole ticket purchase as a donation and claim an extra 25p for every £1 spent - at **no extra cost** to you or us.

ADD TO BASKET
without donation

ADD TO BASKET
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If you are not a UK tax payer your donation will still help ZSL work for wildlife.



Recipient

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Chosen Date

Saturday 11th March 2017

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To pay today:

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Dark patterns: easy to access difficult to leave

To open an account on Amazon you need about 4 actions (insert and clicks)

To close your account... You need to know how to do it! And it takes time

The screenshot shows the Amazon.de help page. At the top left, there is the Amazon.de logo with a 'Try Prime' button. Below it, the delivery location is set to 'Netherlands'. The navigation bar includes 'Shop by Department', 'Your Amazon.de', 'Today's Deals', 'Gift Cards', 'Sell', and 'Help'. The main heading is 'Hello. What can we help you with?'. Below this, there are six help categories, each with an icon and a list of actions:

- Your Orders** (box icon):
 - Track parcels
 - Edit or cancel orders
- Returns & Refunds** (box with arrow icon):
 - Return or exchange items
 - Print return mailing labels
- Device Support** (device icons):
 - Find device help & support
 - Troubleshoot device issues
- Manage Prime** (prime logo icon):
 - Learn about Prime benefits
 - Cancel membership
- Payment Options** (credit card icon):
 - Add or edit payment methods
 - Edit expired debit, credit card
- Account Settings** (person icon):
 - Change email or password
 - Update login information

Below the categories is a search bar with the text 'Search our Help pages...' and a 'Go' button. At the bottom, there is a link to 'Browse Help Topics'.

Violation of expectations

I bought a Smart TV of a well know brand

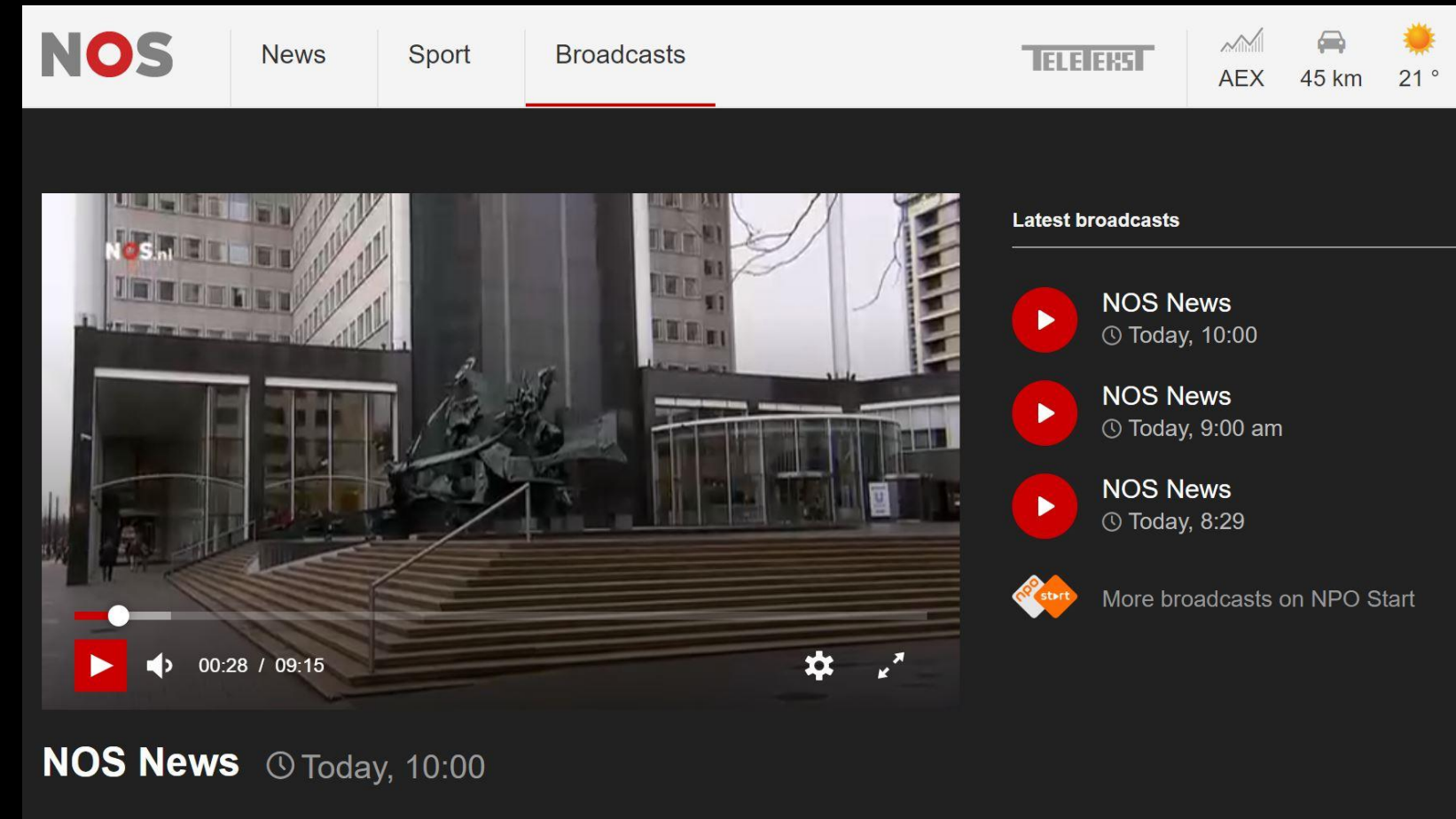
Packaging and information →



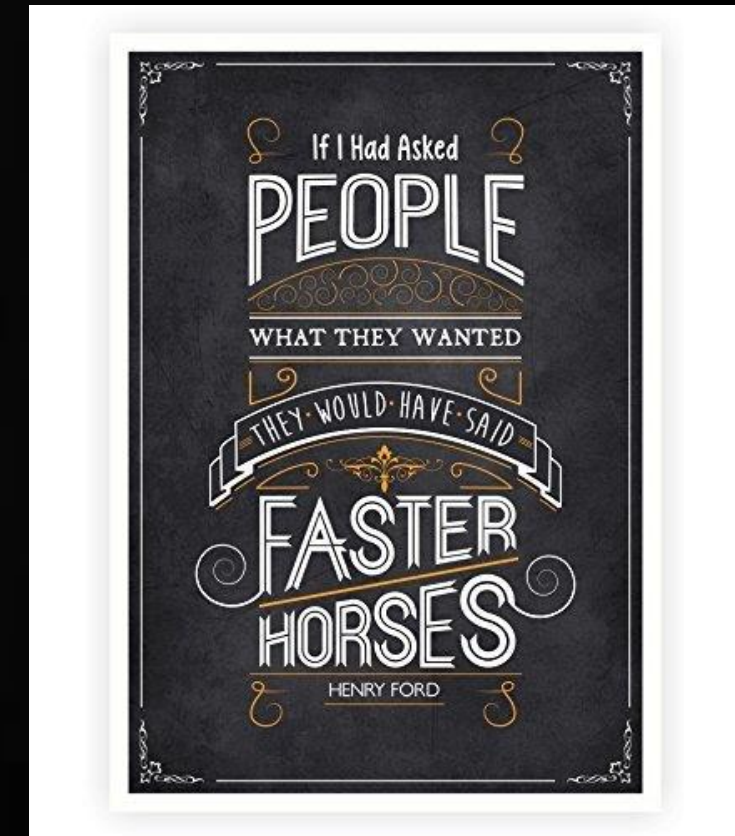
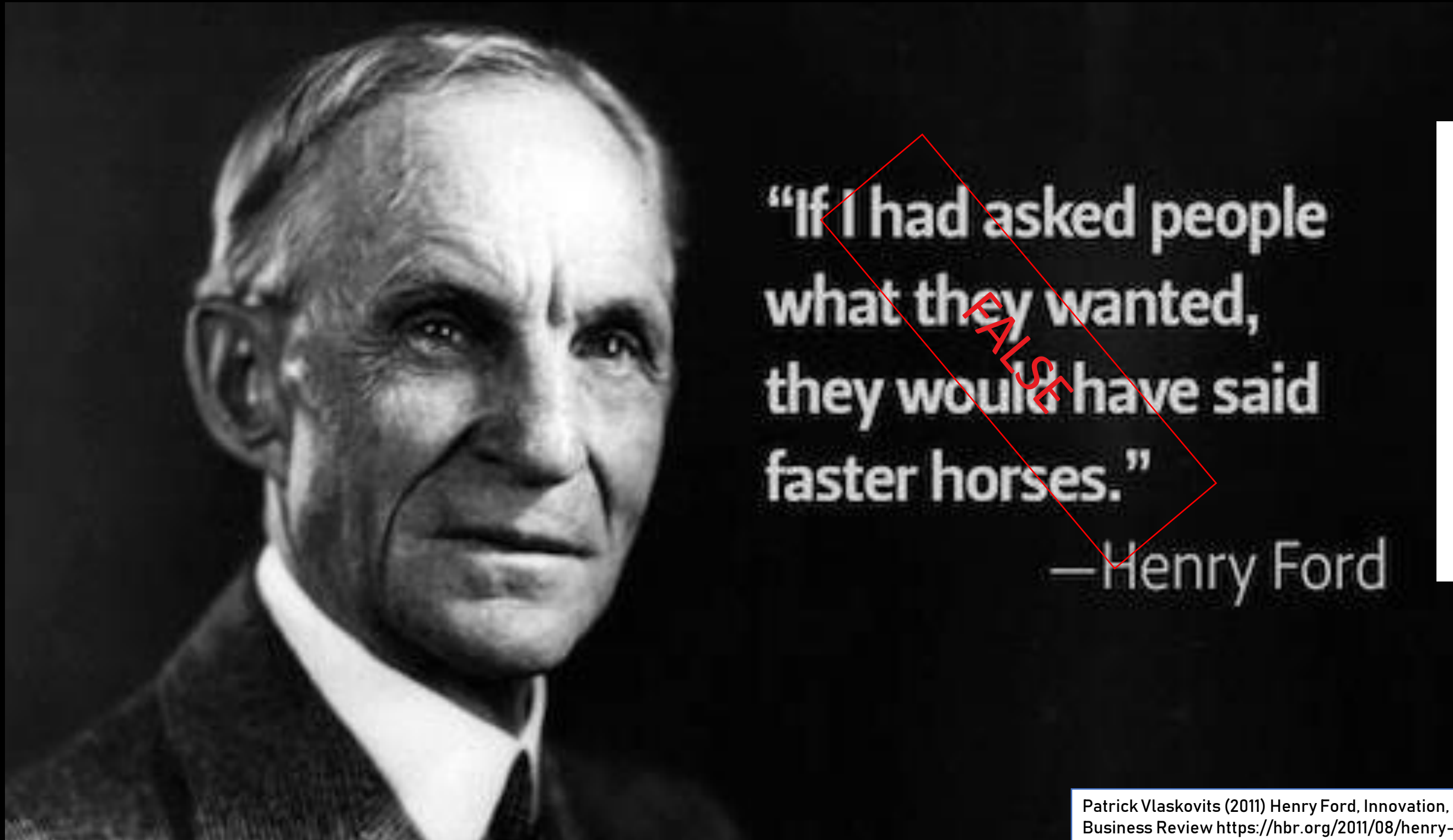
My expectation



Reality



Deceptive / manipulated information



“Partial” or deceptive information (illegal)

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<http://autoweek.com/article/car-news/hyundai-busted-over-performance-claims>

You bought a car that has less horsepower than in the description



How we may defend our selves

Lessons from evolutionary psychology

During a social exchange people:

- 1 may rely on a specialised cognitive mechanism to detect cheaters;
- 2 tend to look at (and remember) cheaters more than co-operators
- 3 are able to recognise and exclude cheaters from the exchange;

Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. *Cognition*, 31(3), 187-276.

Verplaetse, J., Vanneste, S., & Braeckman, J. (2007). You can judge a book by its cover: the sequel.: A kernel of truth in predictive cheating detection. *Evolution and Human Behavior*, 28(4), 260-271.

What we don't know

When we select and use a technology...

- 1 Are we able to detect if a technology is worthy or not of trust before we use it?
- 2 Is TTS part of (or affects) our experience with technology?

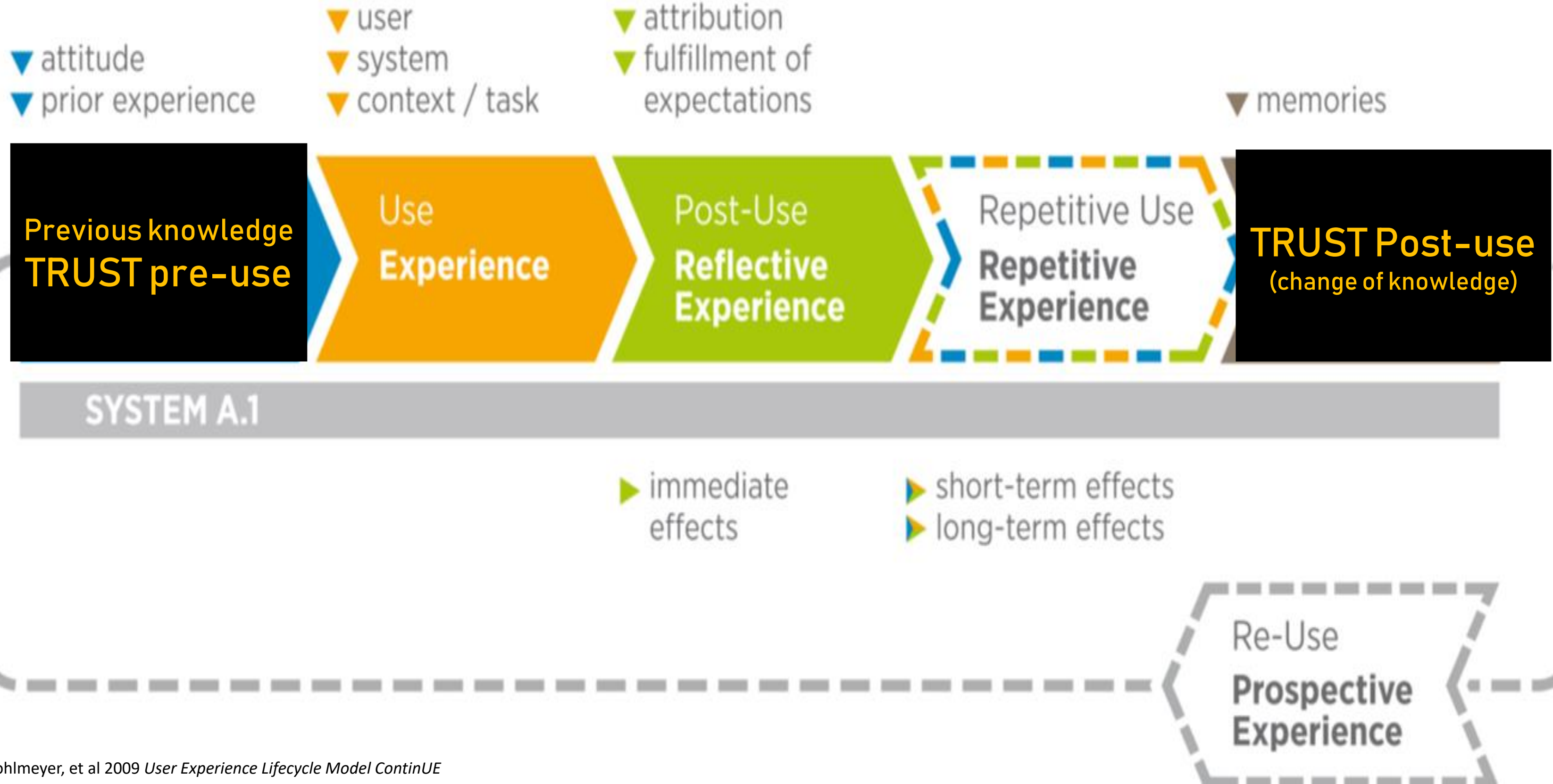


Giorgio de Chirico, *Mystery and Melancholy of a Street*, 1914

Working Hypothesis

Trust as part of UX

UX AND TRUST



Our literature-based assumption

Pre-Use
Anticipated
Experience

Before the use

People are placing (indirectly) their trust on the fact that **manufacturers** have created a product/service with certain set of qualities and characteristics

e.g., usefulness, safety, learnability, usability and reliability

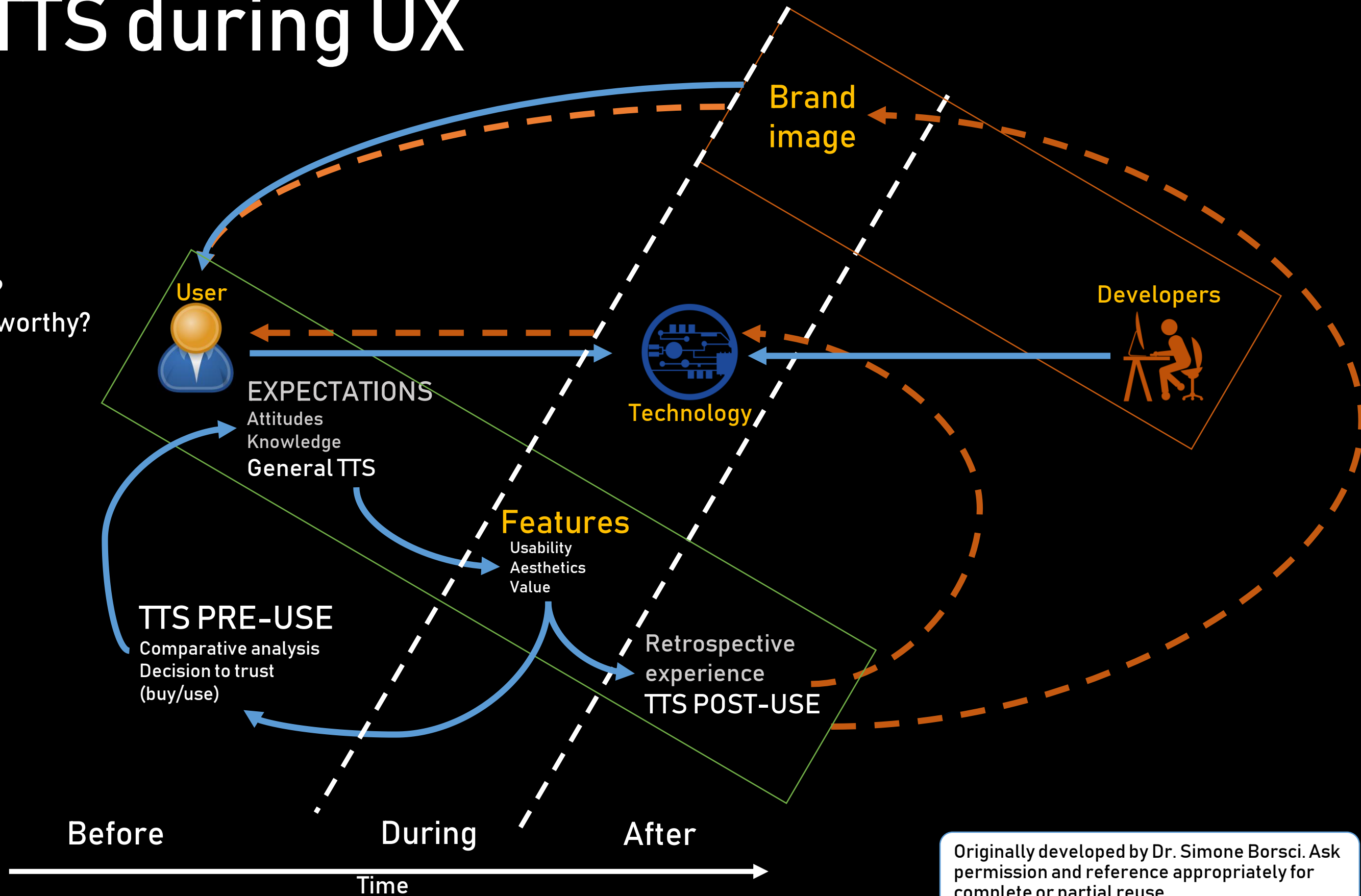
Past-Use
Retrospective
Experience

Assessment of trust after the experience (also affect the Brand)

Sketch of TTS during UX

Outcomes

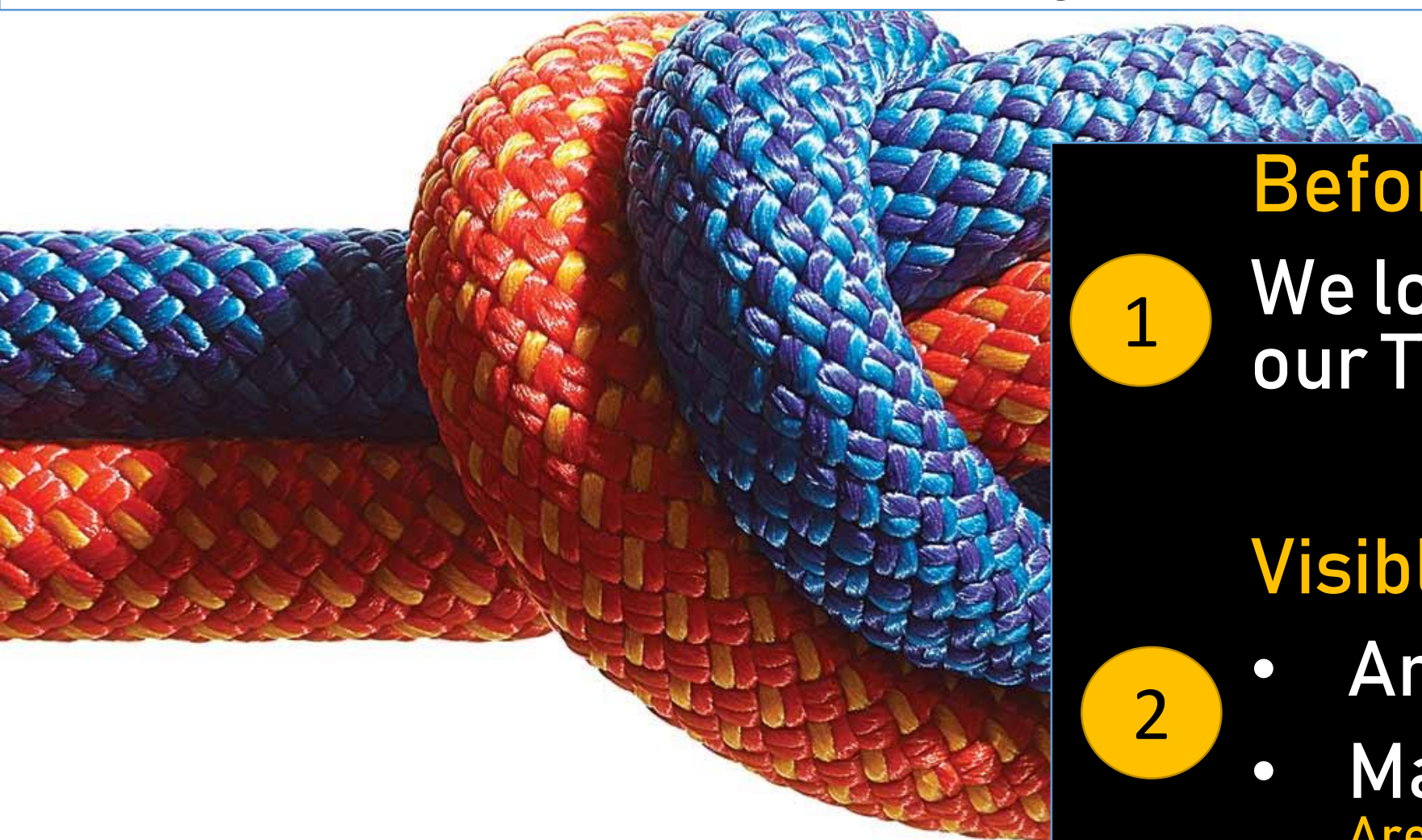
- Is the technology trustable?
- Is the brand/designer trustworthy?



Originally developed by Dr. Simone Borsci. Ask permission and reference appropriately for complete or partial reuse

Trust Toward Systems: our definition

TTS is a product-mediated relationship between people i.e., the end-user and the designer.



Before the use

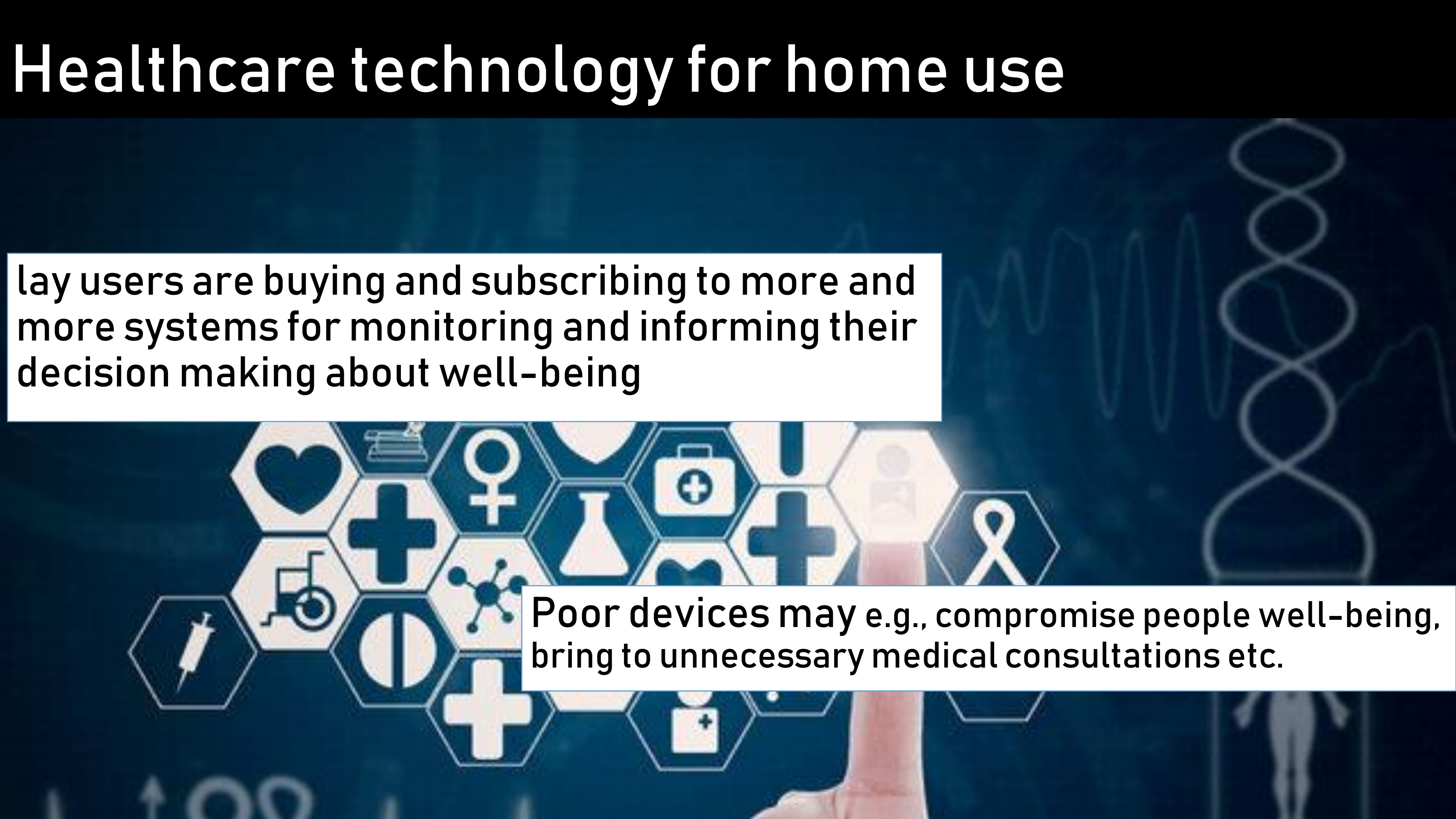
1 We look for cues and information to enrich our TTS

Visible design and information about tech:

- 2
- Are essential to convey a sense of trust
 - May trick people trust
- Are we able to detect technology cheaters?

Healthcare technology for home use

lay users are buying and subscribing to more and more systems for monitoring and informing their decision making about well-being

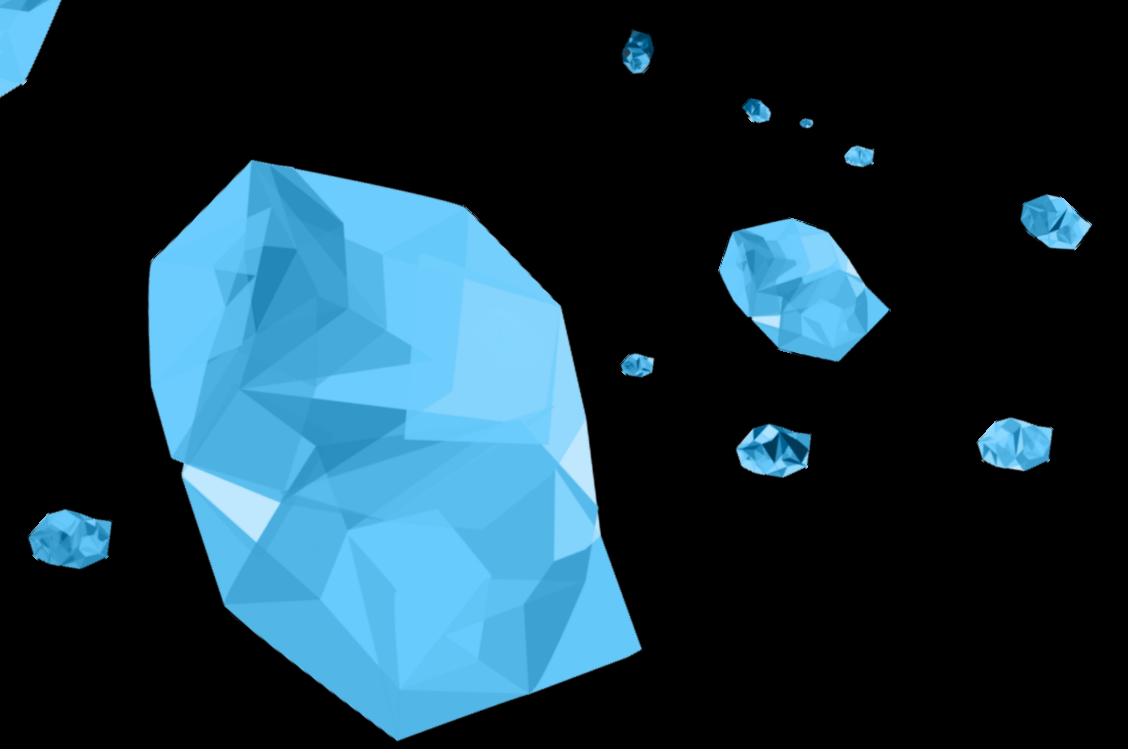
The background features a dark blue gradient with a faint DNA double helix on the right and an ECG line across the middle. In the lower half, a hand is pointing upwards towards a grid of white hexagonal icons. These icons include a heart, a microscope, a female symbol, a flask, a first aid kit, a plus sign, a person silhouette, a wheelchair, a syringe, a pill, a virus, a plus sign, a plus sign, and a ribbon symbol.

Poor devices may e.g., compromise people well-being, bring to unnecessary medical consultations etc.

Why is important to investigate trust?

1. People trust toward autonomous tech and AI assistant is key topic for the successful implementation in our society of these emerging technology
2. Medical equipment for home use is more and more available to lay users.
 - This increased availability needs transparency of information that is often missing (about and around) devices.
 - Lack of transparency may damage lay people well being, their trust as well as their experience of use. And in the long run damage to the market as well.





Thank you!

