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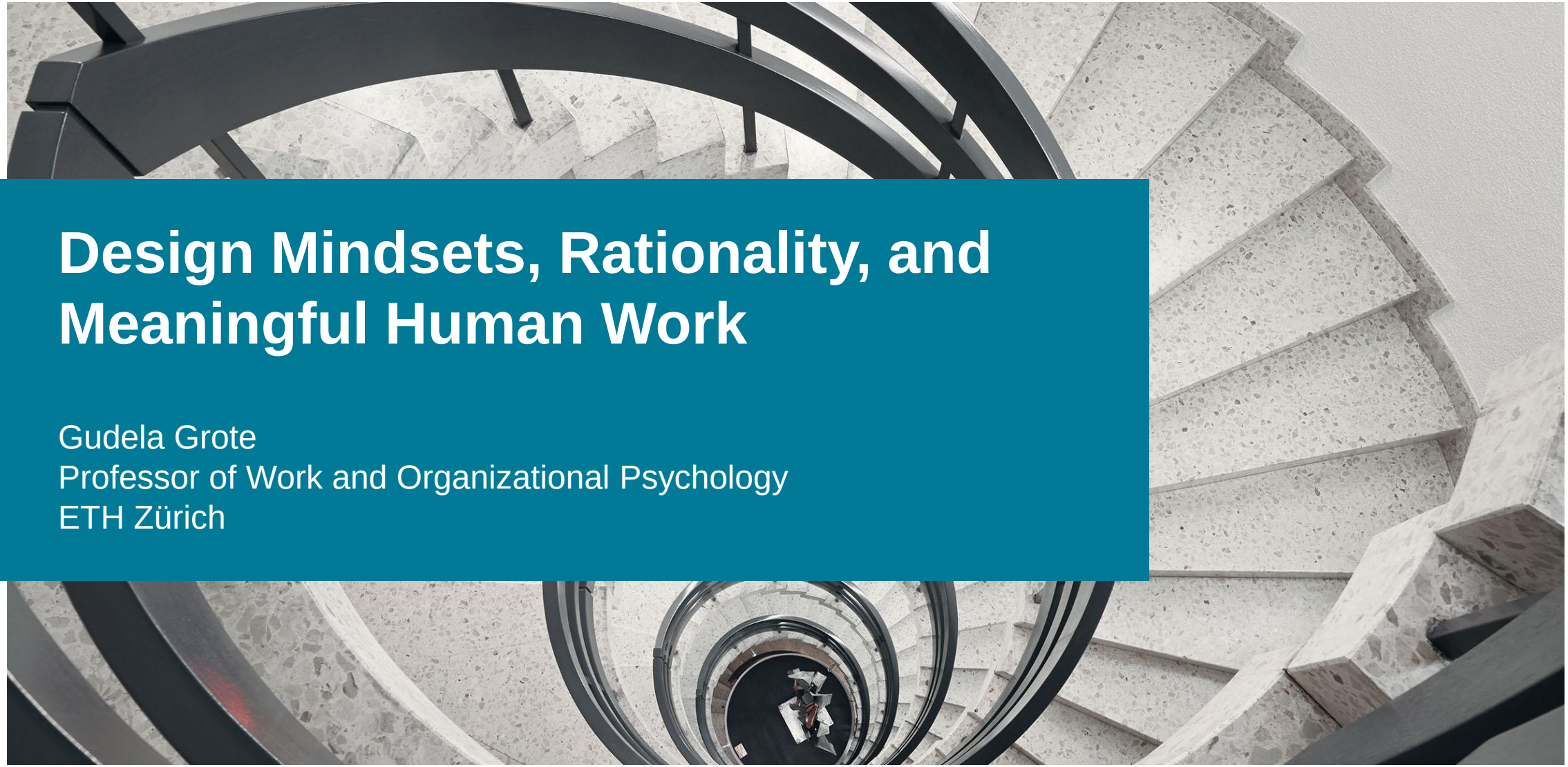

Design Mindsets, Rationality, and Meaningful Human Work

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Which is more probable: Linda, a single 31-year-old woman with a philosophy degree and left wing political views is

- a bank teller

- a bank teller and an active feminist

(Source: Kahneman, 2011)

Rationalist versus constructivist perspectives on technology

(Anthony et al., 2023; Leonardi & Barley, 2010)

Rationalist perspective

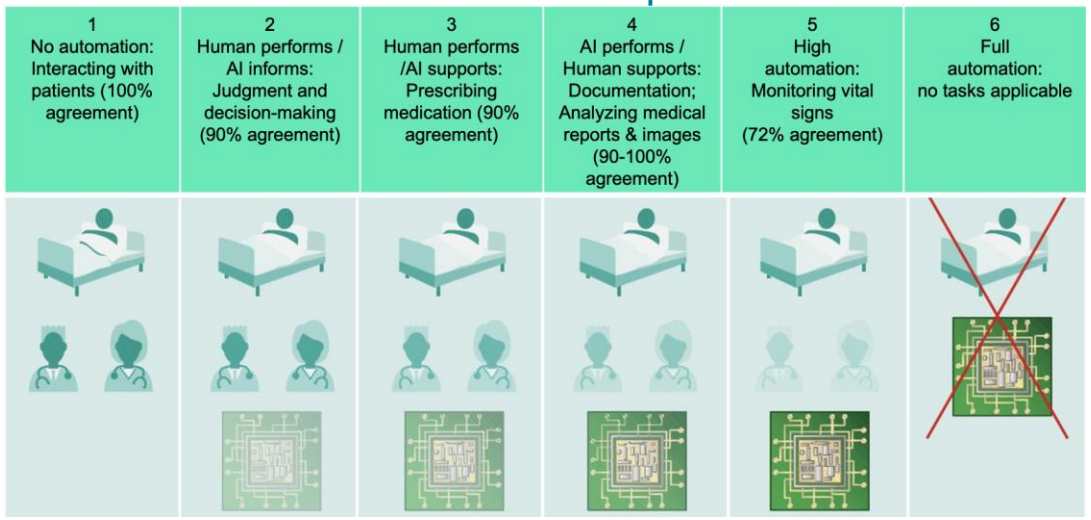
- Emphasizes scientific knowledge, objectivity, and quantification
- Assumes deterministic influences of technology on organizational and work processes
- Conceptualizes organizations as production systems for enhancing efficiency and adaptability
- Understands accountability in terms of instrumental motives

Constructivist perspective

- Emphasizes subjective meaning making in social discourse
- Highlights the entanglement of technology and social reality and the emergent nature of new practices and routines
- Conceptualizes organizations as social systems in which actors strive for individual and collective meaningful goals
- Understands accountability in terms of contested value-oriented reasoning

Combining different rationalities from engineering and social sciences for human-centred technology design (Bienefeld et al., 2024)

Data scientists' assessment of AI potential



Work psychologists' assessment of prospective work design

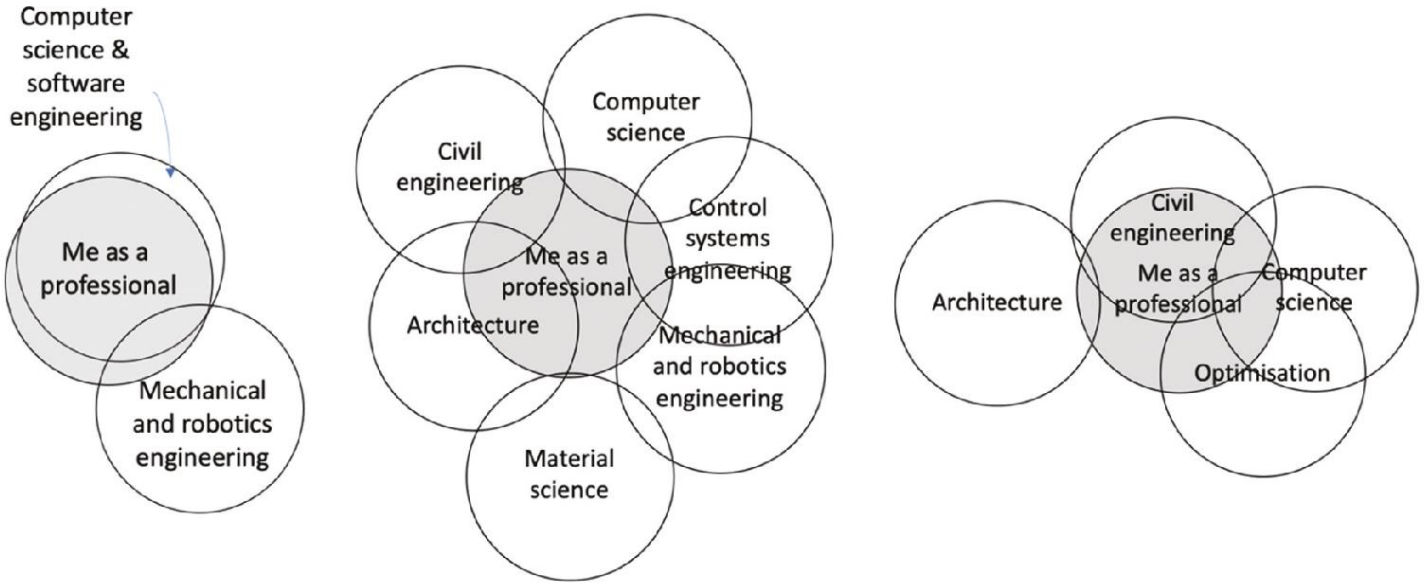
COMPASS criteria	Current state analysis & desired changes Low / Medium / High Physician ◆ Nurse ◆ maintain for both (=) / increase for nurse (→) / increase physician (→)	Recommendations for optimal design of future work systems
Task identity	◇ ◆ ◇	- Include preparation, planning, or finishing elements - Provide transparency of other tasks/sub-tasks & processes - Do not automate most meaningful tasks
Planning & Decision-making requirements	◇ ◆ ◆	- Autonomy in decision-making is key - Enhance rather than replace - Transparency & explainability of decisions by AI
Opportunities for learning & development	◇ ◆ ◆	- Maintain important old skills - Create new skills & competences - Clear roles & responsibilities
Influence over working conditions and temporal flexibility	◆ ◇ ◇	- Increase flexibility regarding time and place of work - Pay attention to qualitative detriments

ICU Cockpit
artificial intelligence for neurointensive care

ML-based prediction of delayed cerebral ischemia

- Co-design with user involvement early on in the development process
- Assisted implementation & post-implementation assessment
- Assessment of user & designer mental models (pre, during, post design phase)

Fostering human-centred design through interdisciplinary professional identities and holistic and impact-aware design mindsets (Kahlert & Grote, 2024)



Holistic and impact-aware design mindset

High

Dimensions			
	Focus of own work	Technical	Socio-technical
	Consideration of technology users	None	During the whole development
	Relevance of interdisciplinary collaboration	For solving technical problems in projects	For advancing AEC industry
	Envisioned impact	Technical	Societal

Key to human-centred design: Aligning control and accountability

Which car would you prefer?

Control enables and accountability motivates actors to achieve desired and avoid undesired outcomes and thereby mitigate risks.

Misalignment results from control without accountability or accountability without control – these two forms of misalignment are often connected when actors with control transfer accountability to actors without control.

Socio-technical system design aims at aligning control and accountability by establishing human control over technology, and self-regulation by individual and collective autonomy. A key design criterion is whether individuals and teams are enabled and motivated to manage task interdependencies in routine and non-routine events.

New challenges for aligning control and accountability for AI systems

ML-based AI systems autonomously learn from large and dynamically changing data sets.

Systems become less controllable for developers and users.

Lines between system development and use blur, creating new task interdependencies between developers and users.

Fundamental challenge for AI governance:

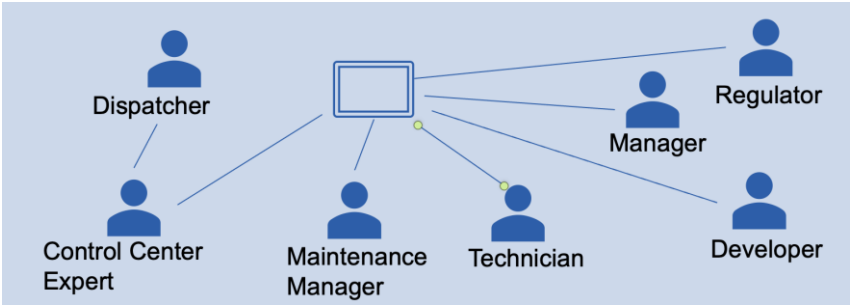
With decreasing control for all actors, who is to be held to account?

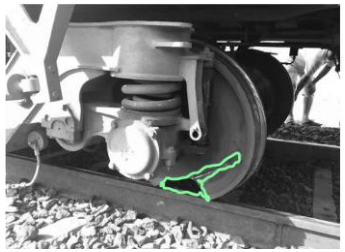
Are there ways to still align control and accountability?

Explainability helps with transparency and predictability, but to (re)establish control also requires influence over system processes and outcomes.

Developing new approaches to human-centred design for AI: Explainable AI project with SBB and Siemens

- Research questions
  - How should we design the distribution of control and accountability for collaborative use of AI?
  - How can we ensure explainability as a prerequisite of control for actors with different educational backgrounds and professional roles?
  - How can we support technology developers in addressing these questions?
- Visual inspection as use case
  - Many stakeholders with very different tasks and competencies
  - Requirements for explainability as a prerequisite for control vary widely
- Upcoming experiment
  - Computer-based experiment with mock system for damage detection
  - Assessing different explanations (varying in content and design) from multiple stakeholder perspectives





I would not want to develop AI-based medical tools because I have too little control over the AI models.

(Data scientist in a software development company)

It never occurred to me that XAI could be (mis)used to hold AI users accountable.

(HCI researcher)

Two paths towards leveraging AI (Hagtvedt et al., 2024)

- Bright imagining
  - Initiated by surprises during deep technical work
  - Seeing AI as magical and only partially understandable
  - Handling surprises with unconstrained idea development
  - Grounded in strong motivation for scientific discovery
  - Protected from moral concerns by considering harms as distant possibilities, ascribing accountability to others, and relying on basic safeguards ("emergency buttons")

- Dark imagining
  - Initiated by surprises during real-world testing of ideas
  - Seeing AI as in need of transparency and control
  - Handling surprises by embedding contraints into idea development
  - Grounded in strong motivation for creating useful systems
  - Embracing moral concerns with a sense of urgency and self-initiated learning about how to deal with them

- Which path is more rational / more meaningful?
- Which path should be strengthened through work design?

Thank you!

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