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Designing Human-AI Hybrids: Challenges and Good Practices from a Multiple Case Study

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Humans are teaming up with AI agents in ever more circumstances

McKinsey Global Institute

Fast Company

AI could increase corporate profits by $4.4 trillion a year, according to new research

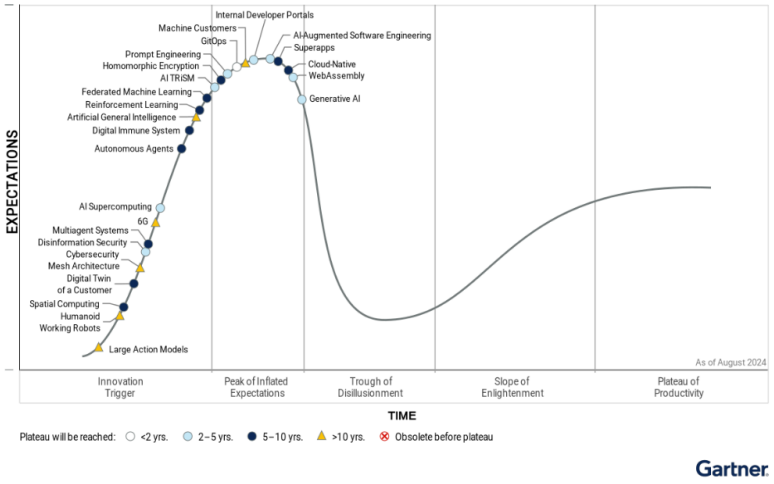
July 7, 2023

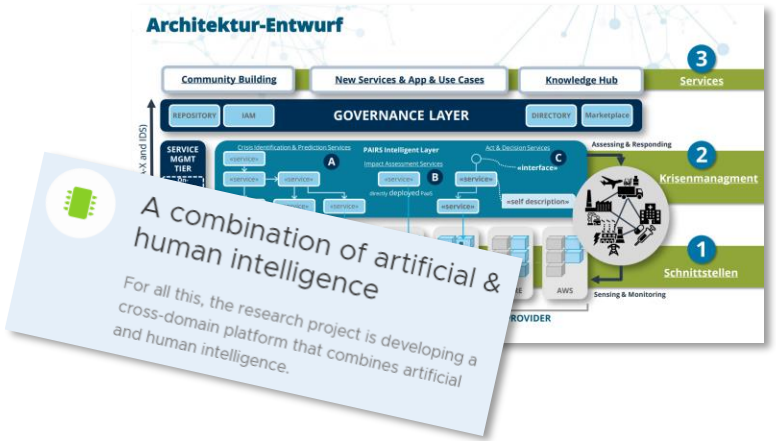
THE WALL STREET JOURNAL.

TECH

Nvidia Joins $1 Trillion Club, Fueled by AI's Rise

Chip maker becomes seventh U.S. company to reach that market capitalization

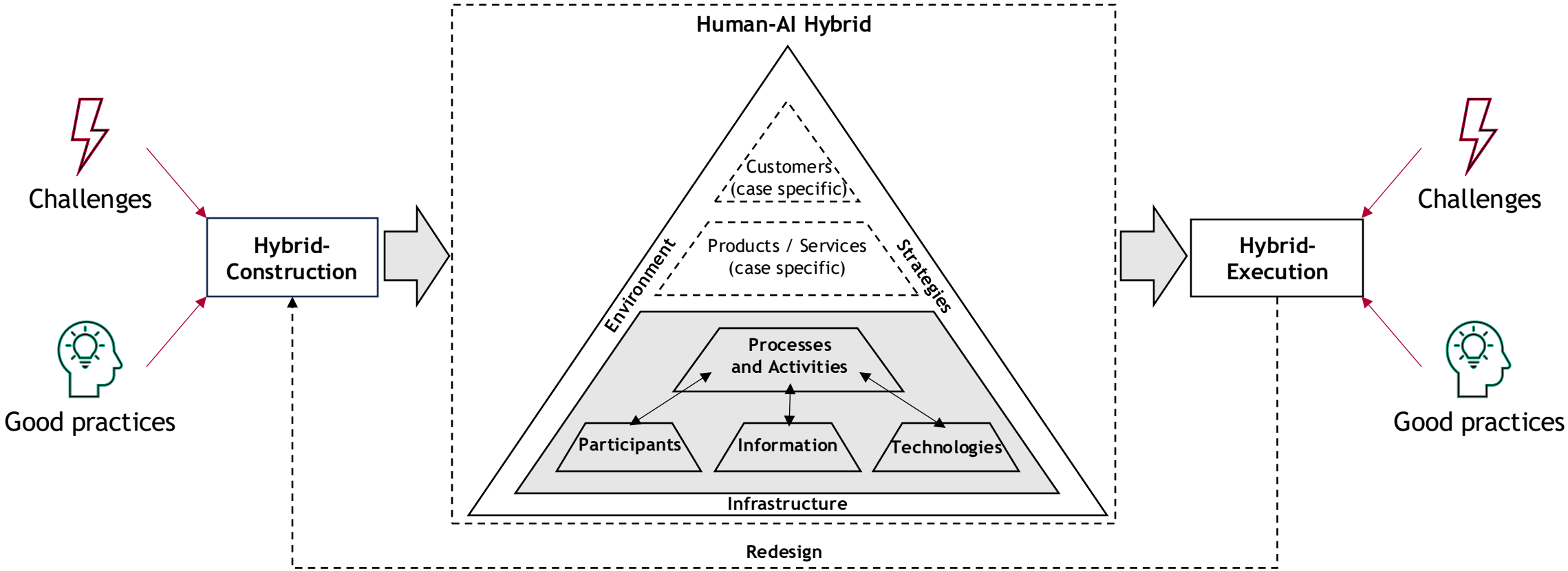




The purposeful implementation of organizational settings (hereafter referred to as *work system*) where human agents are collaborating with AI agents on a joint process or task (hereafter referred to as *human-AI hybrid*) is becoming an important concern for organizations seeking to leverage the capabilities of AI applications.

Fabri et al., 2023; Jakob et al., 2024; Stohr et al., 2024

We use a model based on work system theory as underlying structure

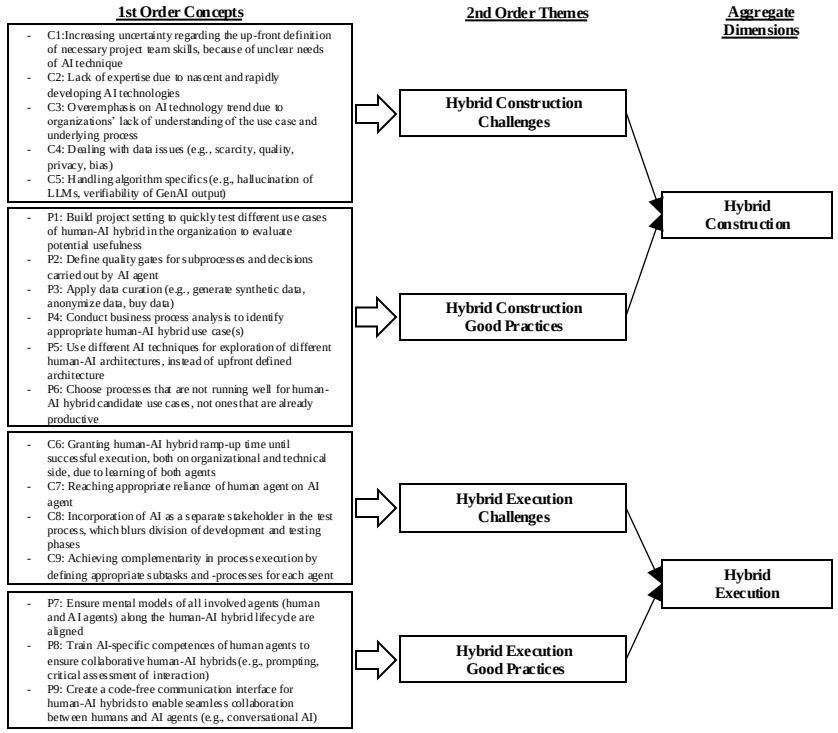


Alter, 2013

During the construction phase, the focus of the design should lay on the architecture of the HAIH (infrastructure, technologies, organizational strategy), while during the execution phase the focus shifts towards the participants (human and AI).

The research model served as sensitizing concepts for data analysis

Case	No.	Interview partner	Perspective	Interview duration	Case data
Case A: Knowledge management	I1	IP1: Researcher & management consultant	Organizational	63 min	• 1 project website • 1 interim report • 5 factual reports • 3 presentations from steering committee meetings • 1 (technical) demo workshop of AI system
	I2	IP2: Researcher & management consultant	Organizational	64 min	
	I3	IP3: Lead developer	Technical	59 min	
Case B: LLM-based employee onboarding	I4	IP4: Senior IT-Architect	Technical	63 min	• 1 project website • 1 project presentation
	I5	IP5: Lead project manager	Organizational	70 min	
	I6	IP6: Lead developer	Technical	58 min	
Case C: Intelligent parking assistant	I7	IP7: Technical project lead	Technical	33 min	• 1 secondary project interview
	I8			52 min	
	I9	IP8: Organizational project lead	Organizational	60 min	• 5 project websites • 1 project video by public television
	I10	IP9: CEO	Organizational	54 min	• 1 presentation of project challenges and results at conference
Case D: Crisis management	I11	IP10: Researcher & crisis management consultant	Organizational	61 min	• 2 project websites • 1 secondary conference panel interview • 1 whitepaper • 1 magazine article • 1 AI innovation competition report • 1 research article pre-print • 7 research articles • 6 short-clips about offered AI-services
Total:	**11 interviews**	**10 interview partners**		**10h 37 min**	**41 case documents**



We sampled **four cases**, for each of which we triangulated data with interviews and case documents such as videos, presentations, research papers, or whitepapers.

Data Collection

We combined inductive coding of 1st order concepts from the data with deductive grouping of insights based on 2nd order themes derived from research model, which severed as sensitizing concepts.

Data Analysis

Bowen, 2006; Eisenhardt, 1989; Gioia et al., 2013; Glaser, 1978; Yin, 2014

Results

We identified five challenges for the construction of HAIH

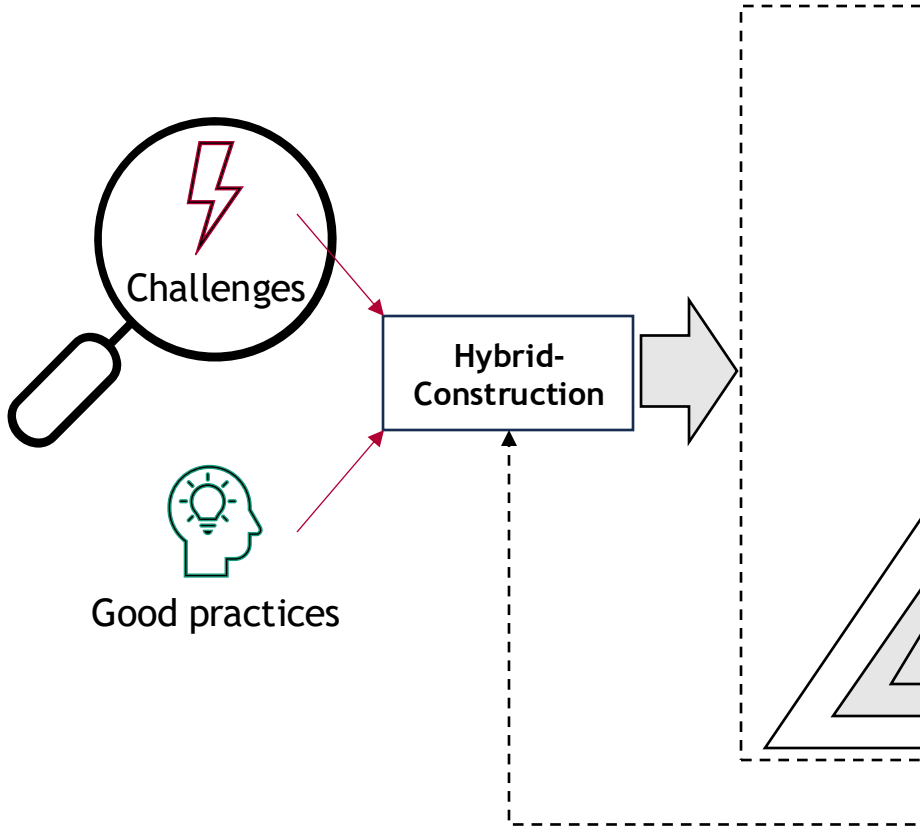
1. PROJECT TEAM
Increasing uncertainty regarding the up-front definition of necessary project team skills, because of unclear needs of AI technique

2. EXPERTISE
Lack of expertise due to nascent and rapidly developing AI technologies

3. INFLATED EXPECTATIONS
Overemphasis on AI technology trend due to organizations' lack of understanding of the use case and underlying process

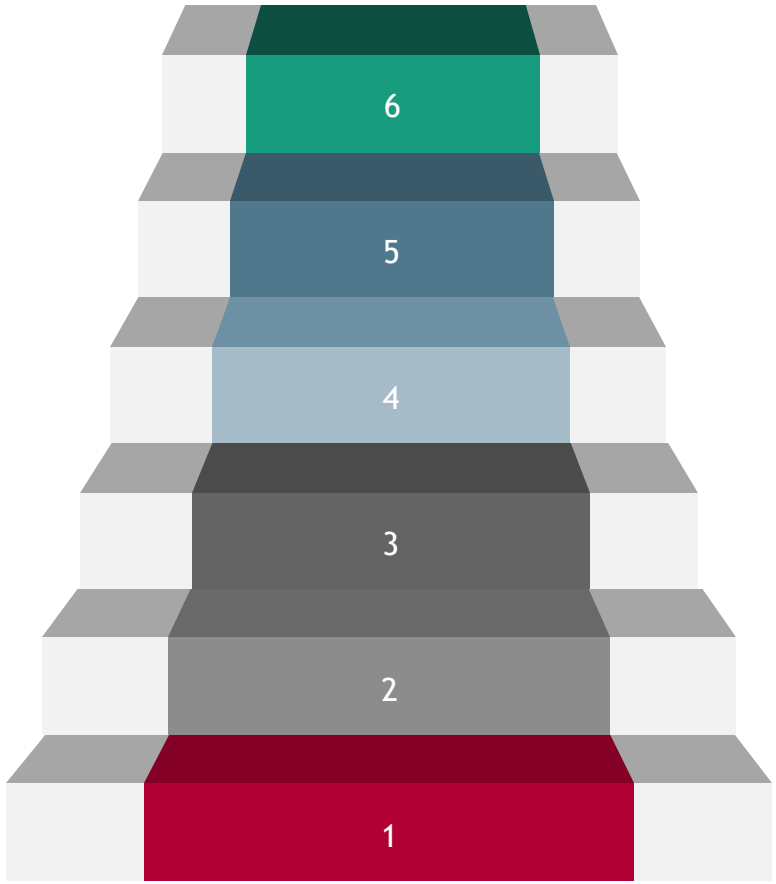
4. DATA ISSUES
Dealing with data issues (e.g., scarcity, quality, privacy, bias)

5. ALGORITHM SPECIFICS
Handling algorithm specifics (e.g., hallucination of LLMs, verifiability of GenAI output)



Results

We identified six good practices for the construction of HAIH



6. EXPERIMENT FAST
Build project setting to quickly test different use cases of human-AI hybrid in the organization to evaluate potential usefulness

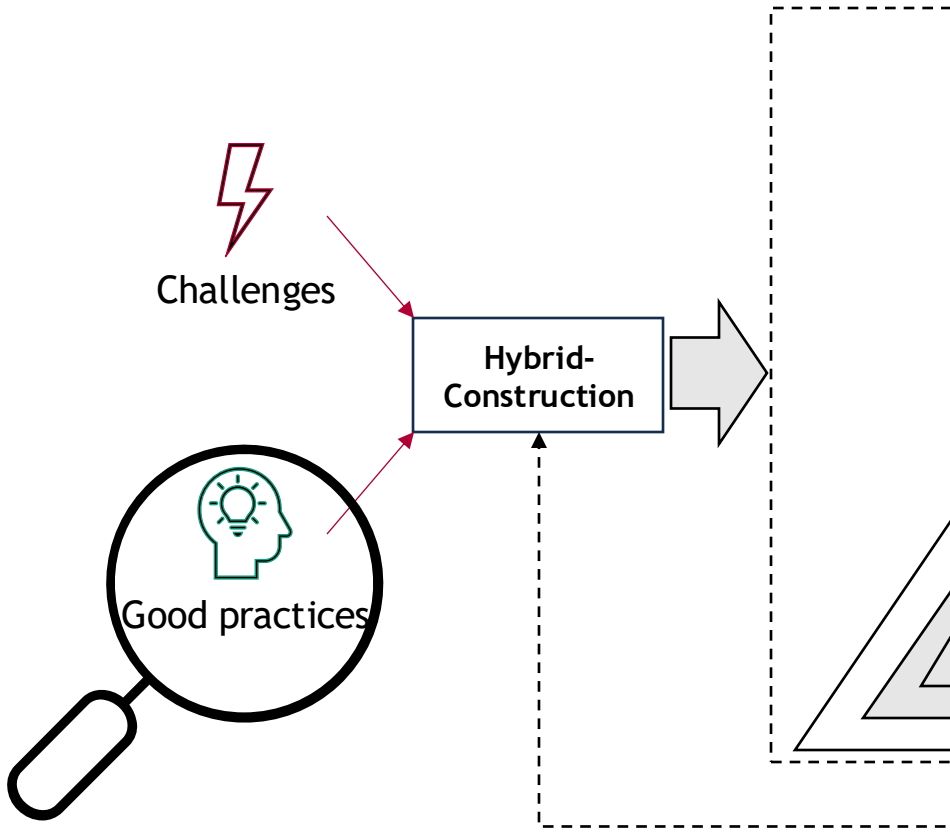
5. QUALITY MANAGEMENT
Define quality gates for subprocesses and decisions carried out by AI agent

4. DATA CURATION
Apply data curation (e.g., generate synthetic data, anonymize data, buy data)

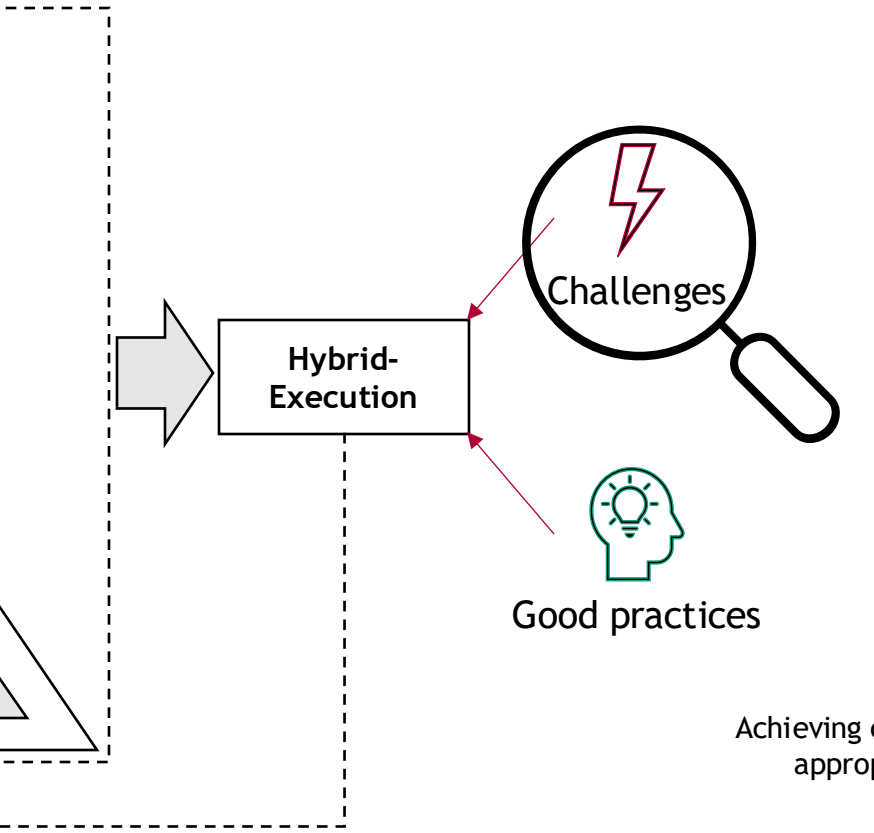
3. BUSINESS PROCESS ANALYSIS
Conduct business process analysis to identify appropriate human-AI hybrid use case(s)

2. FLEXIBLE ARCHITECTURE
Use different AI techniques for exploration of different human-AI architectures, instead of upfront defined architecture

1. CHOOSE PAIN PROCESSES
Choose processes that are not running well for human-AI hybrid candidate use cases, not ones that are already productive



We identified four challenges for the execution of HAIH



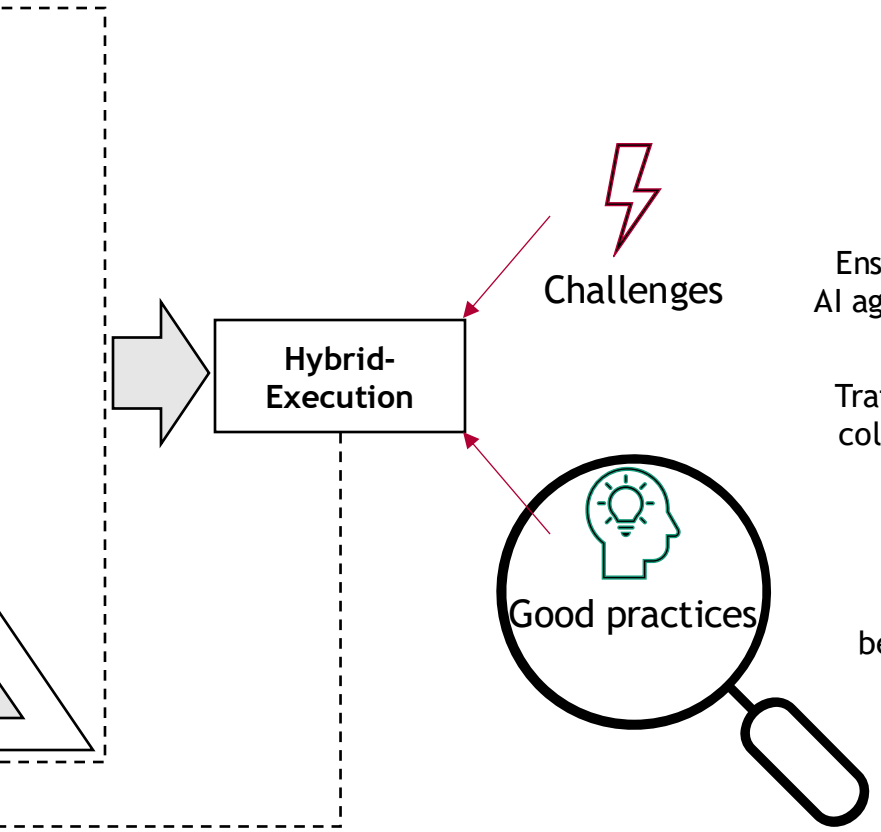
1. LEARNING TIME
Granting human-AI hybrid ramp-up time until successful execution, both on organizational and technical side, due to learning of both agents

2. APPROPRIATE RELIANCE
Reaching appropriate reliance of human agent on AI agent

3. AI AS STAKEHOLDER
Incorporation of AI as a separate stakeholder in the test process, which blurs division of development and testing phases

4. COMPLEMENTARITY
Achieving complementarity in process execution by defining appropriate subtasks and -processes for each agent

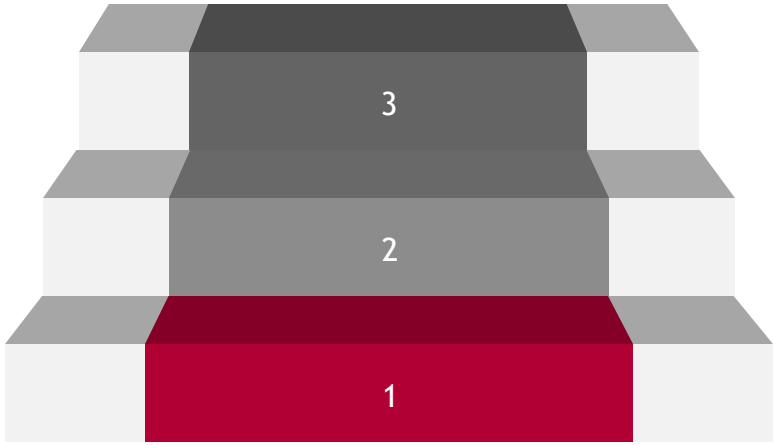
We identified three good practices for the execution of HAIH



1. MENTAL MODELS
Ensure mental models of all involved agents (human and AI agents) along the human-AI hybrid lifecycle are aligned

2. COMPETENCES
Train AI-specific competences of human agents to ensure collaborative human-AI hybrids (e.g., prompting, critical assessment of interaction)

3. CONVERSATIONAL AI
Create a code-free communication interface for human-AI hybrids to enable seamless collaboration between humans and AI agents (e.g., conversational AI)



Our research has implications for research and practice

Theoretical implication

- The integration of AI as a dynamic participant in workflows **challenges** the traditional **distinction** between **participant** and **technology** in WST, requiring a more iterative and adaptive approach to system design
- The focus of HAIH design evolves from the architectural setup during the **construction** phase to participant dynamics during **execution**. This highlights the need for flexibility and adaptability in AI-based work system design

Managerial implication

- The construction phase of HAIH is characterized by a focus on **architectural aspects**, while the importance of **participants** is highlighted during the execution phase
- We must consider AI systems as **co-equal entities** that require deliberate consideration in organizational construction and execution
- By incorporating **technical** and **organizational implementers**, organizations may be able to better navigate the complexities inherent in human-AI collaboration

Alter, 2013

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Thank you for listening.

We are happy to discuss our research!

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