Human-AI Hybrids in Virtual Teams: The Effects of IT Identity and Trust on Knowledge Sharing and Knowledge Application

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Introduction

As a significant unit for problem-solving and task execution, organizations increasingly rely on virtual teams for improved performance and competitive advantage. Organizations seek ways to increase virtual team efficiency and effectiveness through technology. Newer applications of artificial intelligence (AI) are driving organizational innovation, and organizations are taking notice. Nothing has brought this more sharply into focus than the COVID-19 pandemic. Three dynamics across organizations include increased virtual work for individuals, increased dependence on teams as the workforce moves online, and human-AI hybrid collaboration in executing tasks. The Deloitte Insights 2020 report "Returning to Work in the Future of Work" highlights that more effective workforce strategies enabled technology augmentation or collaboration with humans during the pandemic (Deloitte Insights, 2020).

Humans and AI are increasingly working together to accomplish organizational tasks and goals. Recent research has highlighted interdependence among human-AI hybrids leading to “tightly coupled collaboration” (Sundar, 2020, p. 82). AI has been considered a teammate (Rix & Hess, 2022; Seeber et al., 2019), a member of a collaborating team (Makarius et al., 2020), and a human-AI hybrid (Rai et al., 2019). The use of AI in organizations is expanding to include AI as a tool and an integrated human-AI partnership (Makarius et al., 2020). The differing competencies of humans and AI complement each other in the execution of tasks as humans and AI work together as an “integrated unit” (Rai et al., 2019, p. iv).

This research was designed to understand the impacts of IT identity on trust in the human-AI hybrid relationship and knowledge application during task execution. Specifically, two research questions inform this study: (1) How does IT identity impact trust in the human-AI hybrid relationship? (2) What is the impact of IT identity in the human-AI hybrid on knowledge application during task execution? Therefore, this research examines IT identity, trust in a specific technology, knowledge sharing, and knowledge application in human-AI hybrids where the AI is an intelligent assistant used in team collaboration software.

Background

The increasing combination of human-AI hybrids for collaboration and task execution also presents opportunities for IT identity development, a form of material identity. IT identity is "the extent to which an individual views use of an IT as integral to his or her sense of self" (Carter & Grover, 2015, p. 932). In the human-AI relationship, humans incorporate AI capabilities in their formation of self. People develop multiple identities where one may be dominant in any specific situation. When encountering situations, people attempt to maintain their identity. Thus, the identities formed influence human behavior. Individuals alter their behavior if a situation challenges their identity to preserve their self-perception (Carter & Grover, 2015).

Research suggests that a strong IT identity increases IT feature usage and exploratory feature usage (Carter et al., 2020). Among the capabilities of AI in the form of intelligent assistants is the ability to identify and share knowledge. Humans must determine whether to apply this shared knowledge in executing tasks. Hence, will a strong IT identity increase knowledge sharing and application in task execution?

Team performance among virtual team members depends on sharing and applying knowledge during the execution of work (Alavi & Leidner, 2001). Virtual teams provide a unique perspective for understanding knowledge sharing and application since they rarely meet face-to-face and rely upon information and communications technologies. For virtual teams, geographical, time zone, and cultural differences create barriers to knowledge sharing among members, impacting the application of knowledge when needed (Kanawattanachai & Yoo, 2007).

Furthermore, previous literature indicates that trust impacts team performance (McNeese et al., 2019), influences team interactions and knowledge sharing over time (Alavi & Tiwana, 2002), and is a basis for the decision to apply knowledge (Haamann & Basten, 2018). Recent research has focused attention on trust in a specific technology. McKnight et al. (2011) examined multiple forms of trust to develop a framework for trust in technology. The framework specifies technology definitions and constructs for examining beliefs about beneficial technology attributes (McKnight et al., 2011). Trusting beliefs in a specific technology, comprised of reliability, functionality, and helpfulness, relate to the human trusting beliefs of competence, benevolence, and integrity.

Theoretical Foundation

This research provides insights that increase our understanding of these relational interactions in examining the human-AI hybrid relationship. IT identity is the theoretical foundation for this research study. With the increasing work shift to human-AI hybrids, this framework aids our understanding of the relationship between humans and AI in the context of the human-intelligent assistant hybrid. Artificial Intelligence (AI) has had many definitions throughout IS literature. In the context of this research, AI is defined as a

machine's ability to imitate human cognitive functions, learn, interact, and perform tasks (Seeber et al., 2019). This research conceptualizes the human-AI hybrid as a human and AI combining their respective competencies to perform tasks. The AI subject of this relationship is an intelligent assistant, a form of AI that a human interacts with to perform tasks, including capabilities for human interaction, locating knowledge in an organization or among team members, sharing contextually relevant knowledge when needed, and learning from experience.

As mentioned, there are differing results in the literature examining knowledge application. Knowledge application is a component of knowledge management in which existing knowledge is used on a problem or task when needed (Alavi & Tiwana, 2002). Past literature has highlighted the importance of knowledge application for organizational competitive advantage. For example, a team's ability to effectively apply shared knowledge leads to improved team performance (Alavi & Tiwana, 2002). A firm's competitive advantage depends on applying knowledge when needed (Alavi & Leidner, 2001). Additionally, there is a literature gap in understanding the impact of IT identity on trust, knowledge sharing, and knowledge application.

With the proliferation of AI and repeated human-AI interactions, AI may be incorporated into an individual's self, termed AI identity by Mirbabaie et al. (2022), a form of IT identity. In addition, Sundar (2020) notes that AI acts as a social partner to humans, where the more relational a technology, the higher the interdependence. Both positive and negative impacts of IT identity have been identified in previous literature (Carter et al., 2020; Mirbabaie et al., 2022). Although there have been models of knowledge application utilizing varied theoretical foundations, at this time, none have brought IT identity to bear on the problem of applying knowledge in task execution.

Research Design

The research design is quantitative, addressing the research questions through an adapted survey from existing literature to understand the context more fully regarding the human-AI hybrid. Specifically, the use of an AI in the form of an intelligent assistant, as found in team collaboration software such as Slack, Salesforce, and WebEx within US-based virtual teams. Qualtrics was engaged to solicit respondents that meet the sample criteria and to administer a multiwave, online survey. Data collection occurred in two time periods, two weeks apart. Participation was voluntary, and only respondents completing both time collection periods with valid responses received Qualtrics compensation. Overall, 164 matching respondents with valid responses completed both time one and two surveys. Rindfleisch et al. (2008) indicate that multiwave studies provide strong causal arguments for observed relationships.

A virtual team's context is relevant to understanding knowledge sharing and application since both are important determinants of team performance and, ultimately, organizational competitive advantage (Alavi & Leidner, 2001). Moreover, the virtual team environment

complicates knowledge sharing due to team members' temporal, geographic, and cultural differences (Kanawattanachai & Yoo, 2007). Recent advances in AI capabilities have created the potential for human-AI hybrids and AI as a teammate (Makarius et al., 2020). However, research regarding the effectiveness of the human-AI hybrid is needed and whether this partnership might improve organizational performance (Rai et al., 2019; Rix & Hess, 2022; Seeber et al., 2019; Sundar, 2020).

Preliminary Findings

Preliminary results support the positive influence of IT identity on knowledge application as mediated through trust in a specific technology and knowledge sharing. In summary, this research examines constructs in previously untested relationships in knowledge application, IT identity, and trust in a specific technology. IT identity presents an exciting and relevant framework for examining human-AI hybrid relationships. This research contributes to our understanding of IT identity in the context of an intelligent assistant used by virtual team members in team collaboration software.

An interesting contribution from a practitioner standpoint is that this research informs design considerations to focus on creating intelligent assistant tasks that facilitate knowledge sharing and application. Providing additional feature sets that support these tasks may increase knowledge application in task execution by strengthening IT identity. As noted in prior research, positive outcomes and continued IT use behaviors increase IT identity (Carter et al., 2020). Therefore, improving features of the intelligent assistant for knowledge sharing and knowledge application are likely to increase the ultimate application of knowledge in an organization.

References

Alavi, M., & Leidner, D. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual foundations and research issues. *MIS Quarterly, 25*(1), 107-136.

Alavi, M., & Tiwana, A. (2002). Knowledge Integration in Virtual Teams: The Potential Role of KMS. *Journal of the American Society for Information Science and Technology, 53*(12), 1029-1037.

Carter, M., & Grover, V. (2015). Me, My Self, and I(t): Conceptualizing Information Technology Identity and Its Implications. *MIS Quarterly, 39*(4), 931–957.

Carter, M., Petter, S., Grover, V., & Thatcher, J. B. (2020). Information Technology Identity: A Key Determinant of IT Feature and Exploratory Usage. *MIS Quarterly, 44*(3), 983–1021.

Deloitte Insights. (2020). Returning to Work in the Future of Work. Deloitte Insights. Retrieved November 21, 2021, from

https://www2.deloitte.com/us/en/insights/focus/human-capital-trends/2020/covid-19-and-the-future-of-work.html

Haamann, T., & Basten, D. (2018). The role of information technology in bridging the knowing-doing gap: An exploratory case study on knowledge application. *Journal of Knowledge Management, 23*(4), 705–741.

Kanawattanachai, P. & Yoo, Y. (2007). The Impact of Knowledge Coordination on Virtual Team Performance over Time. *MIS Quarterly, 31*(4), 783-808.

Makarius, E. E., Mukherjee, D., Fox, J. D., & Fox, A. K. (2020). Rising with the machines: A sociotechnical framework for bringing artificial intelligence into the organization. *Journal of Business Research, 120*, 262–273.

McKnight, D. H., Carter, M., & Thatcher, J. B. (2011). Trust in a Specific Technology: An Investigation of its Components and Measures. *ACM Transactions on Management Information Systems, 2*(2), 12:1-25.

McNeese, N. J., Demir, M., Chiou, E., Cooke, N., & Yanikian, G. (2019). *Understanding the Role of Trust in Human-Autonomy Teaming.* Proceedings of the 52nd Hawaii International Conference on System Sciences, 254-263.

Mirbabaie, M., Brünker, F., Möllmann Frick, N. R. J., & Stieglitz, S. (2022). The rise of artificial intelligence – understanding the AI identity threat at the workplace. *Electronic Markets, 32*(1), 73–99. https://doi.org/10.1007/s12525-021-00496-x

Rai, A., Constantinides, P., & Sarker, S. (2019). Next-Generation Digital Platforms: Toward Human-AI Hybrids. *MIS Quarterly, 43*(1), iii-ix.

Rindfleisch, A., Malter, A. J., Ganesan, S., & Moorman, C. (2008). Cross-Sectional versus Longitudinal Survey Research: Concepts, Findings, and Guidelines. *Journal of Marketing Research, 45*(3), 261–279. https://doi.org/10.1509/jmkr.45.3.261

Rix, J., & Hess, T. (2022). *Hello, Mate! Insights from the Field on Leveraging Machine Teammates in Organizations.* Proceedings of the Pacific Asia Conference on Information Systems 2022.

Seeber, I., Bittner, E., Briggs, R. O., de Vreede, T., de Vreede, G.-J., Elkins, A., Maier, R., Merz, A. B., Oeste-Reiß, S., Randrup, N., Schwabe, G., & Söllner, M. (2019). Machines as teammates: A research agenda on AI in team collaboration. *Information & Management*, 103174.

Sundar, S. S. (2020). Rise of Machine Agency: A Framework for Studying the Psychology of Human-Ai Interaction. *Journal of Computer-Mediated Communication, 25*, 74-88.