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

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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 :

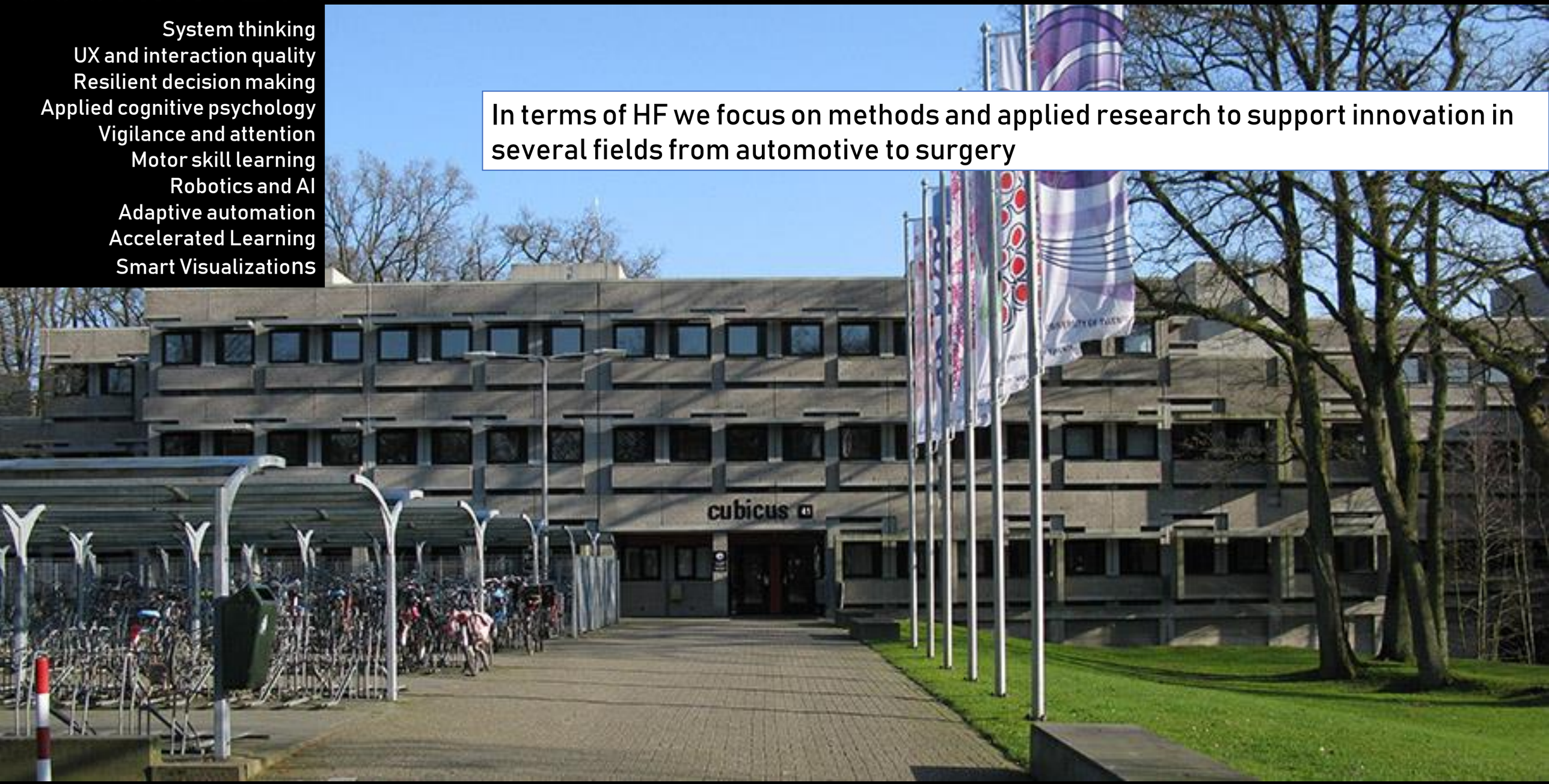
1. Adapt and develop human factors methodologies to support innovation,
2. Establish multidisciplinary frameworks for the evidence generation to support the development of medical device.

Borsci, 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



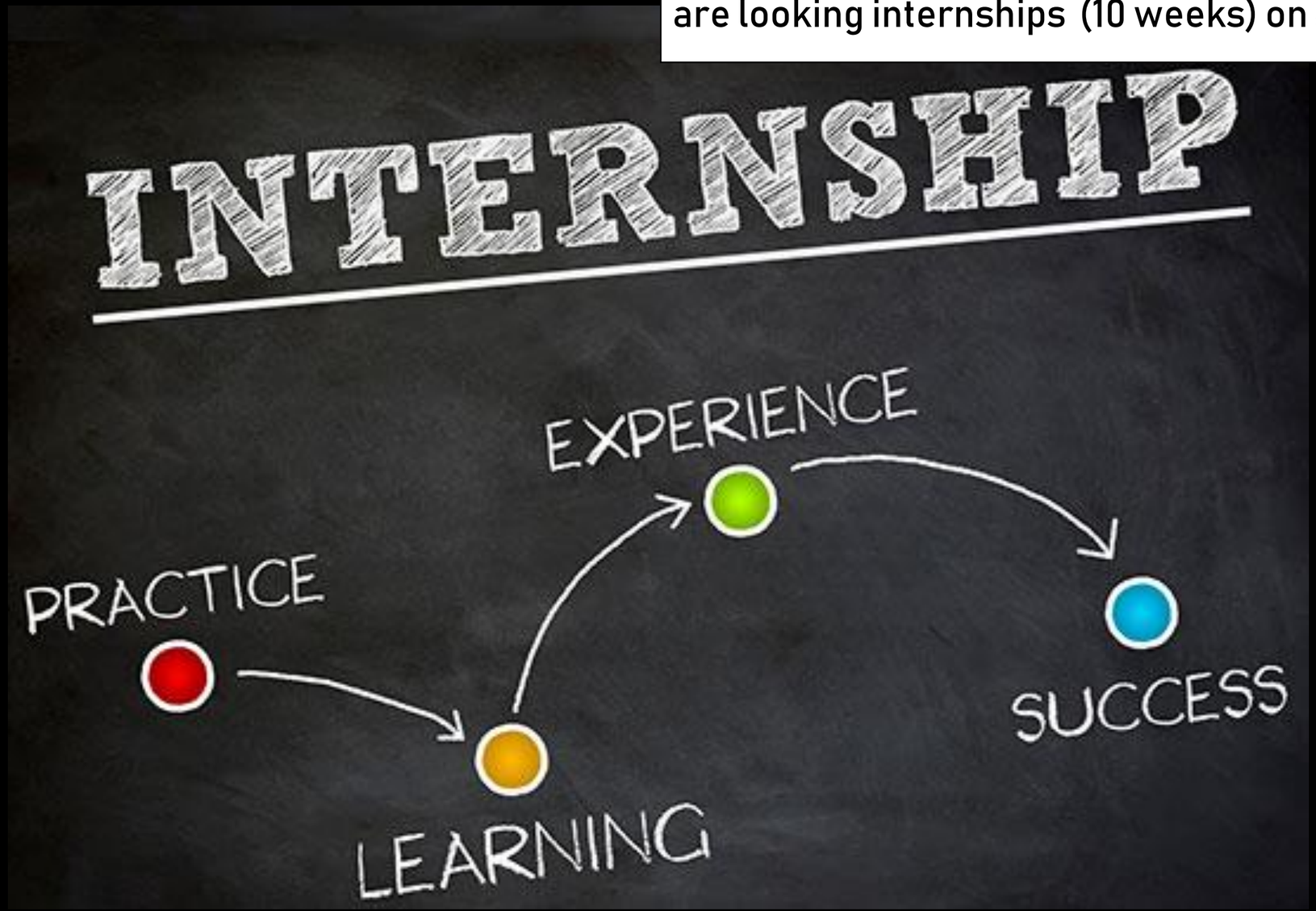
COGNITIVE PSYCHOLOGY AND ERGONOMICS DEPARTMENT

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




THE
BMS
LAB
TECH4PEOPLE
UNIVERSITY OF TWENTE.

BMS Faculty laboratory
>400m^2 of high-tech facilities

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

xsens

FACEWARE TECHNOLOGIES INC

unity

PERCEPTION NEURON

REALLUSION

iClone 7

BRAINSTUD

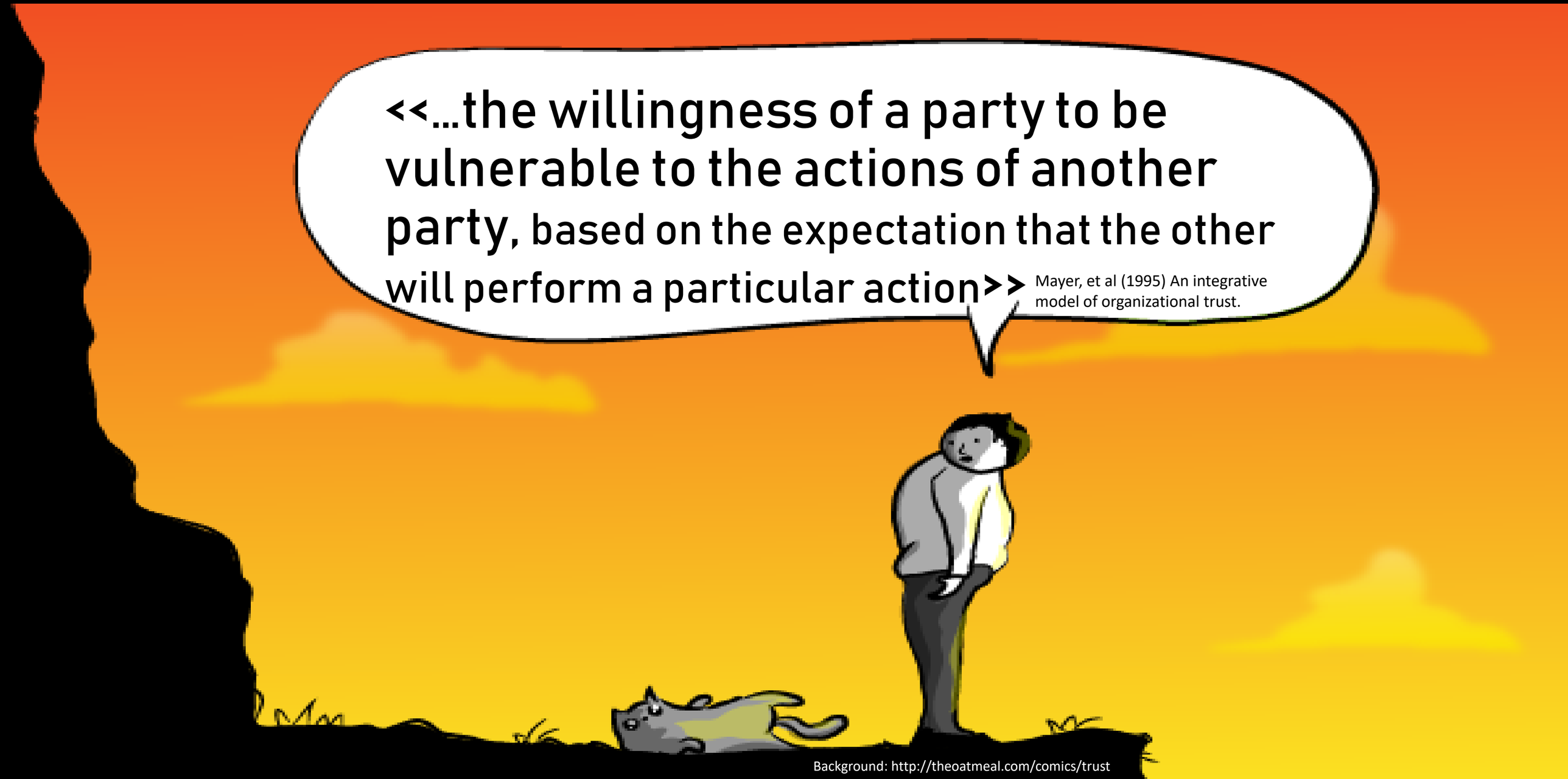
DEMCON

Let’s talk about Trust

What trust is?

Definition and things we know

Trust



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

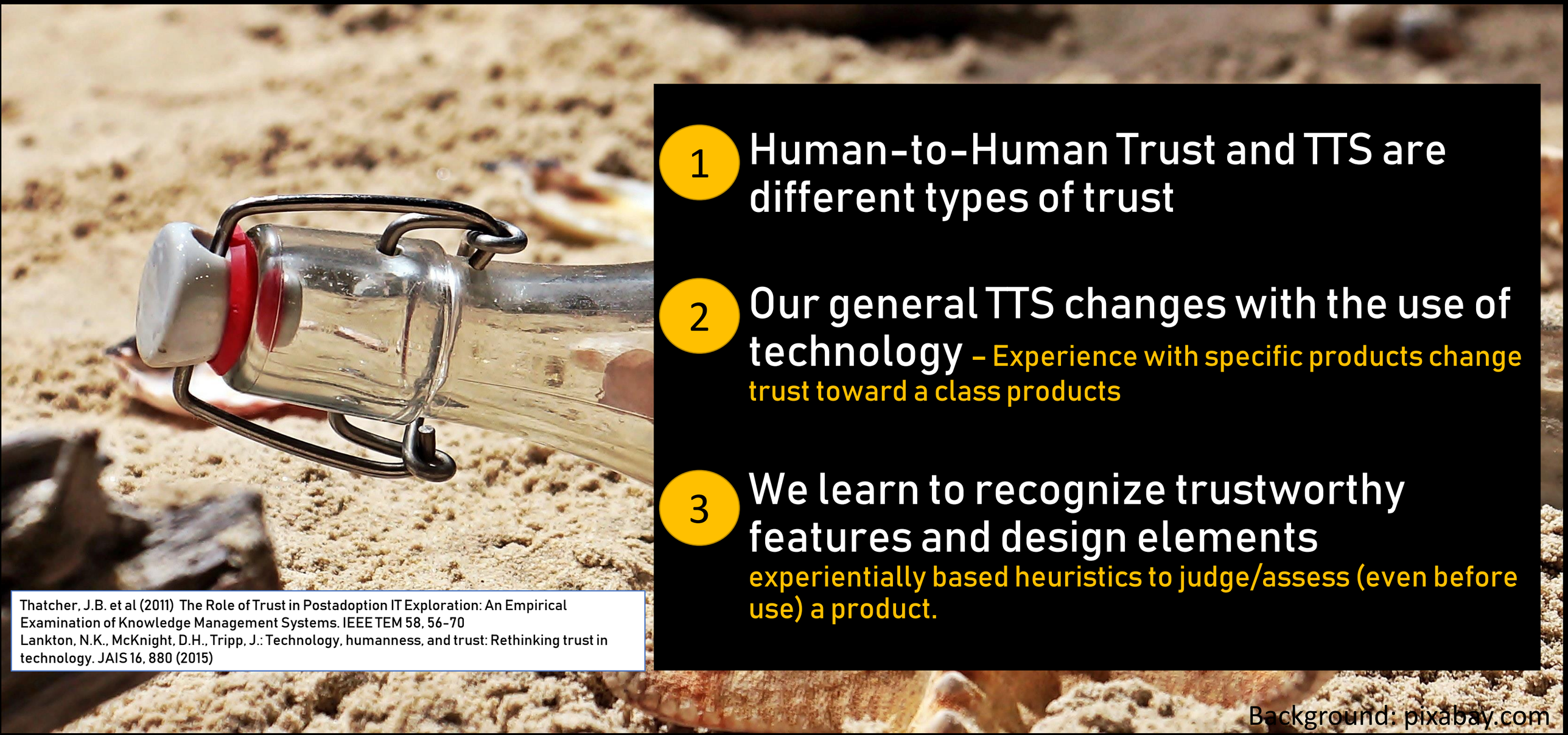
Background: http://theoatmeal.com/comics/trust

Trust Toward Systems

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

Background: Pinterest: Bruno Mangyoku

6 things we know about TTS from literature



1. Human-to-Human Trust and TTS are different types of trust

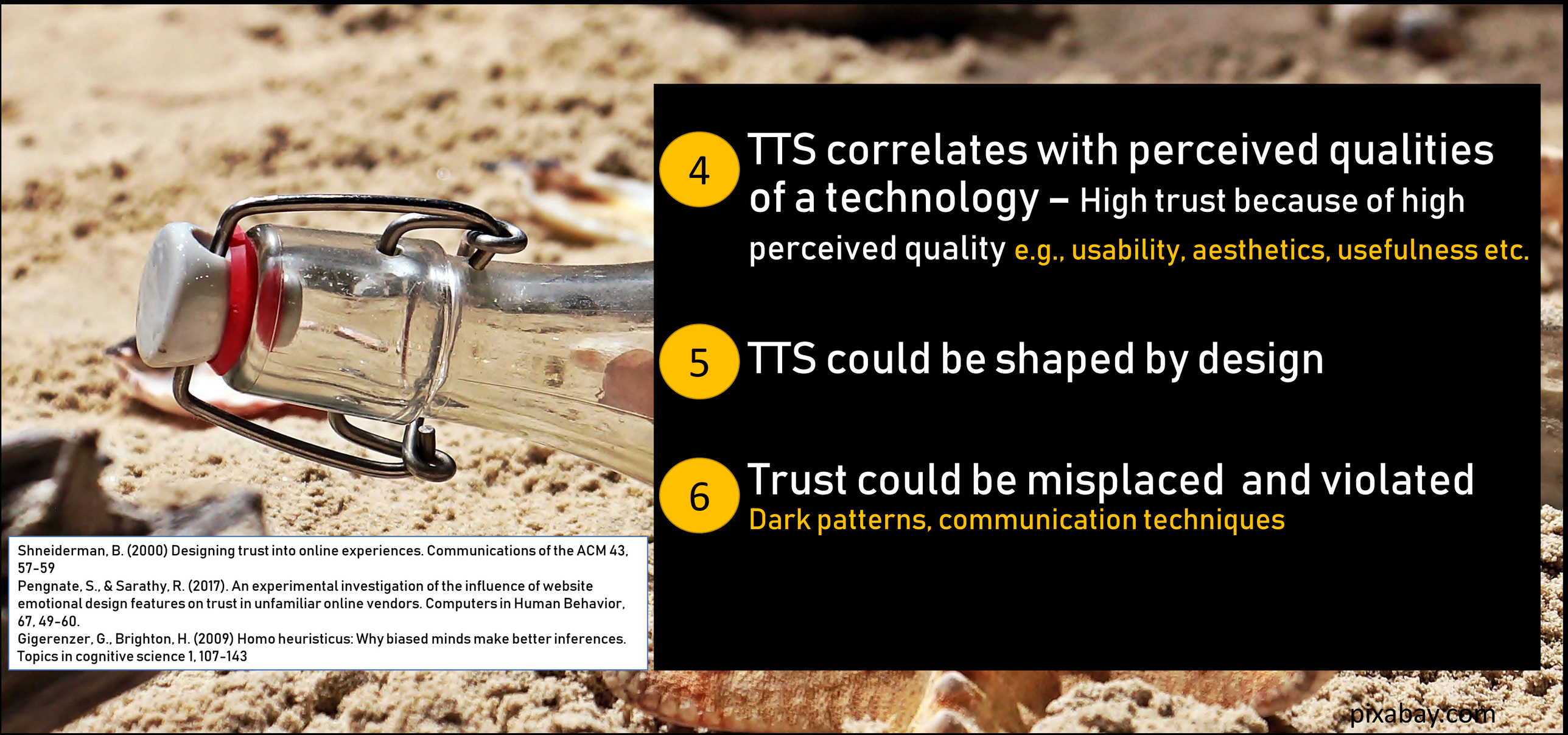
2. Our general TTS changes with the use of technology – Experience with specific products change trust toward a class products

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)

Background: pixabay.com

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

pixabay.com

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

Background: Michael Boeke (2015) Designing for Trust, Codemotion Event

Trust could be design: Designing for trust

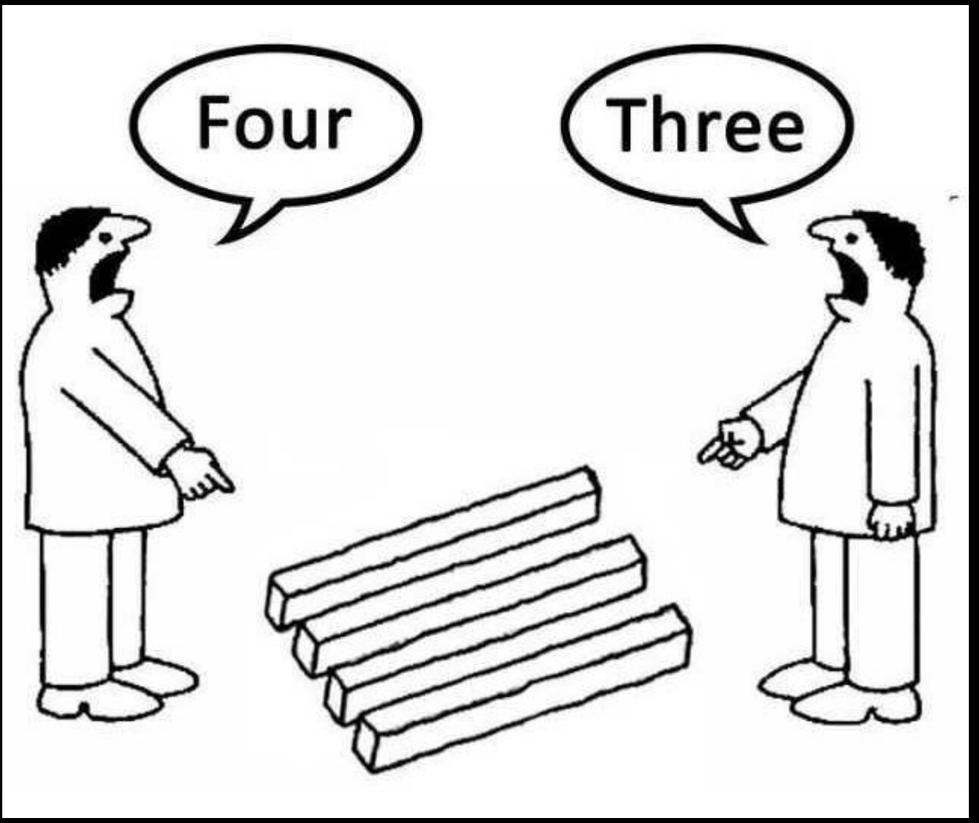
To make visible and recognizable certain features of the design that people want to control/experience to trust a product

Transparency

Control

Background: Michael Boeke (2015) Designing for Trust, Codemotion Event

Designing for trust and violation



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

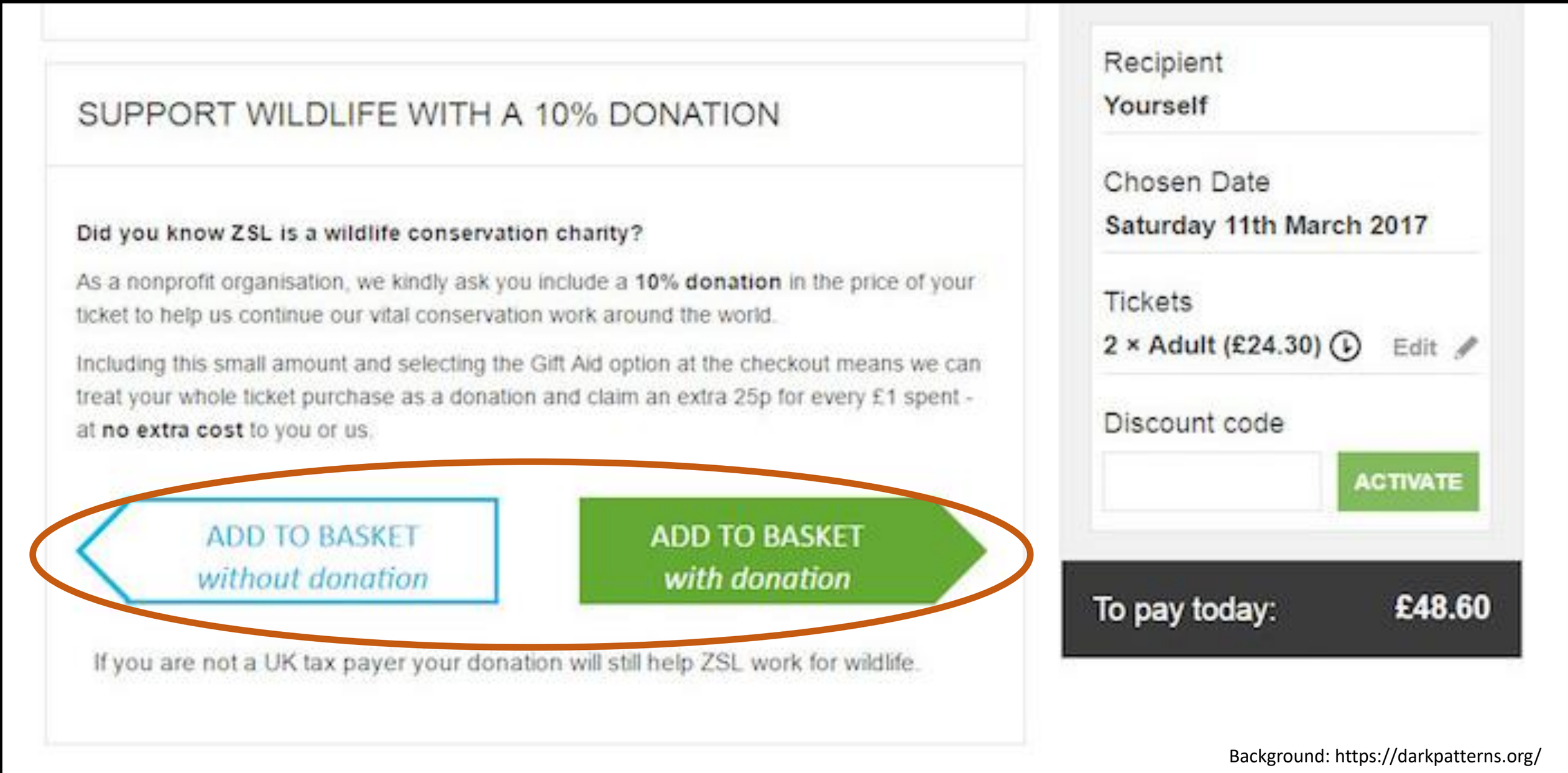
- Ambiguous design elements
- Some product's features more visible than others (less appealing)

Bad design behind a good appearance

It is the right way to insert the key?

http://www.presentationzen.com/presentationzen/2008/11/design-means-putting-yourself-in-the-users-shoes.html

Deceptive design: Dark patterns

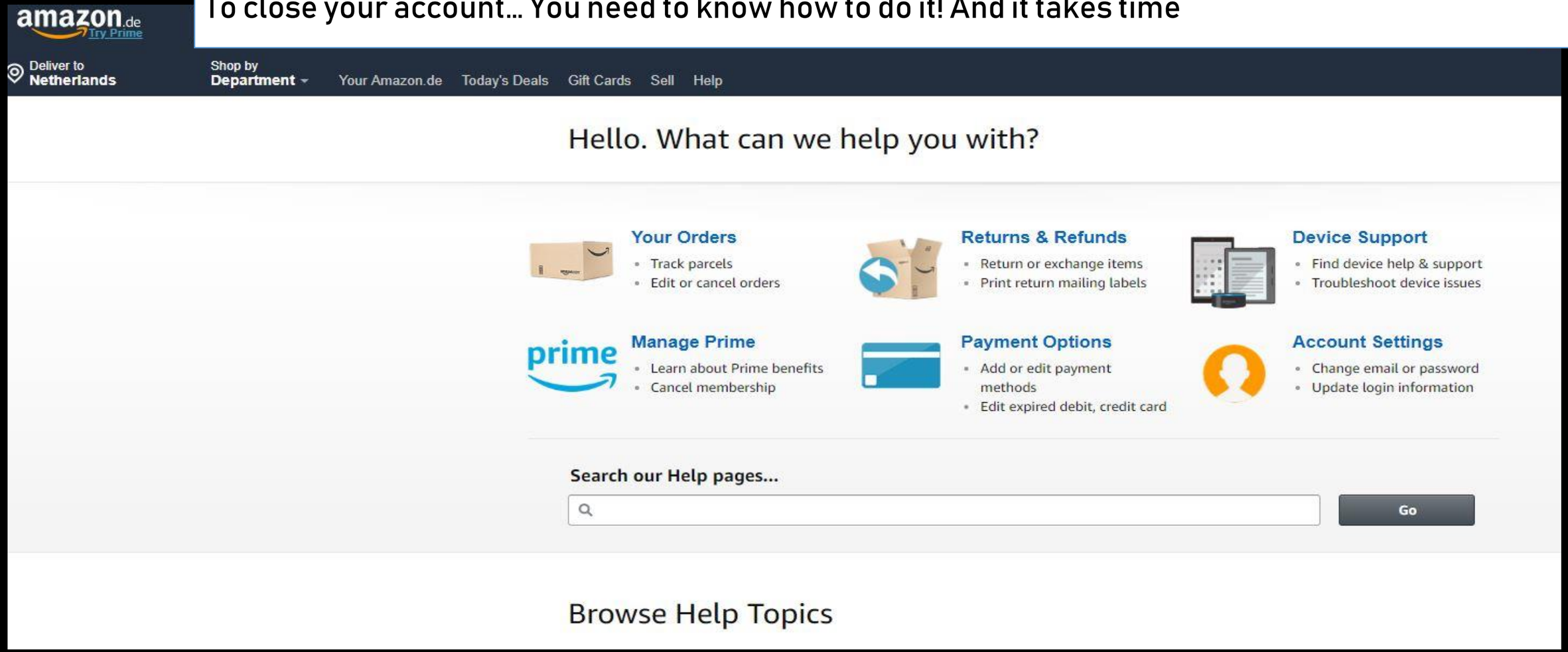


Background: https://darkpatterns.org/

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



Surce: https://www.youtube.com/watch?v=kxkrdLI6e6M

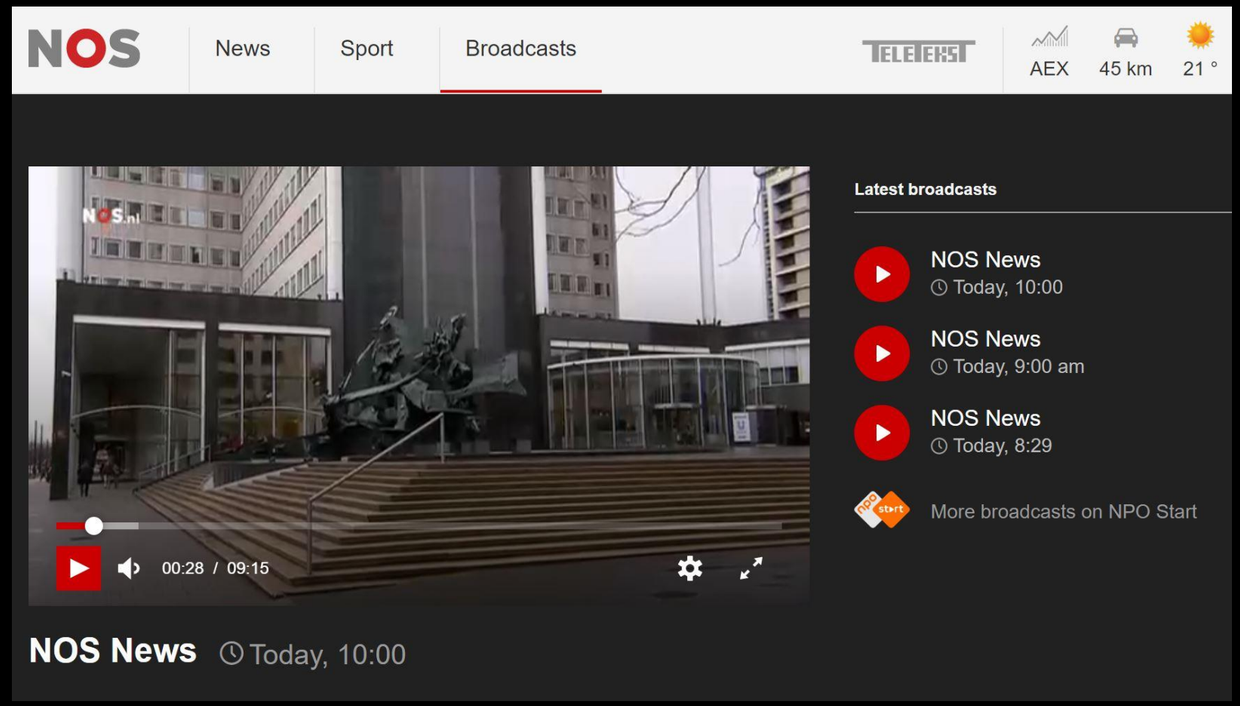
Violation of expectations

I bought a Smart TV of a well know brand

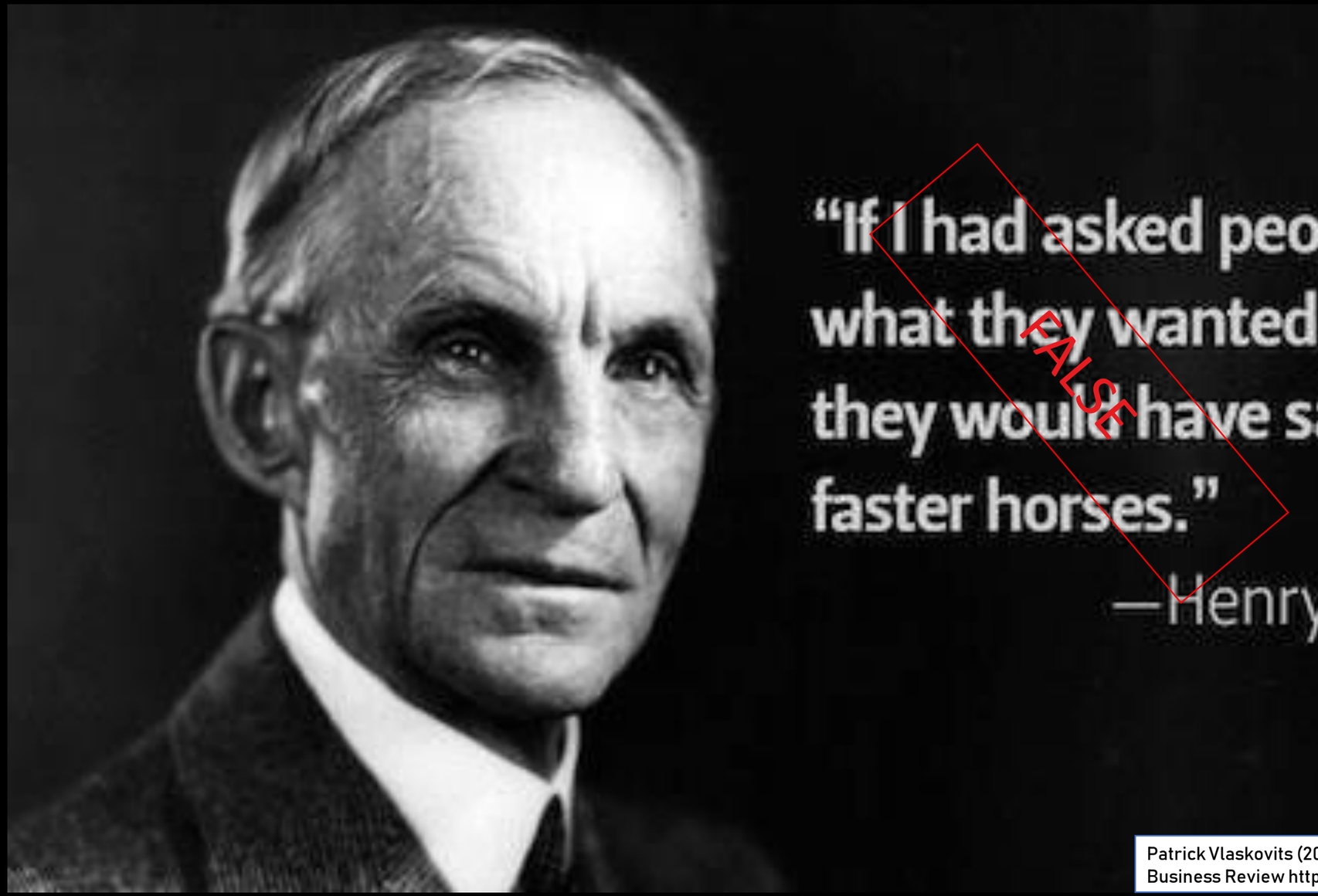
Packaging and information →

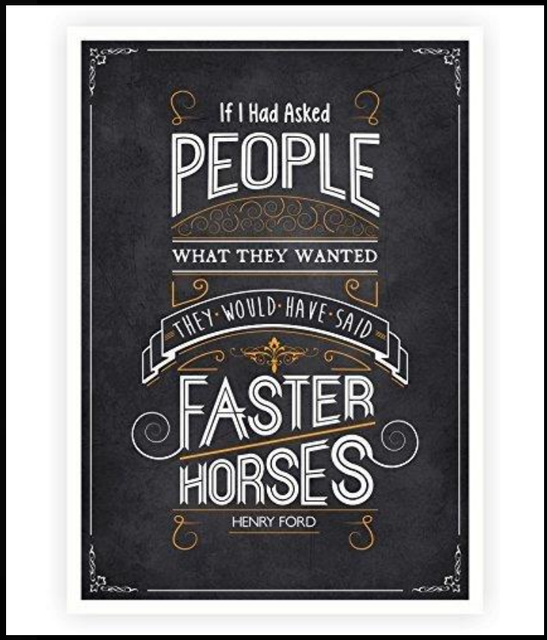
My expectation

Reality



Deceptive / manipulated information





Patrick Vlaskovits (2011) Henry Ford, Innovation, and That "Faster Horse" Quote. Harward Business Review https://hbr.org/2011/08/henry-ford-never-said-the-fast

“Partial” or deceptive information (illegal)

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

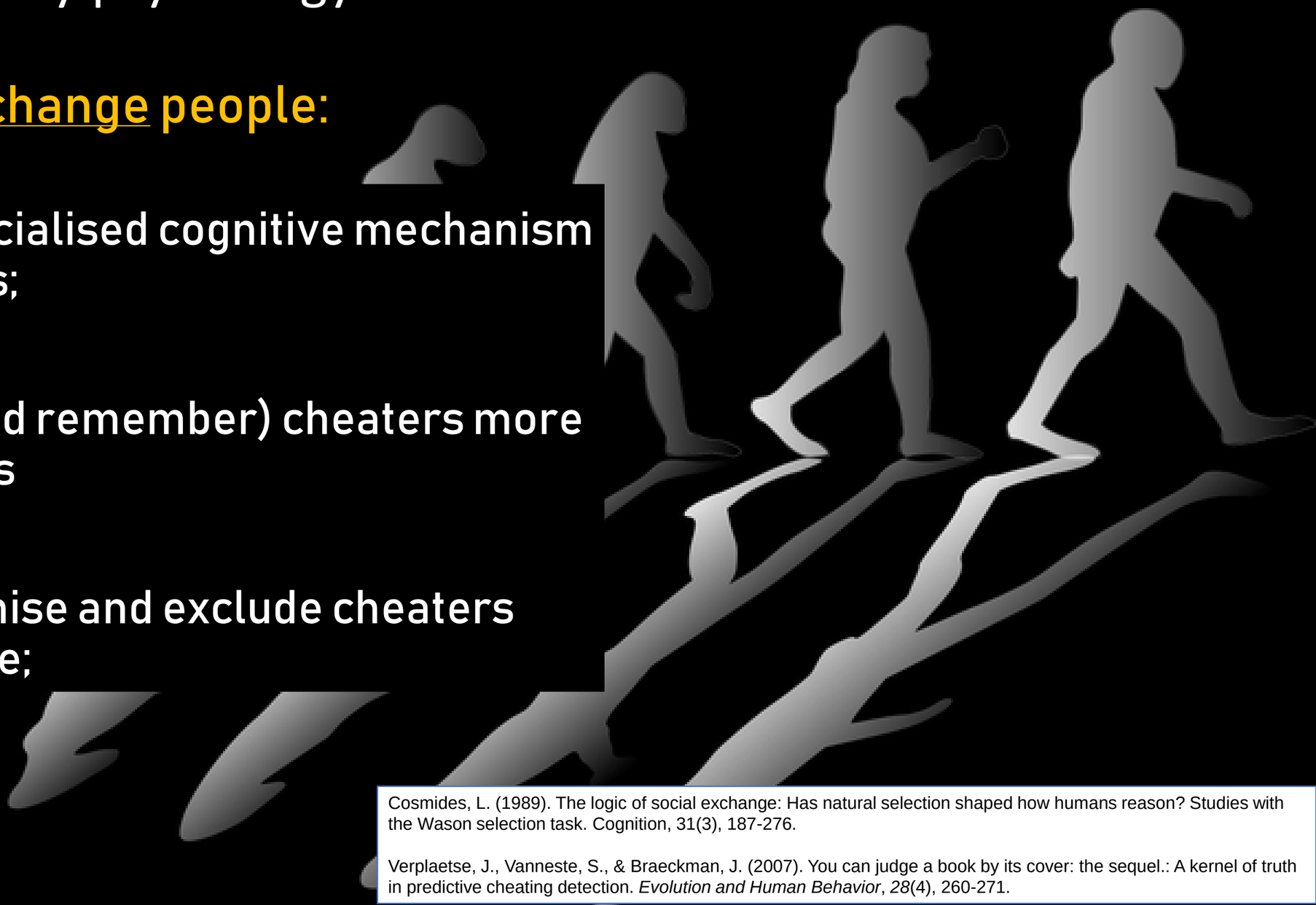
You bought a car that has less horsepower than in the description

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?

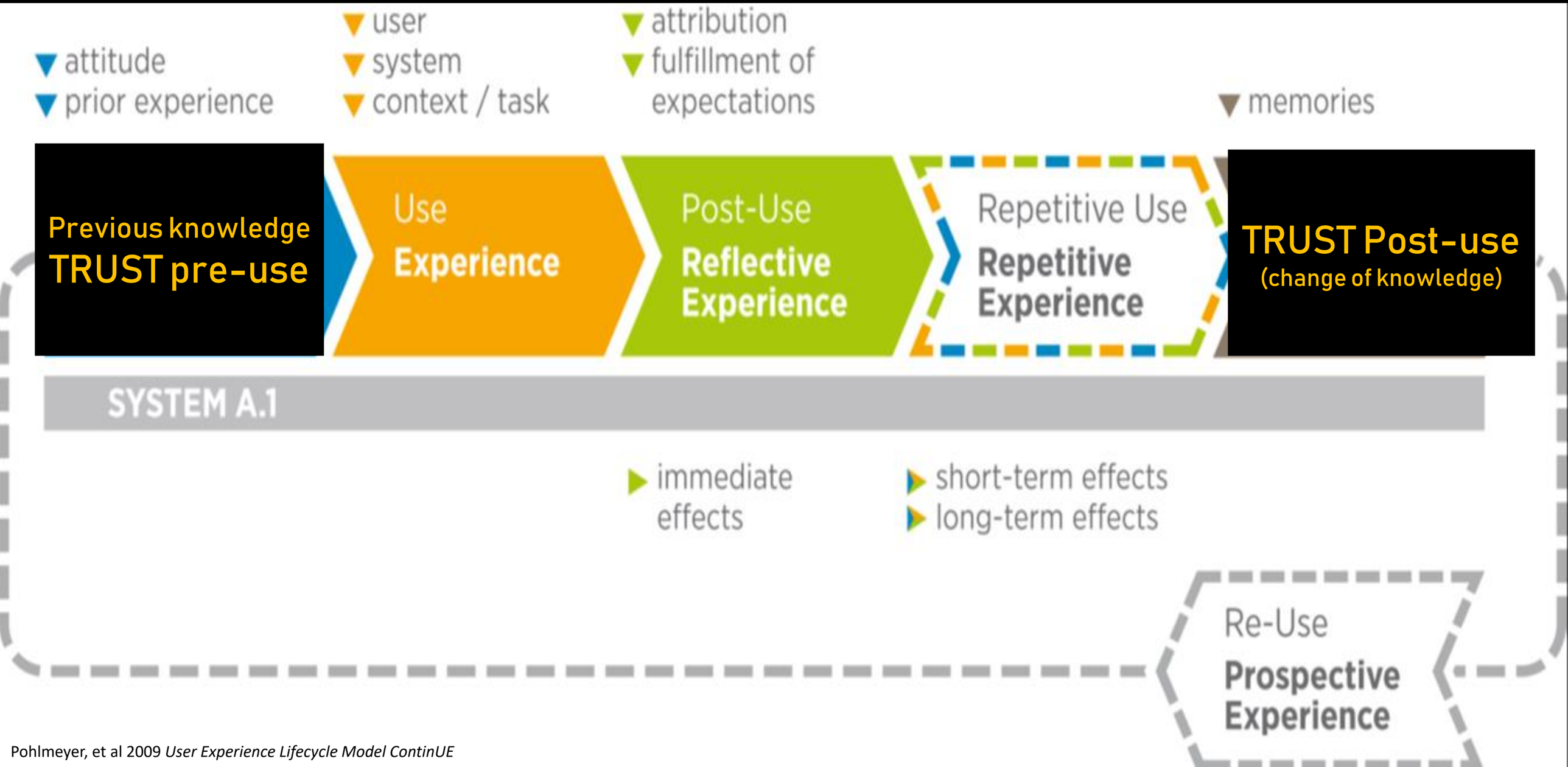
2. Is TTS part of (or affects) our experience with technology?

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

Working Hypothesis

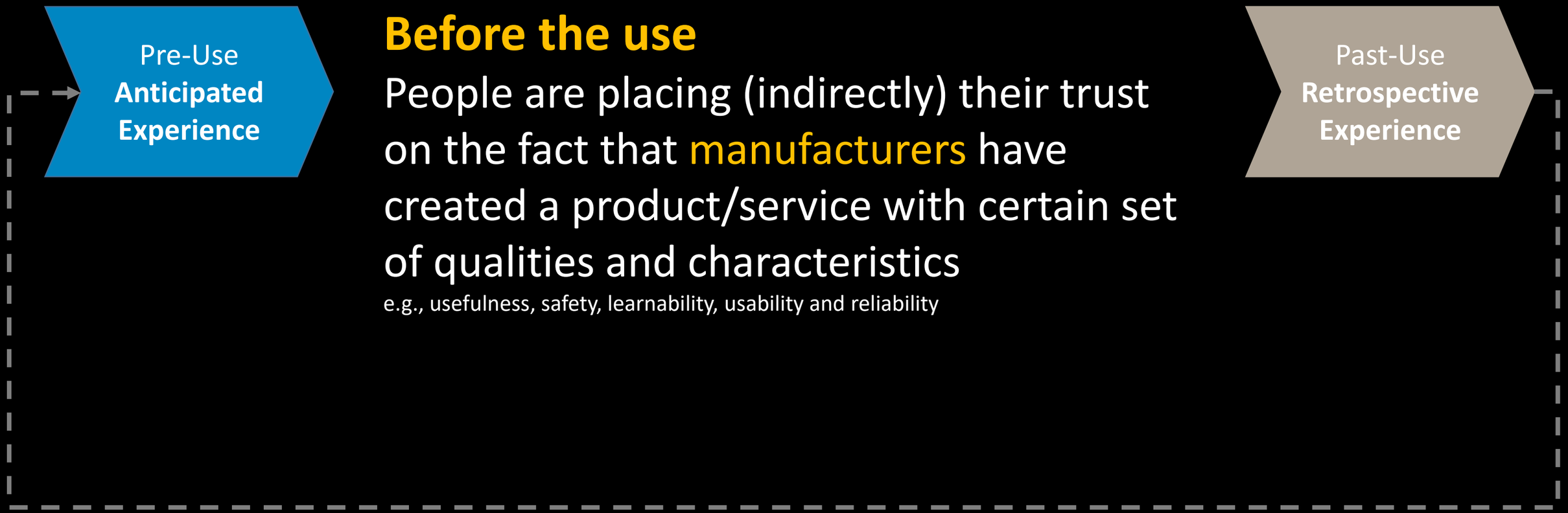
Trust as part of UX

UX AND TRUST



Pohlmeyer, et al 2009 *User Experience Lifecycle Model ContinUE*

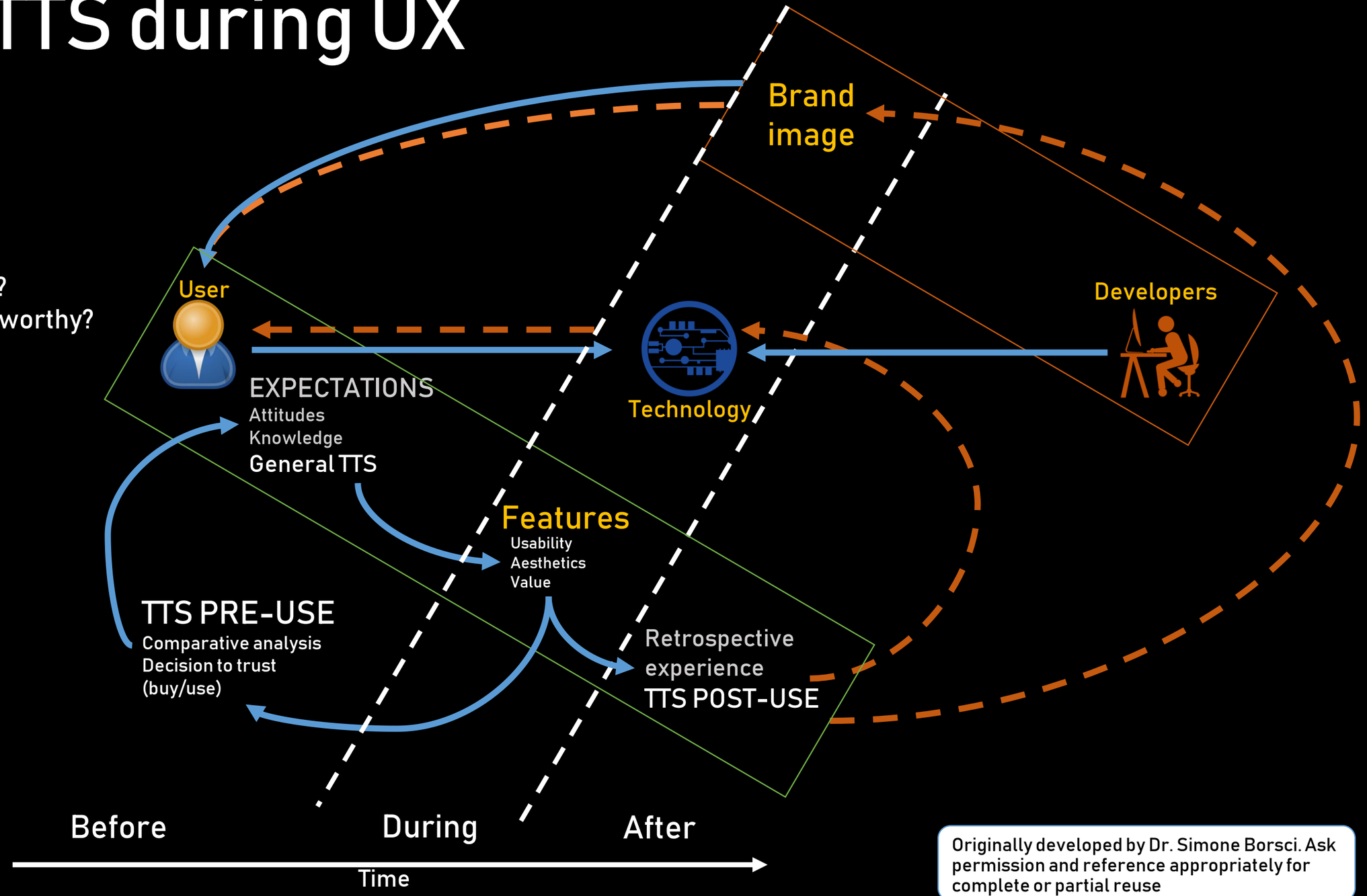
Our literature-based assumption



Sketch of TTS during UX

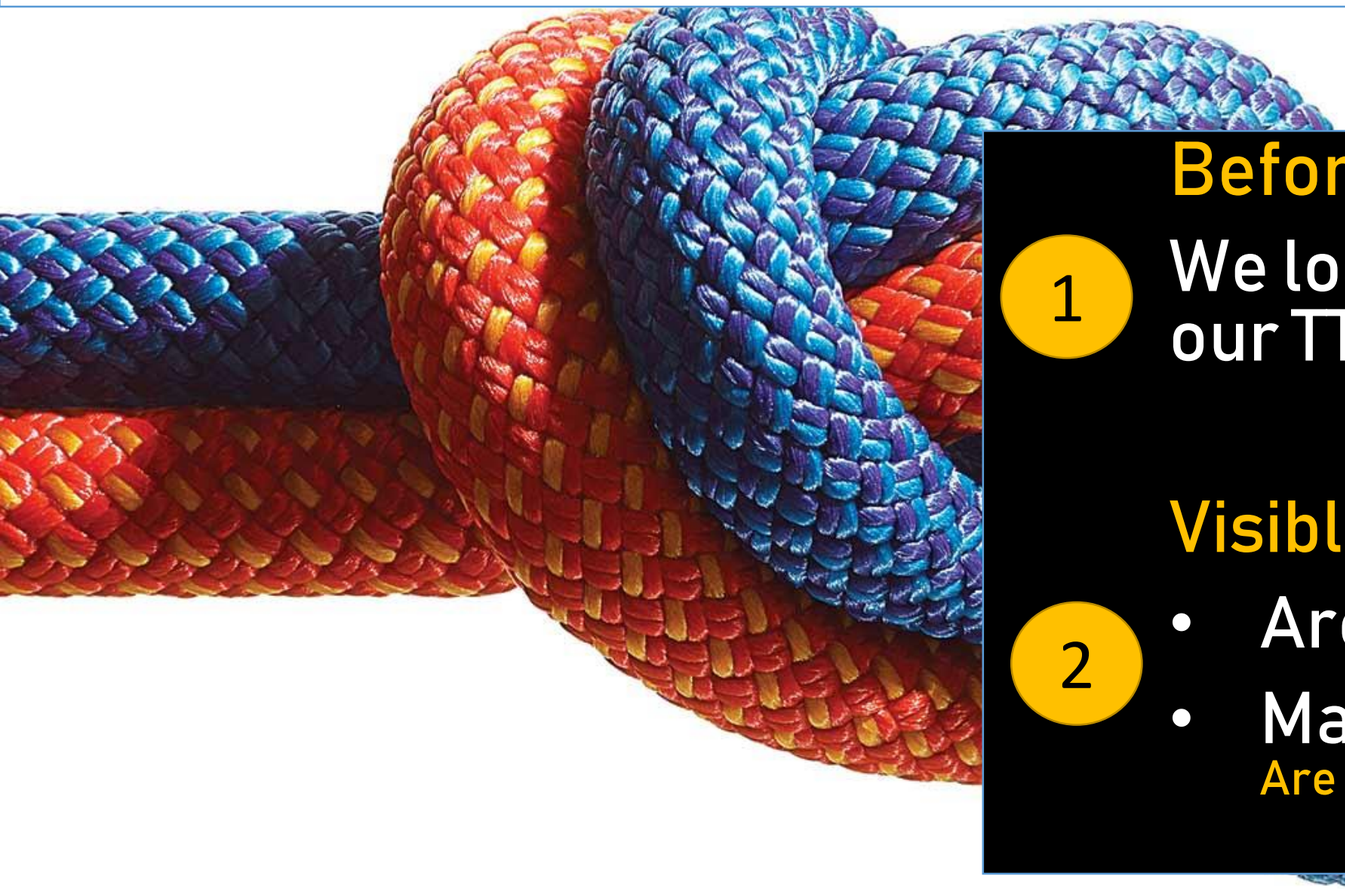
Outcomes

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



Trust Toward Systems: our definition

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



1

Before the use

We look for cues and information to enrich our TTS

2

Visible design and information about tech:

- 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

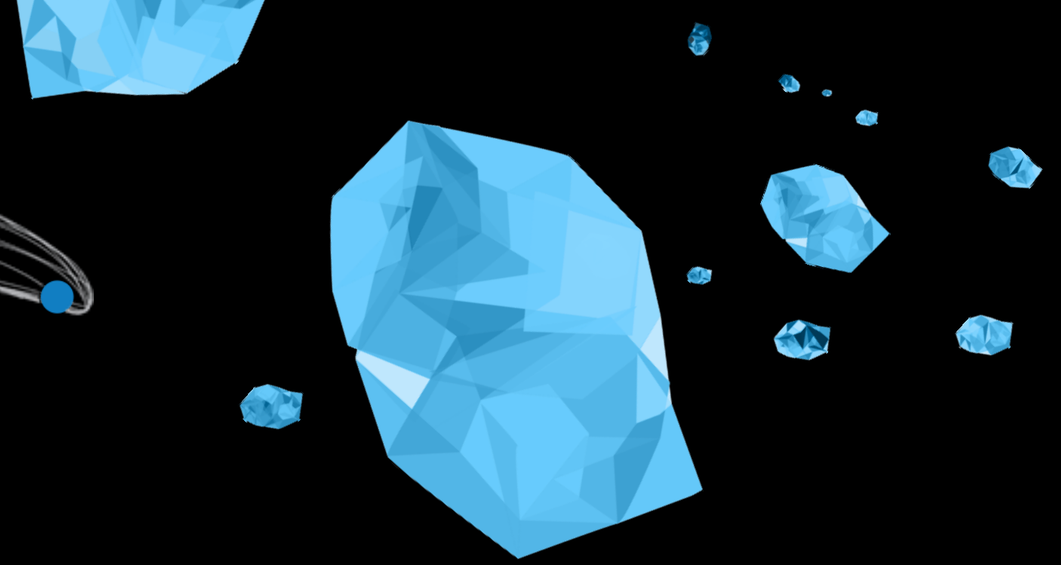
Poor devices may e.g., compromise people well-being, bring to unnecessary medical consultations etc.

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!