"There is No 'AI' in 'TEAM'! Or is there?" – Towards meaningful human-AI collaboration

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Abstract

AI is increasingly embedded in collaborative processes, challenging traditional notions of teamwork. While AI lacks consciousness and human-like intentionality, its ability to shape decision-making, structure interactions, and contribute to shared outcomes necessitates a reassessment of what it means to be a team member. This paper critically examines AI's role in human-AI collaboration, arguing that effective teamwork is not solely defined by mutual understanding but by the complementary contributions of human and AI actors. We highlight the importance of context in shaping collaboration and propose a research agenda structured around five key aspects: (1) rethinking team membership, (2) evolving team roles, (3) the influence of contextual factors, (4) adaptive collaboration practices, and (5) ethical considerations. We call on scholars and practitioners to explore these dimensions to ensure that human-AI teams align with organizational goals and societal values.

Keywords: Human-AI collaboration, Human-AI teams, Adaptive practices.

1 Collaboration, agents, teams

In the evolving landscape of AI-supported work, the concept of collaboration between humans and AI[1] has attracted increasing attention and raised questions. Participating in team activity intuitively looks like something very human and many will object to regarding AI agents as team members. And they have a point: Traditional definitions of teams often emphasize the importance of shared understanding and common goals among team members (Mathieu et al., 2000; Salas et al., 2005). Yet, available AI lacks consciousness, intentions, and an inherent understanding of goals (Floridi & Sanders 2004). So, is it useful to think that can humans and AI truly collaborate? Can AI be regarded as an actor, hence, a 'real' team member? What consequences does this have for our understanding of teamwork?

In this paper, we examine the notion of human-AI collaboration and challenge conventional definitions of teamwork. We argue that AI, though lacking human-like shared understanding, can still be regarded as a team member. As such, human-AI collaboration is not necessarily

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[1] Throughout this article, "AI" refers to artificial intelligence in its broadest sense, encompassing its role as an agent in collaborative processes. This highlights AI's active contributions as a collaborator, beyond mere technological systems.

defined by mutual comprehension but by the complementary strengths of both parties (Huxham & Vangen 2013).

To explore whether AI can be considered an agent, we must first establish the 'guidelines for agenthood' (Floridi & Sanders 2004): how do we define what an agent is? It has been suggested to adopt an intentional stance (Dennett, 1971) when interacting with AI, especially as AI grows more proactive. For instance, the Belief-Desire-Intention (BDI) model offers a framework for developing AI that mimics goal-oriented human reasoning. BDI systems simulate intentional behavior by representing beliefs about the environment, desires (or goals), and intentions (or plans to achieve those goals). Although BDI systems do not have true desires or intentions, they offer an approximation that allows AI to take a more autonomous role in collaborative settings (Rao & Georgeff, 1995). Against this backdrop it has been argued that it is, in many cases, useful to follow the natural tendency of human actors to attribute agency to AI (Nass & Moon 2000): The more human-like a computer acts, the more humans can use their learnt human interaction skill with digital agents. And the simpler and the less critical the interaction is, the easier it is to include digital agents into human interaction.

Taking the example of innovation, digital agents have participated successfully as team members in brainstorming (Schwabe et al. 2025) and they can easily be imagined to contribute as actors to organizing and evaluating ideas, too. As brainstorming is supposed to be conducted anonymously and strives to create "crazy" ideas, a digital brainstorming agent looks like a promising use case – with possibly unintended consequences for group dynamics. For example, when digital brainstorming agents assisted individual human brainstorming participants the human participants became free riders, not contributing as much as to traditional meetings (Memmert & Tavanapour 2023). In this context, the AI and the human team members each take on roles that influence the outcome.

AI's role as a collaborator becomes even more critical in complex social environments where multiple stakeholders with diverse interests interact. AI must navigate these complexities by understanding and balancing conflicting interests, which requires a nuanced approach to cooperation. The ability of AI to act in multistakeholder environments - such as those characterized by competing incentives or shared resources - will redefine the parameters of human-AI collaboration (Dafoe et al. 2021). Hence, while AI may not fulfill all traditional criteria for team membership, its ability to contribute to collaborative processes highlights the need to rethink what it means to be a team member in the context of human-AI collaboration.

2 Adaptive Practices and Contextual Factors in Human-AI Collaboration

As teams increasingly operate within digital ecosystems saturated with AI, the distinction between human and AI contributions becomes less apparent. For example, in collaborative platforms where AI offers real-time suggestions, moderates discussions, or automates routine tasks, it becomes challenging to attribute decisions solely to human or AI agents. As AI becomes more seamlessly embedded into digital workspaces, teams face the challenge of adapting their practices to leverage AI's capabilities without losing the unique strengths of human collaboration. In many of these AI-infused environments, AI often operates behind the scenes to mediate tasks, facilitate communication, or automate decision-making processes. This 'invisible AI' phenomenon blurs the line between active team members and the underlying digital infrastructure, making it challenging for teams to distinguish between

human contributions and those influenced by AI. The invisibility of AI in such contexts raises important considerations for transparency and accountability, as teams may not always be aware of the extent to which AI shapes their workflows and outcomes. This underscores the need for governance models that ensure AI-driven decisions remain transparent and accountable.

As AI's role in teams evolves, its impact on work configurations extends beyond structured team settings to broader sociotechnical ecosystems. AI-mediated work has reconfigured spatial-temporal work dynamics, affecting when and where collaboration occurs (Willems & Hafermalz, 2021). In remote and hybrid work settings, AI can mediate digital interactions, shape participation dynamics, and influence role distributions, sometimes in ways that remain unnoticed (Klein & Watson-Manheim, 2021). This raises critical questions about how AI's presence in virtual and hybrid work environments transforms social coordination and decision-making over time.

Consequently, practices must evolve to ensure that teams can effectively integrate AI into their workflows while maintaining the critical contributions of human members. This includes fostering an environment where human team members can interpret AI outputs critically, understanding when to trust AI recommendations and when to override them based on contextual knowledge. The challenge lies in developing and reassessing practices enhancing collaboration as AI evolves. This intentional adaptation should not only focus on efficiency and effectiveness but also on ensuring that human-AI teams' function in the way we desire. This iterative adaptation is especially crucial in high-stakes environments like healthcare, where AI's role in decision-making must be aligned with human values and ethical standards to prevent unintended consequences. By recognizing that AI's influence permeates various levels of team dynamics - from direct collaboration to the underlying digital infrastructure that supports it - organizations can better prepare for the complexities of future collaborative environments.

AI embedded within collaborative platforms might take on coordination tasks, freeing human members to focus on strategic decision-making and creative problem-solving. This reconfiguration of roles highlights the importance of designing adaptive practices that are flexible enough to accommodate the evolving contributions of AI in teams. For instance, Chowdhury et al. (2022) discuss the emergence of 'collaborative intelligence,' which arises from effective knowledge sharing between AI and human collaborators. This concept underscores the need for adaptive practices that evolve alongside the dynamic roles of both AI and humans in collaborative settings.

Exploring the concept of collaboration further, it is worth noting that cultural, social, and organizational contexts may give rise to varying roles and interactions. As such, the nature of the tasks and the environment in which they are performed play a key role in shaping the dynamics between human and AI agents. For instance, inherent cultural norms or perceptions may limit the extent of human-AI collaboration, leading to a greater focus on human-to-human interaction. In some scenarios, AI might take on more directive roles, steering the process, making decisions or providing insights that guide human actions. In other contexts, humans may primarily participate in the collaborative process, with AI acting as a sophisticated agent that imitates human capabilities.

Historically, AI has primarily augmented human activities by specialized recommendations. For instance, IBM's Watson has been used in healthcare to analyze medical literature and

patient records, providing doctors with evidence-based treatment options to enhance their decision-making. However, more recent generative AI (GenAI) tools, such as ChatGPT or Google Gemini, reduce the need for human involvement in routine activities. They can draft emails, generate content, write basic code, or even automate customer support by generating responses to inquiries. By recognizing AI's capacity to co-create and provide strategic insights, we further challenge traditional notions of AI as a passive instrument.

Both specialized recommendation systems and generative AI exemplify the diverse ways in which human-AI collaboration can unfold. The roles and interactions between humans and AI shift considerably based on the specific demands of the situation and the unique strengths of each agent. Similar to how BDI agents balance conflicting values like health and sustainability in decision-making processes (Cranefield et al., 2017), AI in collaborative teams can adjust their actions based on situational demands. For instance, in Elderly Care Artificial Systems (ECAS), AI chooses between short-term satisfaction (e.g., serving pizza) and long-term health goals (e.g., serving a healthy meal). This value-sensitive decision-making mirrors how AI contributes contextually to team tasks by optimizing for multiple conflicting objectives. Adopting a values-based approach, such as incorporating Value Sensitive Design (VSD) principles (Friedman, 2013), provides a structured framework for embedding core human values—such as privacy, fairness, and autonomy—into adaptive practices. This ongoing ethical calibration ensures that AI aligns with shifting societal norms, maintaining responsiveness to human values like fairness and respect for autonomy across diverse contexts (van Wynsberghe, 2013).

This adaptability is particularly important in complex environments where predefined roles and rigid structures may not suffice. Seeber et al. (2020) highlight the dualities inherent in AI-human collaboration, such as the potential for AI to both augment and deplete human knowledge or to be accepted or rejected by human teammates. These dualities underscore the importance of context in determining the roles and effectiveness of AI in collaborative processes.

Moreover, for AI to truly contribute as collaborator, they should be designed not only to enhance team outcomes but also to align with the ethical values upheld by the human team members. Incorporating VSD principles into human-AI collaboration ensures that AI is attuned to ethical considerations from the outset, aligning their actions with core human values such as privacy, autonomy, and fairness (van Riemsdijk et al. 2015).

From a practical perspective, human-AI collaboration can span across various value chain activities, each associated with different contextual factors. Therefore, it is essential to identify and develop a deep understanding of the practices established in the various departments. Figure 1 illustrates AI's role in multistakeholder environments, highlighting how AI navigates competing incentives and shared resources.

In this context, (human-AI collaboration) use cases are a simple, but effective tool for prioritizing ("Where to begin?"), for facilitating appropriation, risk management ("Which uses bring which inherent risks?"), and for constant reflection and improvement ("Is this use still in line with our cultural mindset") (Sudeeptha et al. 2025).
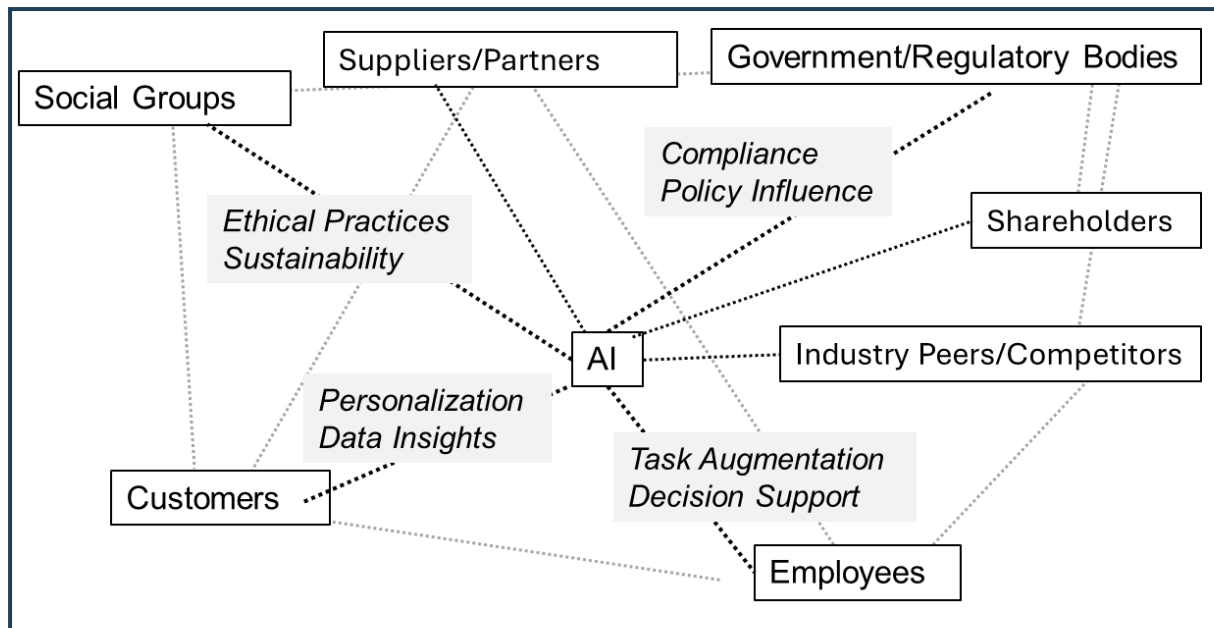
Figure 1: AI's Role in Multistakeholder Environments

Thus, understanding and designing for these contextual nuances and practices is essential for maximizing the benefits of human-AI collaboration. Rather than viewing AI as a mere tool or as an independent actor, it is more productive to see it as participant in a fluid and dynamic relationship. This perspective acknowledges that the effectiveness of human-AI collaboration is not just about the capabilities of the AI or the expertise of the humans but about how well the collaboration is contextualized and practiced within specific environments.

However, as AI becomes more embedded in collaborative work, governance frameworks must evolve to address transparency, bias, and accountability. The challenge is not only to ensure AI's ethical alignment with human values but also to prevent sociotechnical reversals where AI inadvertently reintroduces biases or alters workplace power dynamics. Emerging models of AI safeguards and sociotechnical envelopment provide pathways for organizations to capture AI's value while mitigating risk (Asatiani et al., 2021). These governance mechanisms will be key in ensuring AI supports collaborative agency rather than undermining it.

For human-AI collaboration to be effective, it is crucial that there is a dynamic exchange of information and capabilities between humans and AI. Humans provide AI with essential background information, well-defined objectives, and contextual data, while AI contributes by processing this information, recognizing patterns, and making predictions based on its strengths in data analysis and categorization. This collaborative process allows AI to generate insights that humans then refine and contextualize, integrating these insights into broader decision-making processes. Hence, the success of human-AI collaboration depends on a deep understanding of contextual factors and the continuous adaptation of practices that align with the evolving roles and contributions of both humans and AI.

Our deliberations above lead us to the following propositions and to a definition:

Proposition 1: The evolving nature of human-AI collaboration indicates that, while AI may not fulfill the traditional criteria for team membership, it contributes meaningfully to collective outcomes. As such, the term "team" remains relevant in describing human-AI interactions, albeit with a refined understanding of what constitutes (team) collaboration.

Proposition 2: The nature of human-AI collaboration varies significantly depending on the context, necessitating flexible roles and adaptive practices.

Proposition 3: Roles and practices in human-AI collaboration are not static but must evolve in response to the unique challenges and demands of different contexts. Such an approach ensures that AI is integrated in ways that maximize its potential as collaborator while aligning with human needs and organizational goals.

Proposition 4: Effective human-AI collaboration requires a shift from focusing on technological possibilities to considering what individuals, organizations, and society desire. This involves envisioning future human-AI interactions that align with human values and goals, fostering meaningful and purposeful teamwork.

> Definition:
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> Human-AI collaboration is a synergistic partnership where humans and AI work together to achieve collective outcomes. This dynamic interaction is shaped by specific contextual factors, including cultural norms, organizational structures, and the nature of the task, requiring ongoing adaptation of roles and practices to ensure alignment with human goals and values.

3 Call to Action: Towards meaningful Human-AI Collaboration

We have so far argued that AI's role in collaborative processes challenges traditional definitions of team membership, emphasizing the need for a redefined understanding of (team) collaboration that accounts for the unique contributions of both humans and AI. It seems essential that scholars and practitioners alike consider these insights in designing and governing AI.

Equally important is a reflection on how we, as individuals, organizations, and society, want to collaborate within human-AI teams. This involves proactively shaping the nature of collaboration and shifting our focus from *what is possible* to *what is desired*. Beyond technical and ethical considerations, it requires envisioning human-AI collaboration that aligns with human aspirations, defining AI's role in meaningful ways, and fostering work environments that prioritize purposeful collaboration.

From discussing the potential of AI with stakeholders in industry and government in New Zealand and Australia we know that the success of human-AI collaboration is strongly connected to the socio-cultural, and organizational contexts in which it occurs. On a societal level, our multicultural and highly developed societies provide a fantastic setup to explore human-AI collaboration. Robust governance frameworks and socially inclusive policies can inform the development of AI governance models that are not only effective but also socially responsible and culturally sensitive – and AI must be designed to align with these societal norms.

At the organizational level, integrating AI into collaborative processes mirrors other sociotechnical systems (e.g. for the use of enterprise social media cf. Hacker et al. 2024): The organizational context impacts potential use cases – but on the other side, human-AI collaboration has far-reaching implications beyond team dynamics, influencing organizational structures and necessitating new approaches to work design (Jarrahi et al., 2023). This shift

underscores the importance of developing governance models that are not only inclusive of AI but also adaptable to the evolving nature of human-AI collaboration.

Moreover, these models need to be comprehensive enough to also consider the rapid development of virtual environments (aka the Metaverse). The underlying immersive technologies do not only expand the possibilities for collaboration but also require us to consider their unique challenges and opportunities. Future-oriented methodologies can help stakeholders prepare for and shape the future of work in increasingly complex digital environments (Richter & Richter, 2024). They can contribute to a comprehensive contextual understanding - which is crucial for ensuring that human-AI collaboration not only functions effectively within specific environments but also contributes positively to social cohesion and ethical governance.

The design of 'digital teammates' forces us to understand aspects of teamwork that have been ignored so far. For example, when we designed the digital brainstorming agent, we had to ensure that the agent matched the tone and the length of a typical human brainstorming participant. To our knowledge those have not been studied before. In some situations, digital brainstorming participants may encourage human participants to free ride. This forces us to revisit the motivational basics of team collaboration. So, striving to imitate human behavior in teams will lead to deeper insights into the foundations of team collaboration. Note that this new knowledge may also be applied to purely human teams. But it may become particularly interesting when we create digital brainstorming participants with super-human capabilities (e.g. contributing far more contributions than human participants) or if several team members are digital agents. What does it mean for teamwork if additional (digital) participants can be invited "for free"? The following research questions are designed to explore the various dimensions of human-AI collaboration, as discussed above, from the redefinition of team roles to the practical and ethical implications of integrating AI into collaborative environments. We structure the research questions within a framework highlighting the key aspects of human-AI collaboration as discussed in this article (cf. Figure 2).

A. A new understanding of Teams
- How can we understand team communication? And how can we improve it?
- How can we understand team dynamics? And how can we influence them?
- What is a good team? For which task? How can we detect and predict team quality?
- How can the concept of human-to-human collaboration be reframed in the presence of AI in collaborative scenarios?
- What are team processes? How can they be facilitated?
- What is an optimal team size? What is the optimal ratio between human and digital participants?

B. Reimagining Team Roles
- How can traditional definitions of team membership be adapted to account for the unique contributions of AI in collaborative processes?
- How do roles develop in teams? How can we assign them?
- What criteria should be used to evaluate the effectiveness of AI as a team member in different collaborative contexts?
- How can we redesign human-centered work policies to account for human-AI collaboration?

- How does the emergence of immersive virtual environments (aka the Metaverse) influence the dynamics and effectiveness of human-AI collaboration, and what new frameworks are needed to support these interactions?
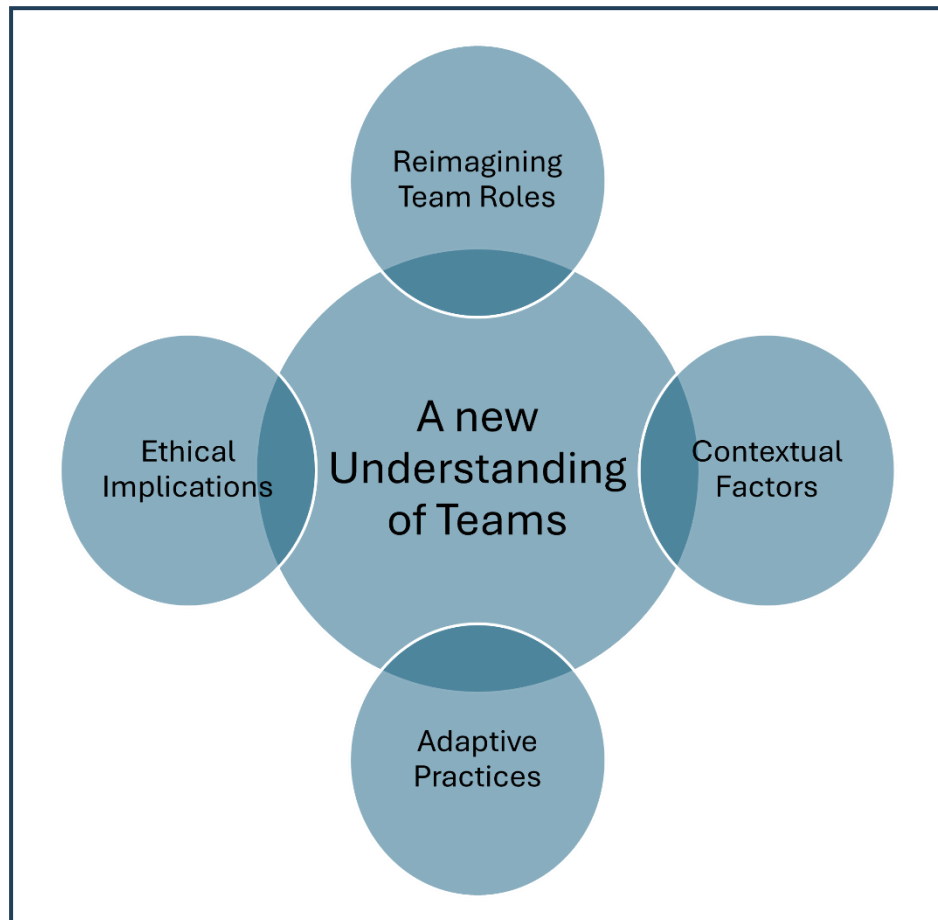

Figure 2: Key aspects of human-AI collaboration

C. Contextual Factors

- How do varying cultural, organizational, and social contexts impact the roles and effectiveness of AI in human-AI collaboration?
- In what ways do specific contextual factors (e.g., industry, task complexity, stakeholder diversity) influence the distribution of decision-making authority between humans and AI?
- What is the impact of cultural, organizational, and social contexts on human-AI collaboration practices such as innovation?

D. Adaptive Practices

- How can we design adaptive roles and practices that can accommodate the evolving nature of human-AI collaboration?
- How can AI be designed to align with evolving collaborative practices while ensuring ethical and effective outcomes?
- How do established practices in high-stakes environments (e.g., healthcare, autonomous driving) ensure that AI contributes effectively to decision-making processes?

E. Ethical Implications:

- How can ethical guidelines be developed to govern the integration of AI in teams, particularly in scenarios where AI takes on decision-making roles traditionally reserved for humans?
- What are the long-term implications of AI-human collaboration for social cohesion and ethical governance in diverse cultural contexts?
- Do AI teammates have rights? How should incidents like harassment by humans toward anthropomorphized AI be addressed, and does this matter in the context of team dynamics?

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