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# Trustworthy AI - Beyond Standardization and Certification

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Schlicker, N., Uhde, A., Baum, K., Hirsch, M. C., & Langer, M. (2022). *Calibrated Trust as a Result of Accurate Trustworthiness Assessment – Introducing the Trustworthiness Assessment Model*. PsyArXiv. 10.31234/osf.io/qhwvx

**AI Quality Summit, November 2nd, 2022,** Frankfurt, Germany

# Human-System-Interaction: Aiming for Calibrated Trust

- **Over-trust** = users rely always on the system disregarding system limitations
- **Under-trust** = users do reject the system and diminish the potentials of automated systems
- ✓ **Calibrated trust** = user's adequately trust and distrust a system (advice)

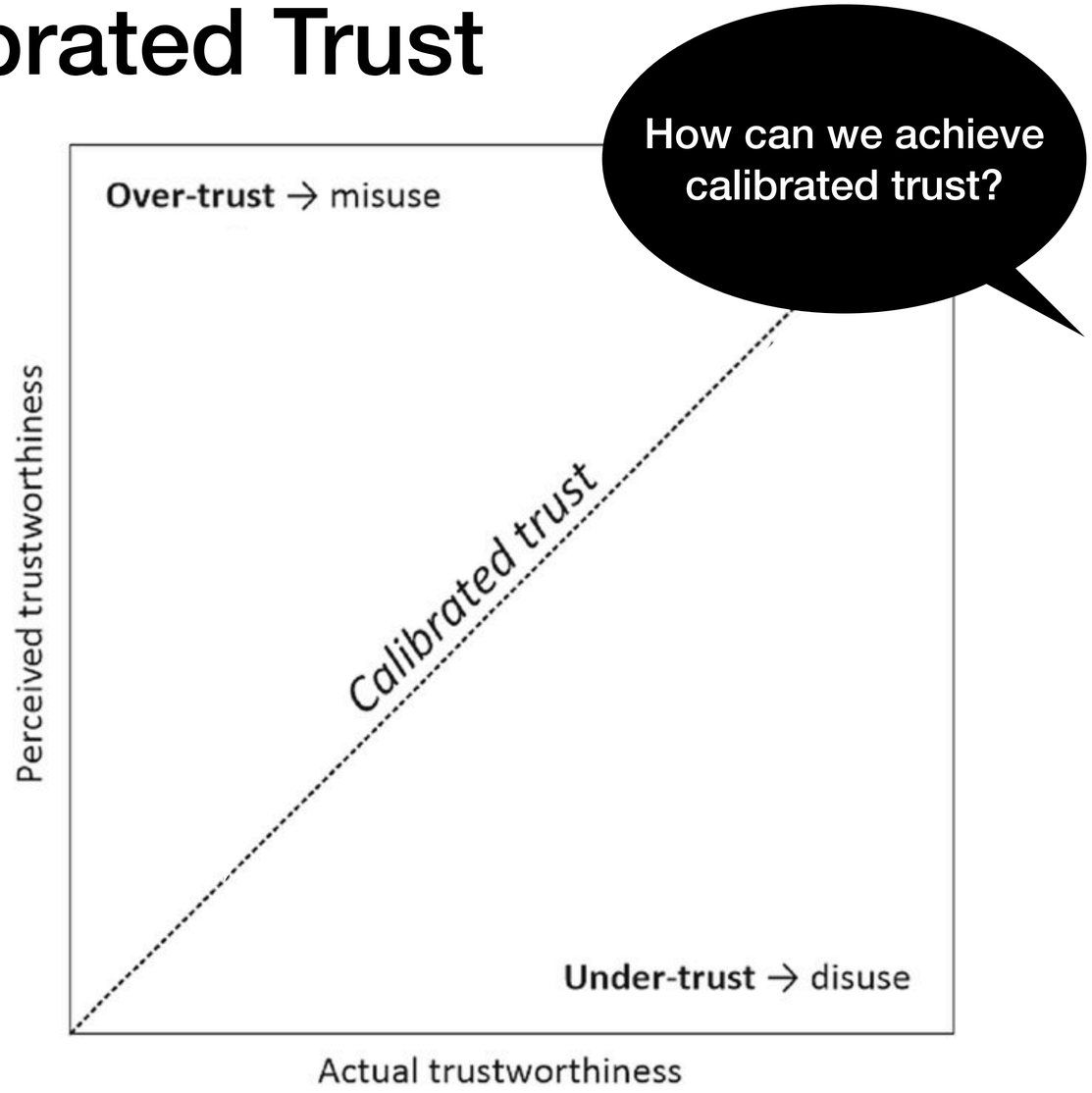
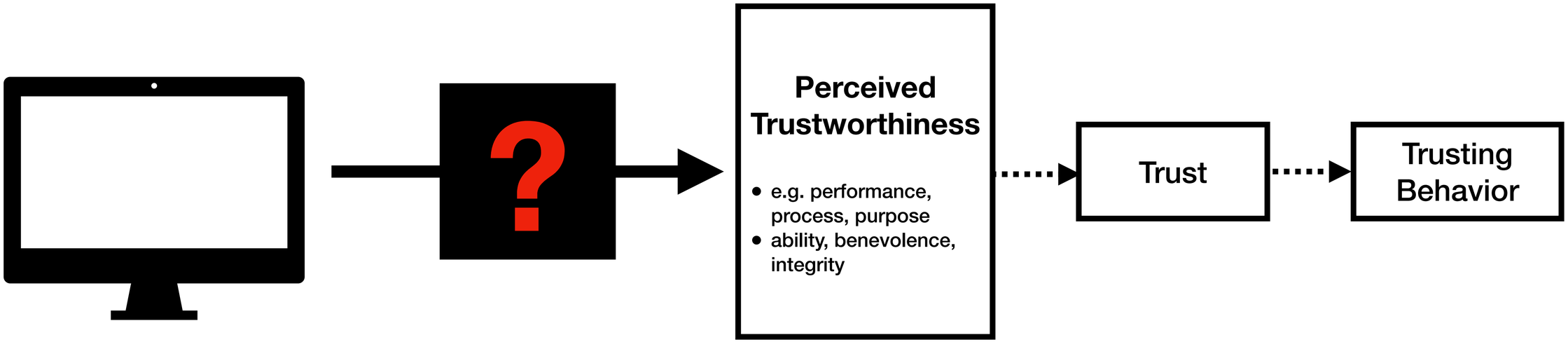
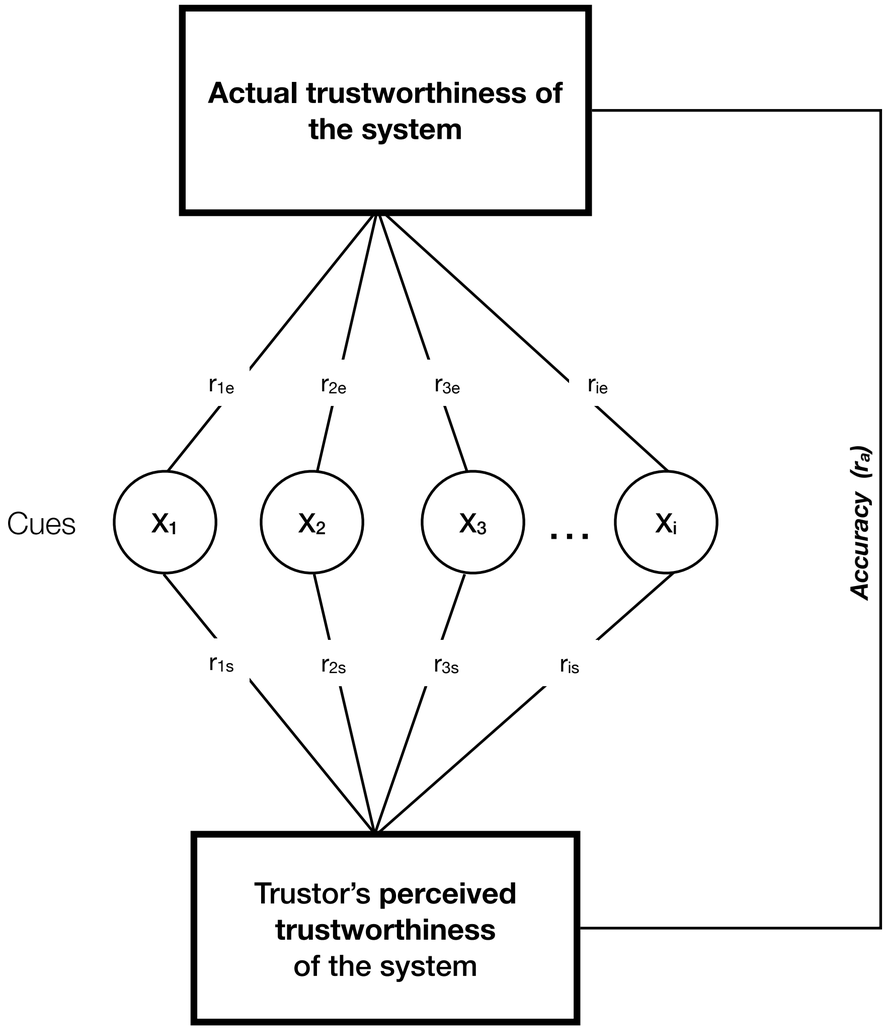



Figure adapted from: de Visser et al., 2020

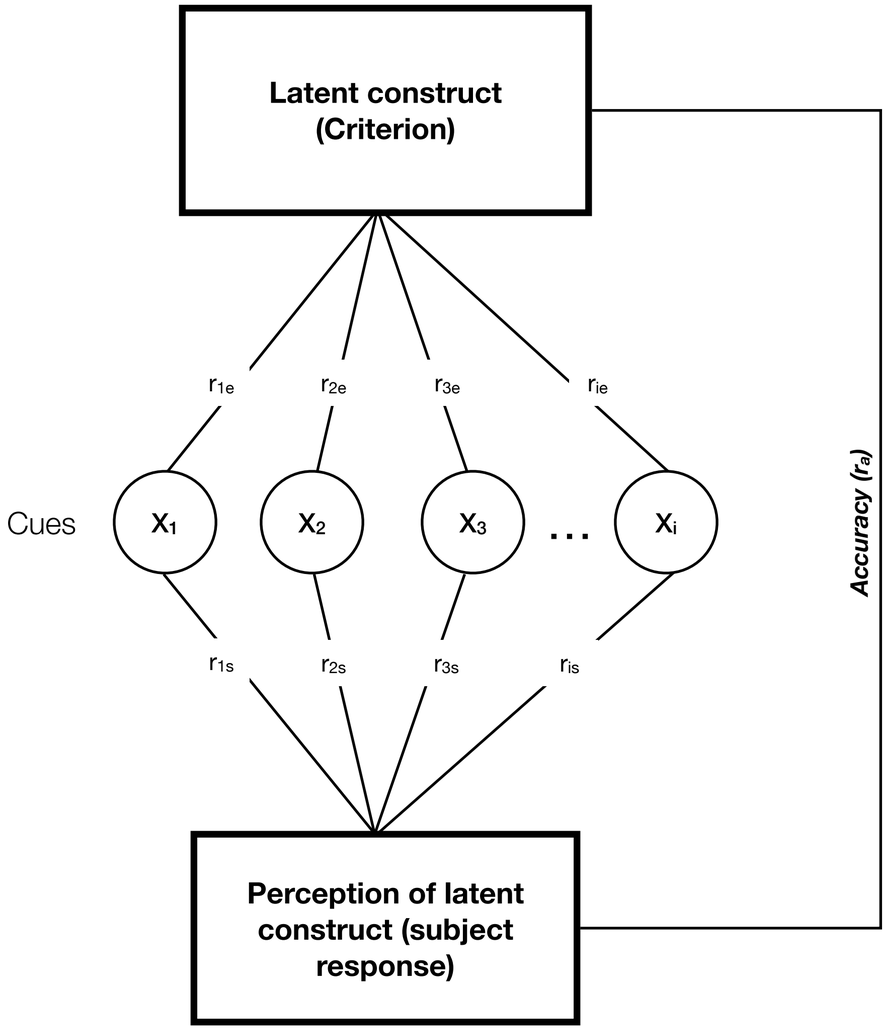
# Related Work



# Basic Idea

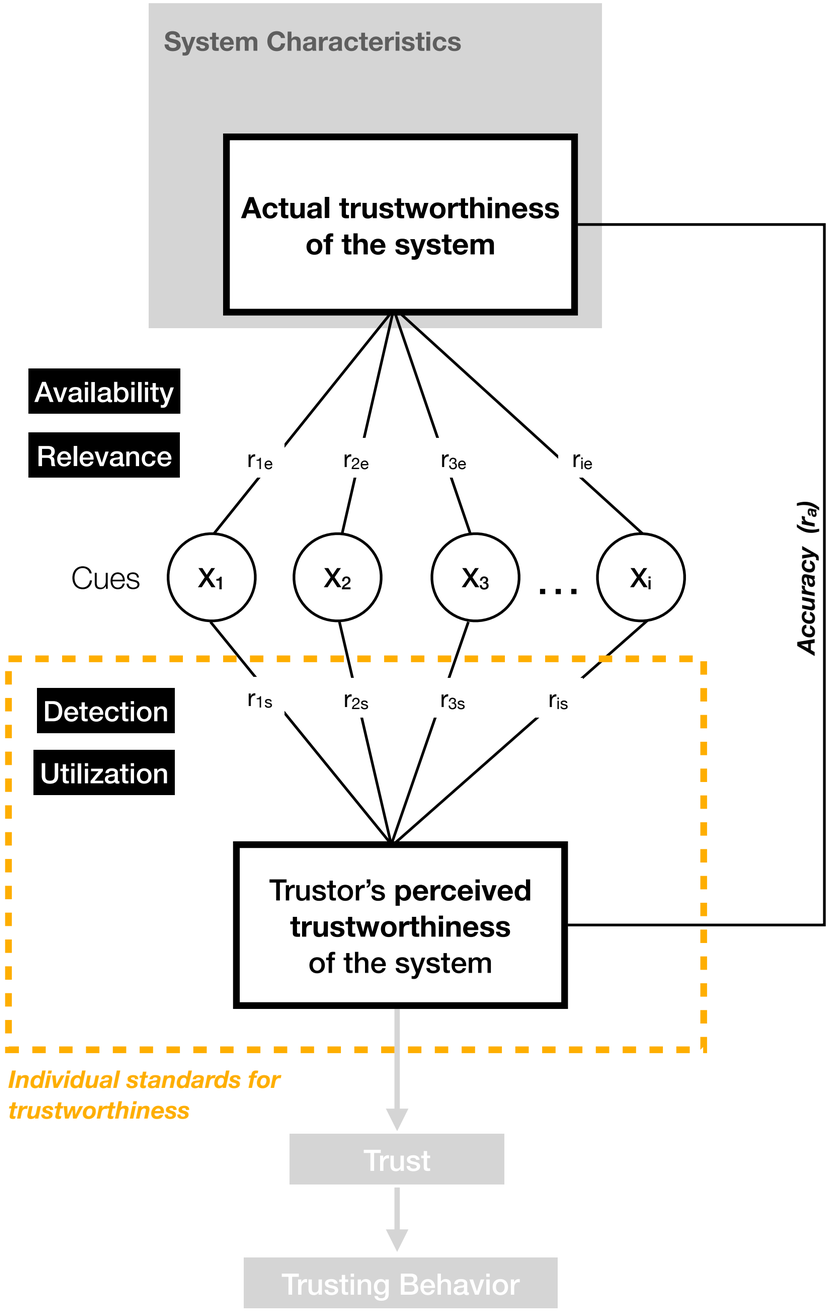

Actual trustworthiness of the system
$r_{1e}$
$r_{2e}$
$r_{3e}$
$r_{ie}$
Cues
$X_1$
$X_2$
$X_3$
...
$X_i$
$r_{1s}$
$r_{2s}$
$r_{3s}$
$r_{is}$
Trustor's perceived trustworthiness of the system
Accuracy ($r_a$)

# Basic Idea




Kuncel, 2017

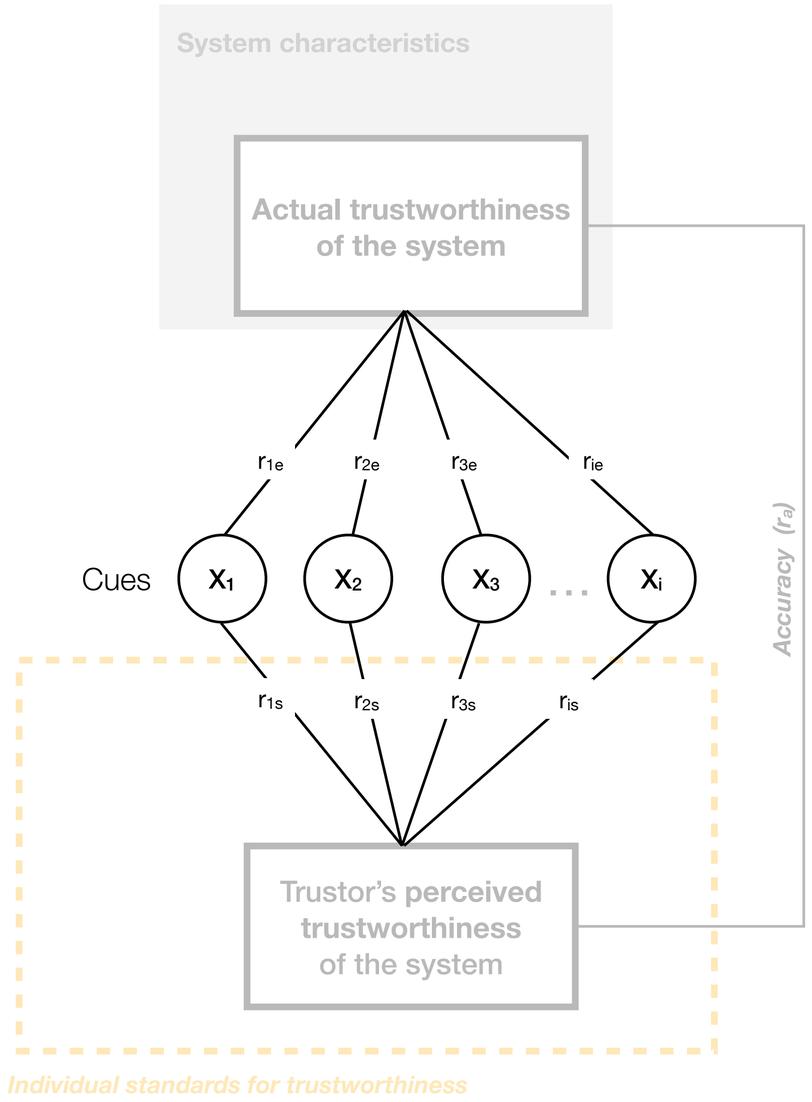
# Our Trustworthiness Assessment Model




Funder, 1995
Kuncel, 2017
Schlicker et al., 2022

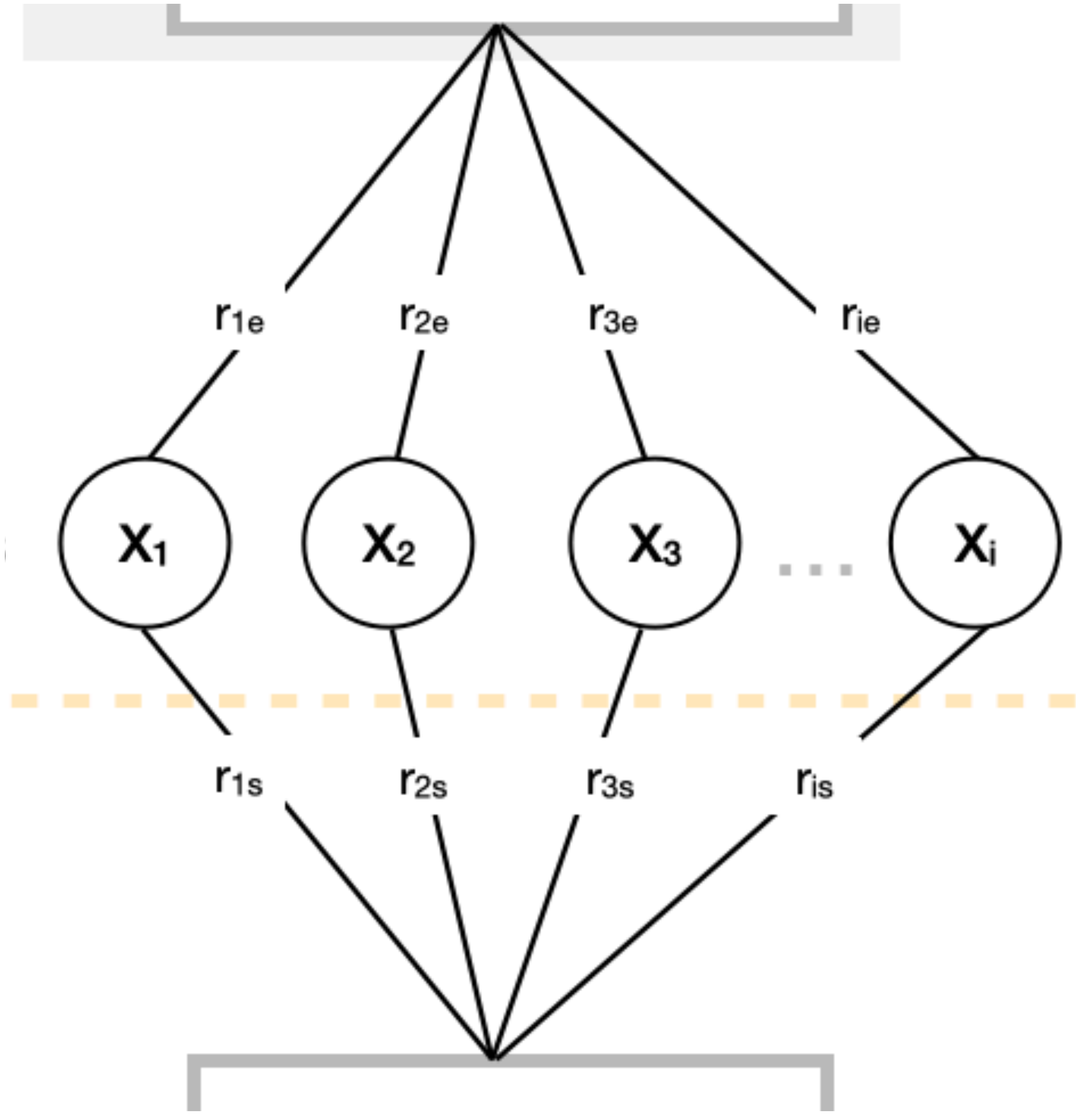
# Cues

- **Pieces of information that presumably provide insights regarding the *Actual Trustworthiness (AT)* of a system**



# Cues

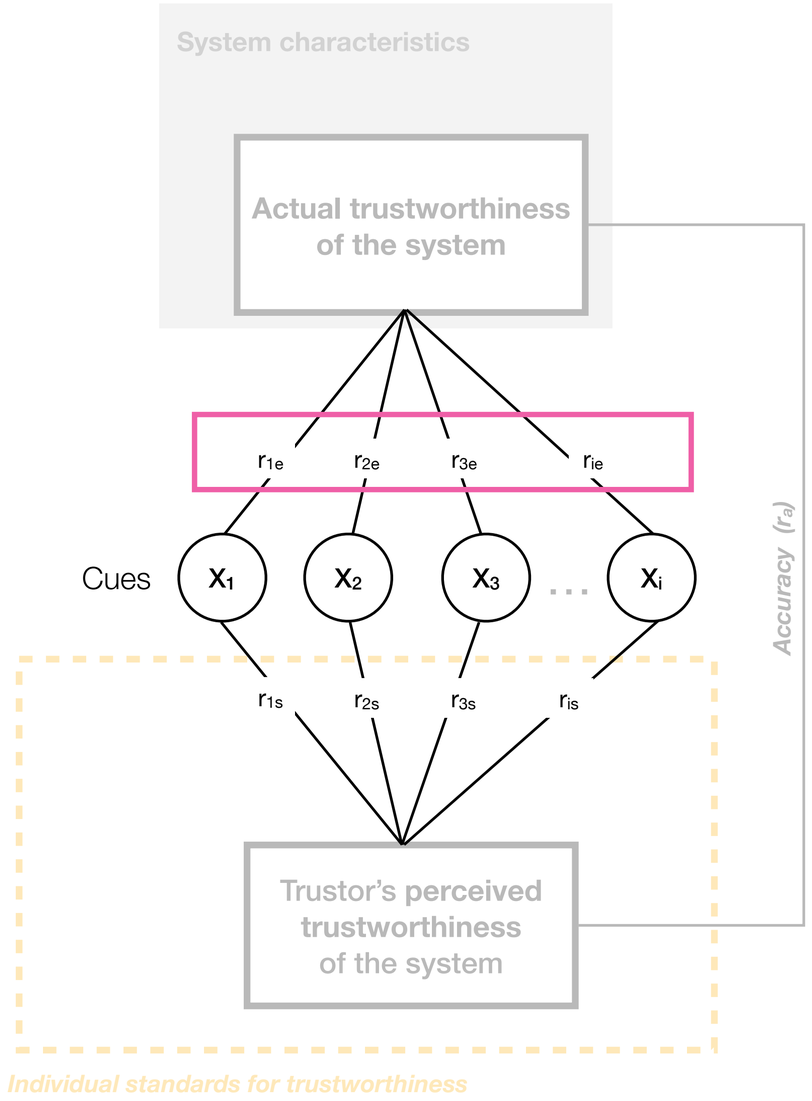
- **Examples:**
  - Logo of a company
  - Marketing
  - Information in the system’s user manual
  - Single outputs that a system produces
  - Testimonies of colleagues
  - Certification seal for "trustworthy AI”
  - …



# Cues

- Pieces of information that presumably provide insights regarding the *Actual Trustworthiness (AT)* of a system

- **Cues are more or less closely related to the AT**



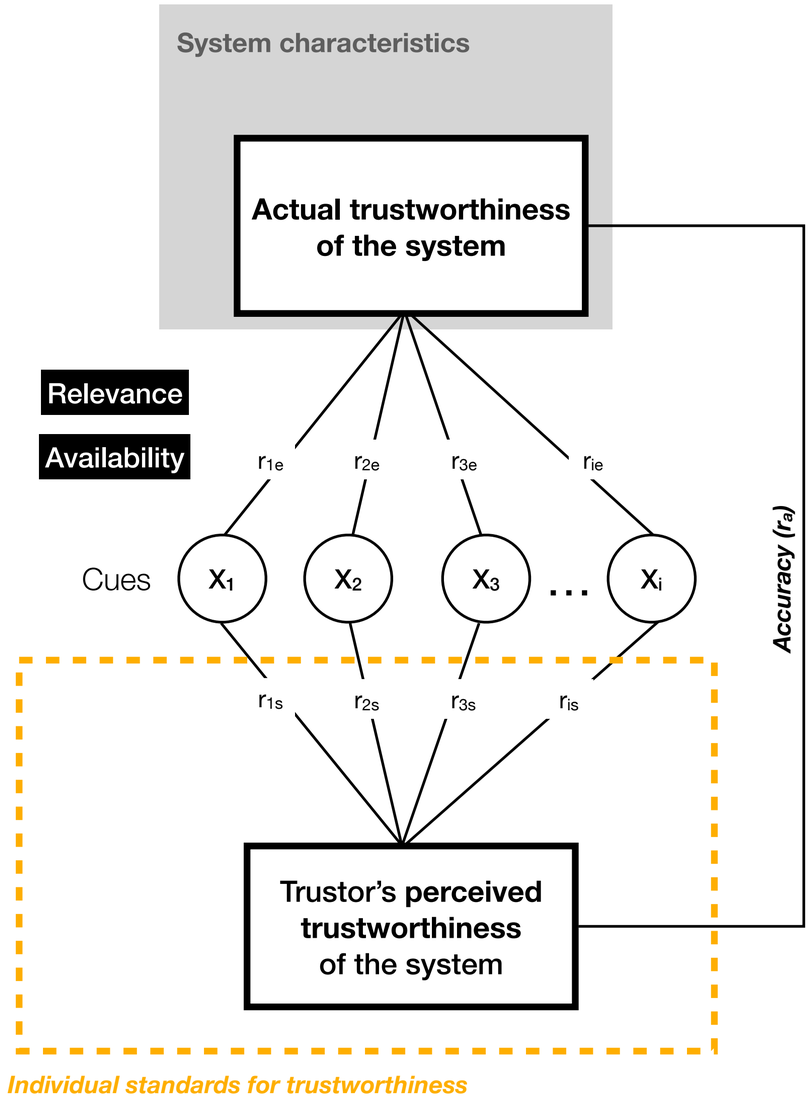
# Relations between the Model Components

**Cue relevance**

- Determines how indicative a cue is for the system's AT
- Relevant cues correlate strongly with the AT of a system (e.g. information regarding a system's performance in a task)
- Less relevant cues correlate low with the AT (e.g. popularity of a brand, ubiquitous presence of advertisement)

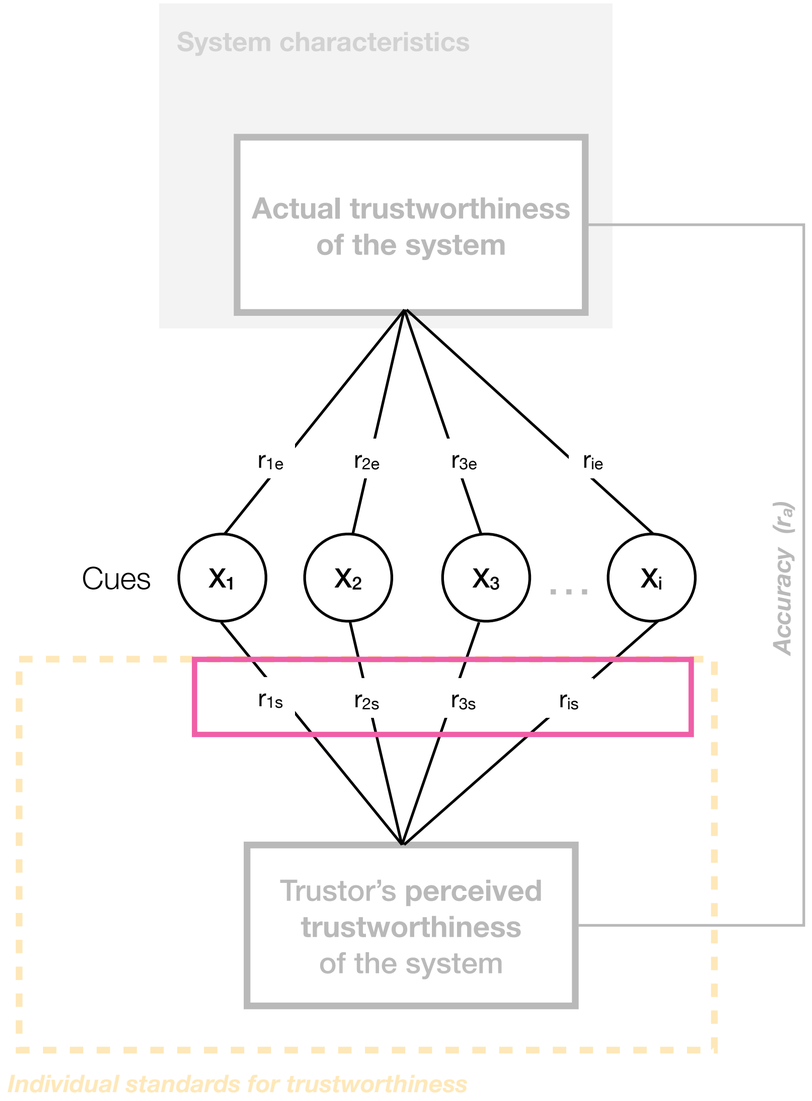
**Cue availability**

- Refers to the fact that cues can only be detected when they are accessible to the trustor (e.g. restricted access rights for training data)



# Cues

- Pieces of information that presumably provide insights regarding the *Actual Trustworthiness (AT)* of a system
- Cues are more or less closely related to the AT
- **Selection and weighting of the individual cues determines trustor's *Perceived Trustworthiness (PT)***



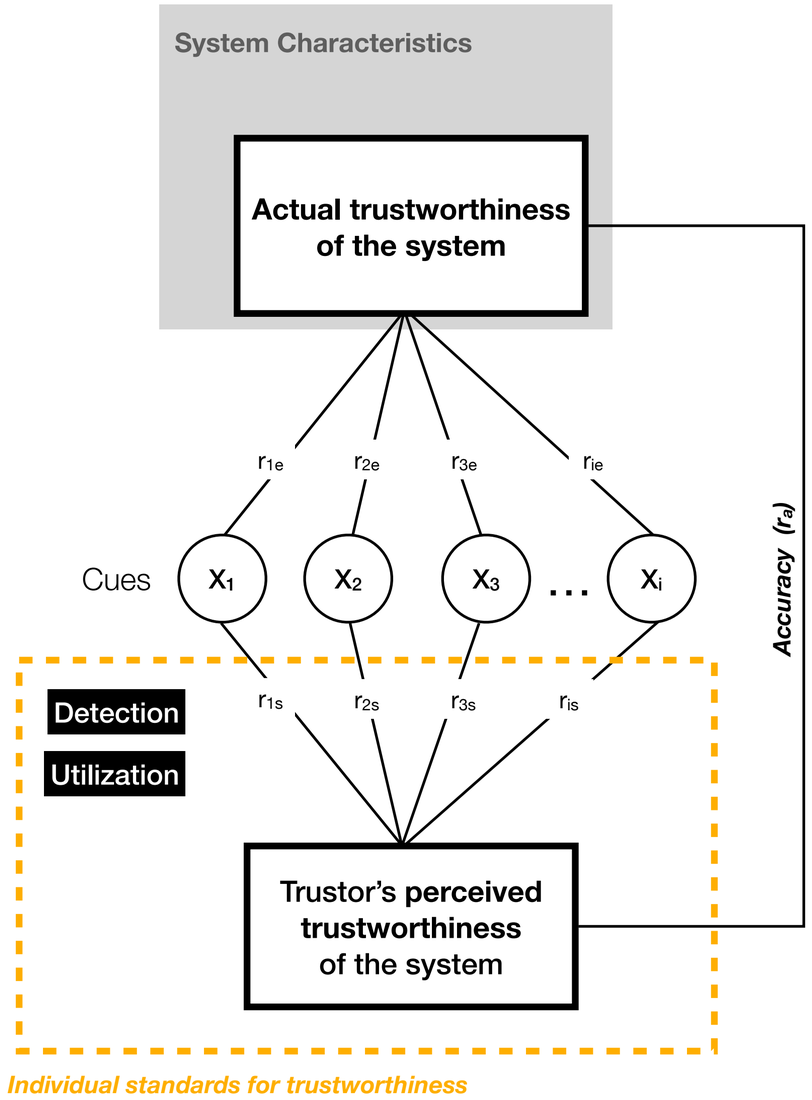
# Relations between the Model Components

**Cue detection**

- Relevant and available cues must be detected by the trustor
- Potential influencing factors:
  - Trustor’s attention capacities (Hawkins,1990), their situation awareness (Endsley,1995), time pressure, or their experience with a system
  - UI properties

**Cue utilization**

- Relevant, available, and detected cue must be correctly interpreted by the trustor
- Potential influencing factors
  - Domain knowledge
  - User's experience with system(s)

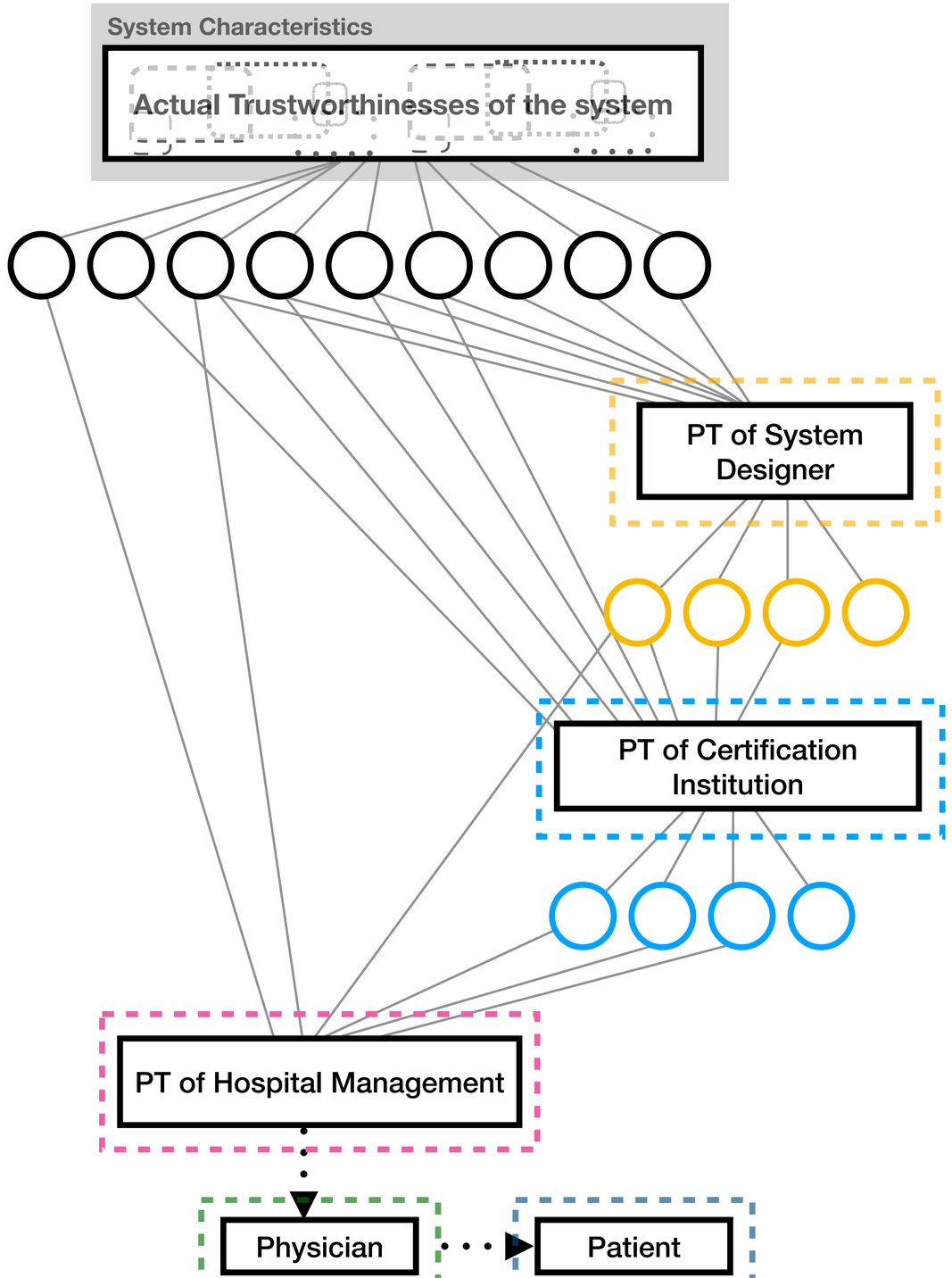


# Zoom Out

A macro level perspective

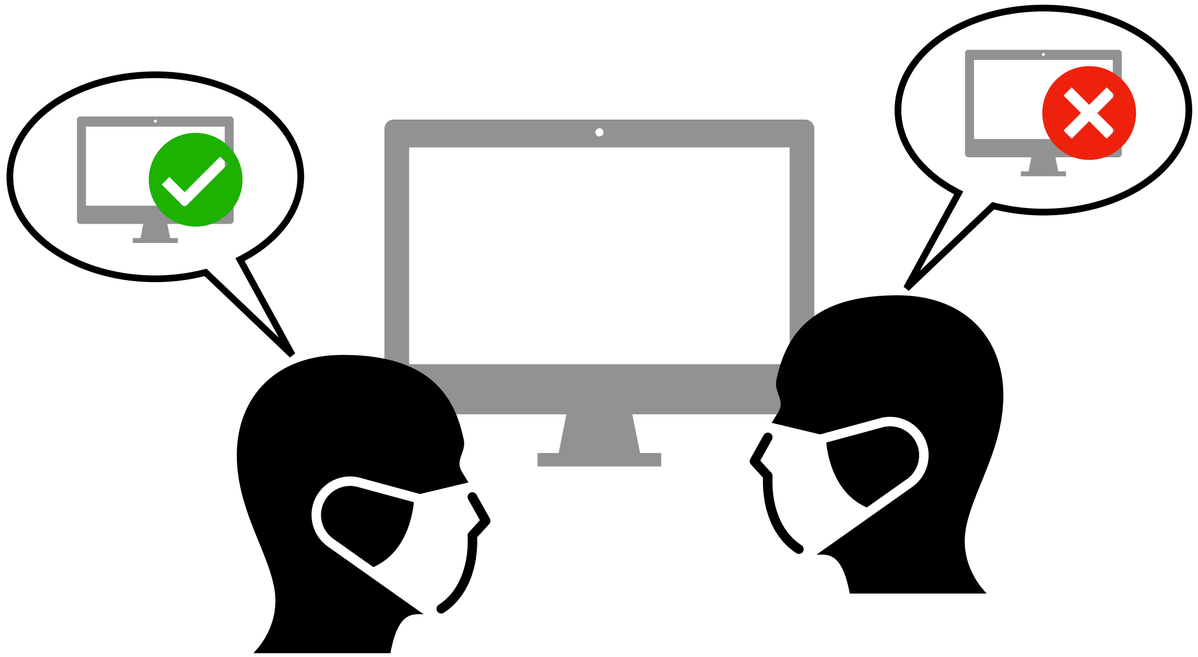
# Macro Level

- Trustworthiness assessment **proliferates**
- The described process on a micro level proceeds for different trustors
- The perceived trustworthiness of a trustor produces new cues for other trustors



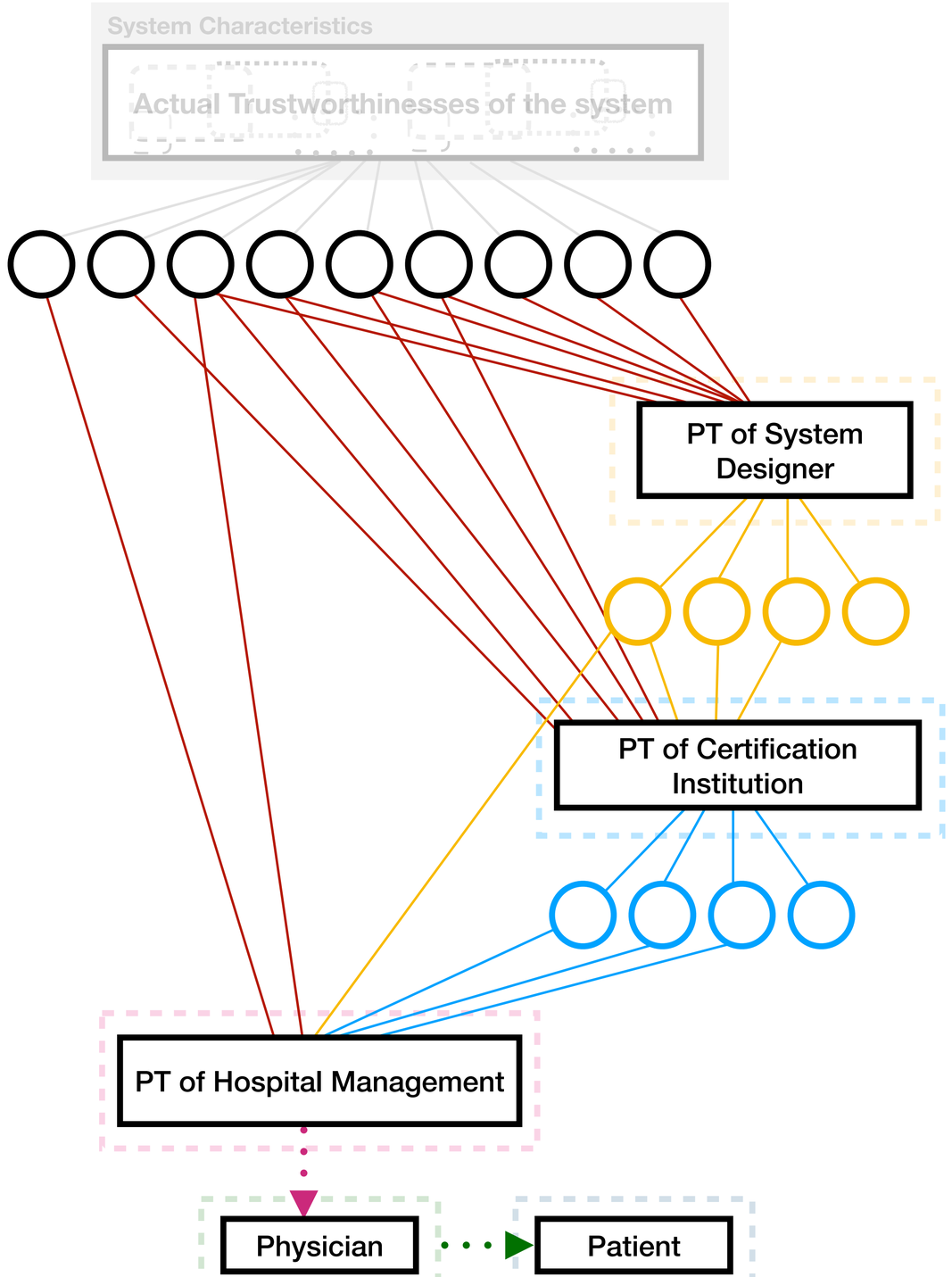
# Different trustors and different perceptions of trustworthiness

- Different trustors can come to different perceptions of system trustworthiness, although the cues and the system characteristics stay the same
    - Due to **different weighting of cues** and **different individual standards**



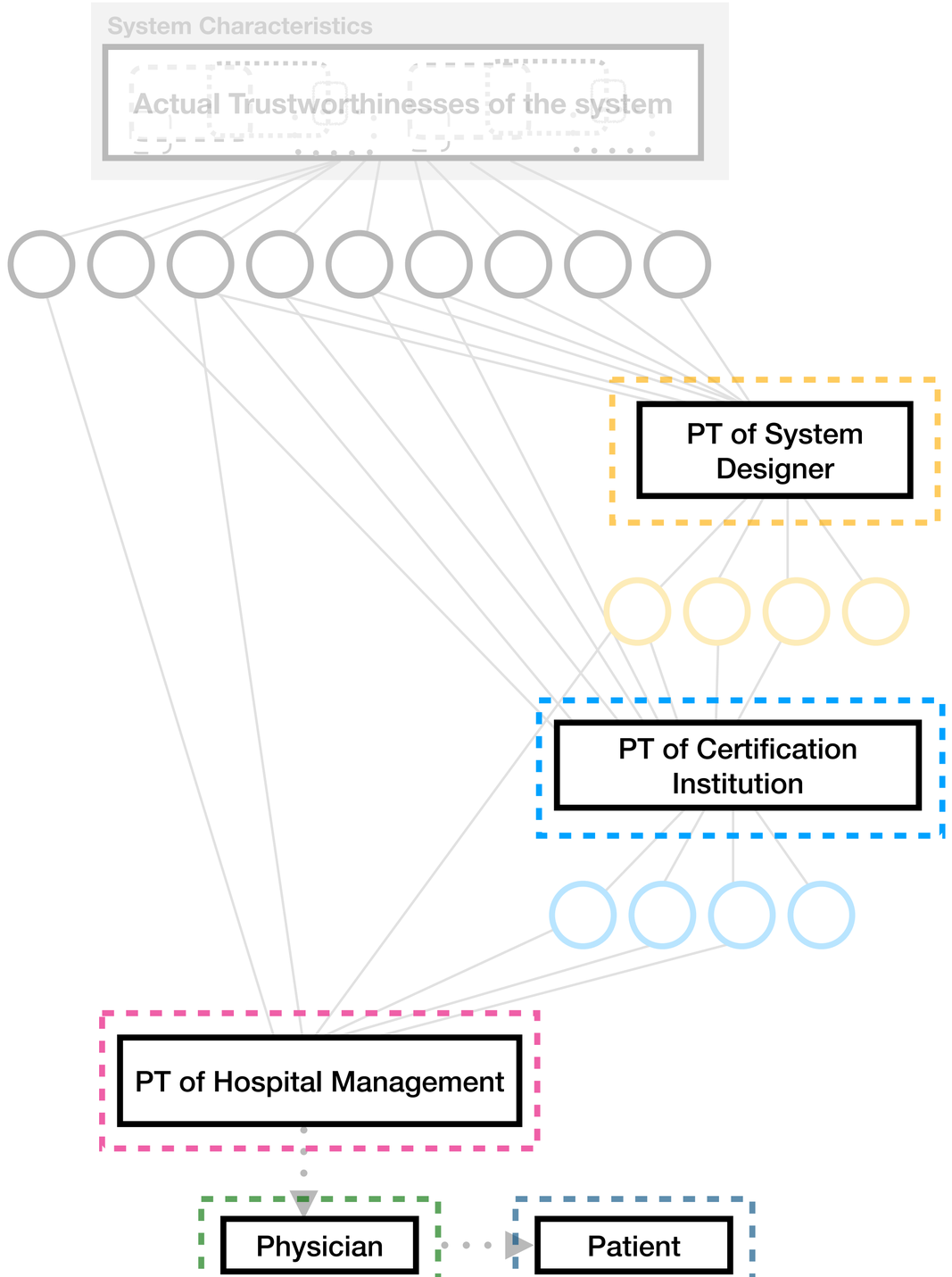
# Weighting of Cues

- **Relevance / Availability / Detection / Utilization**
  - Trustors at the beginning of the trustworthiness proliferation use proportionally **more primary cues**
    - Primary cues are available and they have the expertise to detect and utilize them correctly
  - Downstream trustors use more **secondary cues** (cues that have been processed, interpreted, and filtered by another trustor)
    - Relevance of secondary cues (e.g. marketing)
    - Availability (e.g. data access)
    - Detection & Utilization (lack of expertise)



# Individual standards

- Individual standards are explicitly or implicitly answering the question: **“What is a trustworthy system for me?”**
- Individual standards depend on e.g.
  - Goals and interests (System Designer vs. Hospital management vs. Physicians vs. Patients)
  - Cultural background (e.g. collectivistic vs. individualistic cultures)
  - Normative / Regulatory frame in which trustors operate (e.g., under the influence of the GDPR)



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Thank you!

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**Get in touch!**

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