

Chapter 3

The Complexities of Human Factors in Automation Trust

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ABSTRACT

This study explores how organizational culture and human factors shape trust in automation and influence employee engagement, vigilance, and ethical behavior across high-consequence sectors. Through a multi-case analysis of five organizations, healthcare, biosecurity, emergency response, disaster logistics, and critical infrastructure, the research examines how governance documents, operational procedures, and training materials cultivate or corrode trust. The findings demonstrate that trust in automation is a social and organizational construct, not merely a technical outcome. Punitive cultures and opaque communication foster fear, resistance, and technology complacency and overreliance, while psychologically safe environments that emphasize transparency, dialogue, and shared ownership enable balanced, critical synergy driven trust in automation based on a collaborative relationship between people and technology. The study concludes that sustainable trust emerges when organizations institutionalize human-centered governance and engagement in ways that align automation with cultural values and empower employees to question and calibrate system performance. Ultimately, trust in automation depends on reciprocal accountability between humans and technology, grounded in organizational transparency, actionable user feedback mechanisms, and ethical leadership.

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INTRODUCTION

Automation has transformed the operational landscape of modern workplaces, fundamentally altering how individuals interact with information, systems, and each other. From AI-powered diagnostics in hospitals to predictive dispatch systems in emergency management, automation promises enhanced efficiency and reliability. However, as Nobles (2019) contends, such technological evolution brings with it a “human paradox”: as machines become more capable, human trust in them becomes both more essential and more precarious. Trust in automation is not a static belief but a dynamic relationship shaped by perception, context, and experience (Lee & See, 2004). In complex environments, particularly those characterized by uncertainty, high cognitive load, and moral consequence, trust must be carefully calibrated. Overtrust leads to complacency and uncritical reliance, while distrust results in underutilization of valuable systems (Parasuraman & Riley, 1997). Healthcare professionals ignoring valid alerts, emergency dispatchers deferring to faulty algorithms, or logistics coordinators rejecting accurate AI predictions all exemplify trust miscalibration.

Nobles (2022) and Robinson (2023) emphasize that such failures often stem from neglected human factors: cognitive overload, organizational misalignment, and inadequate feedback mechanisms. In contrast, organizations that embed human-centered design principles, prioritizing ergonomics, transparency, and participatory culture, tend to cultivate more resilient trust relationships. This paper extends these insights to analyze how trust in automation functions across three critical sectors: healthcare, emergency response, and disaster logistics, arguing that sustainable automation depends upon systematic integration of human factors engineering and organizational trust frameworks.

CONCEPTUALIZING HUMAN FACTORS AND AUTOMATION

Human factors encompass the study of how humans interact with technological systems, integrating disciplines such as cognitive psychology, ergonomics, and organizational behavior (Nobles & Burrell, 2024; Robinson, 2023). In automation contexts, these factors determine not only usability but also emotional and ethical dimensions of interaction. Despite the field's maturity, Nobles and Burrell (2024) found significant definitional inconsistency: many organizations reduce human factors to training programs or compliance checklists, ignoring their systemic implications.

In automation research, trust functions as the psychological bridge between human intention and machine action. Lee and See (2004) defined trust in automation as the “attitude that an agent will help achieve an individual's goals in a situation

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