Is Technology Adoption More Than Just Utility? The Role of Social Bonding and Motivation in UTAUT

Esther Federspiel[1], Leonie Däullary[2], Sebastian Müller[1] and Frieder Loch[2]

[1] *IPM Institute for information and Processing Management, Eastern Switzerland University of Applied Sciences, St. Gallen, Switzerland*

[2] *I3 Institute for Interactive Informatics, Eastern Switzerland University of Applied Sciences, Rapperswil, Switzerland*

Abstract

Research suggests that social relationships and situational motivation drive change in behavior. Digital interaction technologies increasingly integrate customizable avatars and conversational chatbots to enhance long-term adoption. This development has prompted a critical examination of how affective attachment to digital systems influences technology acceptance. Traditional models (e.g., UTAUT2) focus on perceived usefulness and ease of use. In this paper, we extend the UTAUT2 framework by incorporating techno-social bonding and situational motivation as pivotal constructs to shape system adoption. Our model posits that personalization options, such as avatar customization and conversational agent interaction, foster techno-social bonding, a form of digital attachment that enhances perceived social presence and user satisfaction. In addition, we explore how situational motivation, particularly intrinsic and extrinsic motivational factors, moderates the relationship between personalization characteristics and system acceptance. The application case of this paper is a Continuous Improvement (CI) system for production environments. We propose a four-week microrandomized trial. Participants will interact with the CI system under varying conditions, including chatbot-based versus form-based interactions and fixed versus personalized avatars. Key outcomes, including techno-social bonding and situational motivation, will be assessed with conventional technology acceptance constructs. This paper improves existing technology acceptance models by including techno-social bonding. This provides a deeper understanding of long-term system adoption and practical guidance for designing CI systems. Furthermore, the proposed model contributes to the development of Behavior Change Support Systems (BCSS) by integrating motivational and affective mechanisms that promote sustainable behavior change.

Keywords

Technology Acceptance, UTAUT2, Motivation, Social Bonding, Conversational Agents, Personalized Avatars

1. Introduction

Social elements are relevant not only for the long-term adoption of interactive technologies (cf. [1]), but also key factors for BCSS, as it addresses social bonding and situational motivation as central mechanisms for behavioral change (cf. [2]). Although these elements generally relate to social interactions between employees and management, the notion of social exchange with the system itself is still relatively new. Technology contributes to cultivating a sense of connection and belonging between users [3] and between users and technology [4]. With recent advances

BCSS 2025: The 13th International Workshop on Behavior Change Support Systems, May 5, 2025, Limassol, Cyprus.
esther.federspiel@ost.ch (E. Federspiel); leonie.daeullary@ost.ch (L. Däullary); sebastian.mueller@ost.ch (S. Müller); frieder.loch@ost.ch (F. Loch);
0009-0007-6859-9311 (E. Federspiel); 0009-0000-6488-937X (L. Däullary); 0000-0001-9877-0086 (S. Müller)

in artificial intelligence (AI), technology is progressively becoming an autonomous entity and thus a social actor [5]. An increasing number of systems are integrating customizable avatars and social chat bots, which, among other benefits, promotes a social connection between users and the system.

There are no unified terminologies for the social relationship with systems in HCI research. Various terms, such as *techno-social bonding* and *digital attachment*, have been established. They refer to emotional and social connections between users and technological systems (cf. [6, 7, 8, 9]). Another concept that shapes this field is *social presence*, which was introduced by Short, Williams, and Christie [10] and describes the degree of felt presence between communicators in mediated interactions [11].

Research indicates that emotional and social relationships support long-term adoption of interactive technologies. The felt social presence in feedback systems has been shown to augment the perceived usefulness of feedback [12]. Likewise, social presence improves favorable results in customer-chatbot interactions [13]. User participation is essential for the efficacy and long-term viability of interactive.

Employee participation appears to be an important driver of business excellence and innovation in CI initiatives [14]. Furthermore, a lack of employee involvement in CI processes has been linked to, for example, preventable patient harm in healthcare settings [15]. Although emotional relationship factors are crucial for successful CI [16], the impact of techno-social bonding on user participation in CI environments remains largely unexplored. This leads to the following research problems:

- How does a conversational chatbot affect the social bonding, situational motivation, acceptance, and usage behavior of a CI system?
- How does a customizable avatar influence social bonding, situational motivation, acceptance, and usage behavior of a CI system?

This paper proposes an extended Technology Acceptance Model, incorporating techno-social bonding and situational motivation. This new model has theoretical and practical ramifications for the development and utilization of intelligent CI systems. By integrating techno-social bonding and situational motivation, it offers useful insights for boosting user acceptance and optimizing the development of interactive systems within CI contexts.

The paper is structured as follows. First, we describe the current state of research on personalized avatars, conversational agents (CA), and situational motivation in interactive systems, particularly in CI. Then, we discuss the original technology acceptance models and examine a possible extension through situational motivation and techno-social bonding. Finally, we describe the case and the methodology with which we intend to test our hypotheses in relation to the extended model.

2. Related Work

Recent research on HCI has increasingly focused on the phenomenon of techno-social bonding, particularly in the context of human-chat bot relationships and avatar design.

2.1. Personalized Avatars

Humans in digital environments are typically represented by avatars, whereas computer-generated entities are known as embodied agents [17, 18]. The ability to personalize avatars plays a crucial role in perceived social connectedness. Avatars allow individuals to distinguish themselves from others [19]. The alignment between the authentic self and the avatar not only strengthens self-identification but also amplifies the experience of social presence in virtual environments [20]. The option to customize avatars may enhance user satisfaction and identification with their digital representation [21, 22]. Research suggests that individuals can develop emotional bonds with digital companions, thus improving emotional well-being [23, 24].

The characteristics of emotional interaction are crucial facilitators of effective adoption of CI [16]. Personalized avatars therefore significantly influence self-confidence, self-perception, and interpersonal connections. These findings highlight the importance of personalized avatars in improving user experience and social interactions, especially for the long-term adoption of interactive systems.

2.2. Conversational Agents

Personalized avatars emphasize self-representation, identity formation, and increased social presence, whereas CAs aim to cultivate emotional and social connections with the system.

CAs are software applications designed to facilitate natural language interactions with humans, emulating human-like dialogue [25, 26]. CAs have the capacity to enhance emotional and social bonds with users. Cassell [27] advocates AI systems that adaptively respond to human behavior, promote social connections, and result in increased interactions and improved task efficacy. The emotional bond between humans and chatbots can improve long-term system adoption [28]. Attachment theory provides a robust framework for understanding the interaction between users and chatbots. When individuals receive emotional support and psychological safety from encounters with these systems, they are more inclined to form a connection with them [29].

CAs provide personalization, efficiency, and automation in the delivery of services and information [30]. The integration of CAs into CI systems is essential to increase organizational efficiency and effectiveness. However, this potential has remained largely unrecognized.

2.3. Situational Motivation

Motivation is crucial for long-term adoption of interactive systems, especially in CI systems [31]. A study indicates that intrinsic motivation results in superior long-term adoption and learning outcomes relative to extrinsic motivation [32].

Behavior is influenced by various forms of motivation, including intrinsic motivation (participating in an activity for its inherent pleasure), extrinsic motivation (being involved in an activity as a way to achieve a goal), and amotivation (a complete absence of motivation). Motivation, as a crucial factor in behavior, affects both the beginning and the continuation of acts [33, 34]. That is why it is also essential when it comes to user behavior, such as long-term system adoption in relation to interactive technologies.

The social and emotional dimensions of avatars and social chatbots are intricately connected to intrinsic motivation (cf. [35, 36]). Furthermore, satisfying the demand for relatedness has been shown to increase intrinsic motivation within CI systems [37].

Intrinsic or extrinsic motivation may be elicited on the basis of the context. Intrinsic motivation denotes participation in an activity for its inherent pleasure, rather than for extrinsic incentives [38]. Extrinsic motivation entails participating in an activity to achieve an external objective rather than for its intrinsic value. Situational motivation includes various components and indicates the type of motivation users perceive while actively performing a task [38].

3. Conceptual Extension and Hypotheses Development

The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT / UTAUT 2) are frequently utilized to explain the adoption of technology. However, they overlook the social and emotional aspects of user engagement and adaptive situational motivation.

3.1. Technology Acceptance Models

The TAM and UTAUT models are two of the most recognized and utilized frameworks in technology acceptance research [39]. The authors primarily refer to UTAUT2. As it extends TAM and UTAUT, the key components of these foundational models are also briefly introduced.

TAM, introduced by Davis [40], seeks to explain how users adopt and use new technologies [41]. The model positions perceived usefulness and perceived ease of use as core influences for technology adoption. Numerous scholars have made efforts to extend the TAM by incorporating social and motivational factors. These research initiatives have been integrated into the TAM through constructs such as social influence (UTAUT, [42]) and hedonic motivation (UTAUT 2, [43]).

The adoption of technology is affected by various interrelated aspects that promote not only long-term adoption but also the post-adoption experience such as user participation. *Performance expectancy*, the belief that a technology improves productivity, continues to be a primary factor influencing adoption [42]. Equally significant is *effort expectancy*, which denotes perceived ease of use, indicating that technologies that require minimal effort to learn are more likely to be accepted, especially by novice users [40, 44]. Moreover, *social influence* significantly impacts technology adoption, as individuals are more predisposed to use technology when they sense support from their social environment, including coworkers or peers [42].

External support structures profoundly influence technology adoption, beyond individual perspectives. *Facilitating conditions*, including access to training, infrastructure and technical support, are essential for successful adoption [43]. Moreover, *hedonic motivation*, defined as the inherent pleasure obtained from utilizing technology, significantly affects engagement, especially within the entertainment and social media domains where enjoyment serves as a primary motivator [45]. The *price value* of a technology, characterized as the balance between its benefits and costs, influences its acceptance, as consumers evaluate whether apparent advantages outweigh financial or time expenditures [46].

The prolonged interaction with technology is reinforced by behavioral habits. *Habit*, an acquired automatic reaction to technology, can profoundly affect ongoing adoption, often functioning independently of deliberate decision making [43]. Likewise, *behavioral intention*, indicative of an individual's motivation and readiness to utilize a technology, serves as a crucial predictor of actual utilization [47]. Ultimately, *usage behavior*, defined as the degree of interaction of an individual with a system, is influenced by hedonic motivation and external facilitators [43].

The UTAUT and its extension to UTAUT2 are widely used frameworks to understand the adoption of technology. However, they do not fully account for the social and emotional as well as motivational dimensions, especially for long-term adoption. To address this gap, we propose integrating techno-social bonding and situational motivation as critical components of an extended model.

3.2. Conceptual Extension and Hypotheses Development

This chapter develops the conceptual extension of the UTAUT2 model and the hypotheses for the planned experimental design, based on the preceding sections on related work and theory.

3.2.1. Conceptual Extension of the UTAUT2

Motivation is essential in all types of behavior [33, 34]. However, focusing on a singular sort of motivation, such as hedonic motivation, is inadequate. A coherent technology acceptance model requires a comprehensive approach to context-dependent motivation that incorporates both extrinsic and intrinsic motivational elements.

In addition, emotional and social attachment extends beyond interpersonal connections and is increasingly relevant in human-system interactions. These factors are particularly crucial for the long-term adoption of technological systems. Consequently, they should be regarded as essential components of a forward-looking technology acceptance model.

By integrating techno-social bonding and situational motivation into the UTAUT 2 model (see1), we can better predict usage behavior in interactive technological systems. These constructs help explain why users start and continue to adopt certain technologies beyond utility and ease of use, addressing gaps in the traditional model.

Situational motivation is particularly relevant as it captures the type of motivation individuals experience while actively participating in a task. Situational motivation encompasses both intrinsic motivation - where use behavior is driven by enjoyment and satisfaction - and extrinsic motivation, where actions are carried out to an external goal [38]. Importantly, the activation of intrinsic versus extrinsic motivation is context-dependent, which means that different situational factors can shape an individual's motivation in real time.

Techno-social bonding refers to the emotional and social connection between users and technological systems, particularly in the context of customizable avatars and CAs. It recognizes that perceived social presence of the system and digital attachment with the system influence facilitating conditions, situational motivation, and usage behavior, and therefore technology acceptance and long-term adoption. This construct is particularly relevant for systems that integrate personalized avatars and AI-driven CAs, where users develop meaningful interactions beyond functional use. In their function as sociomotivational technological design-elements, techno-social bonding and situational motivation also act as key mechanisms of BCSS. As these systems aim not only to trigger interaction but also to support long-term behavioral change (cf. [2, 48])

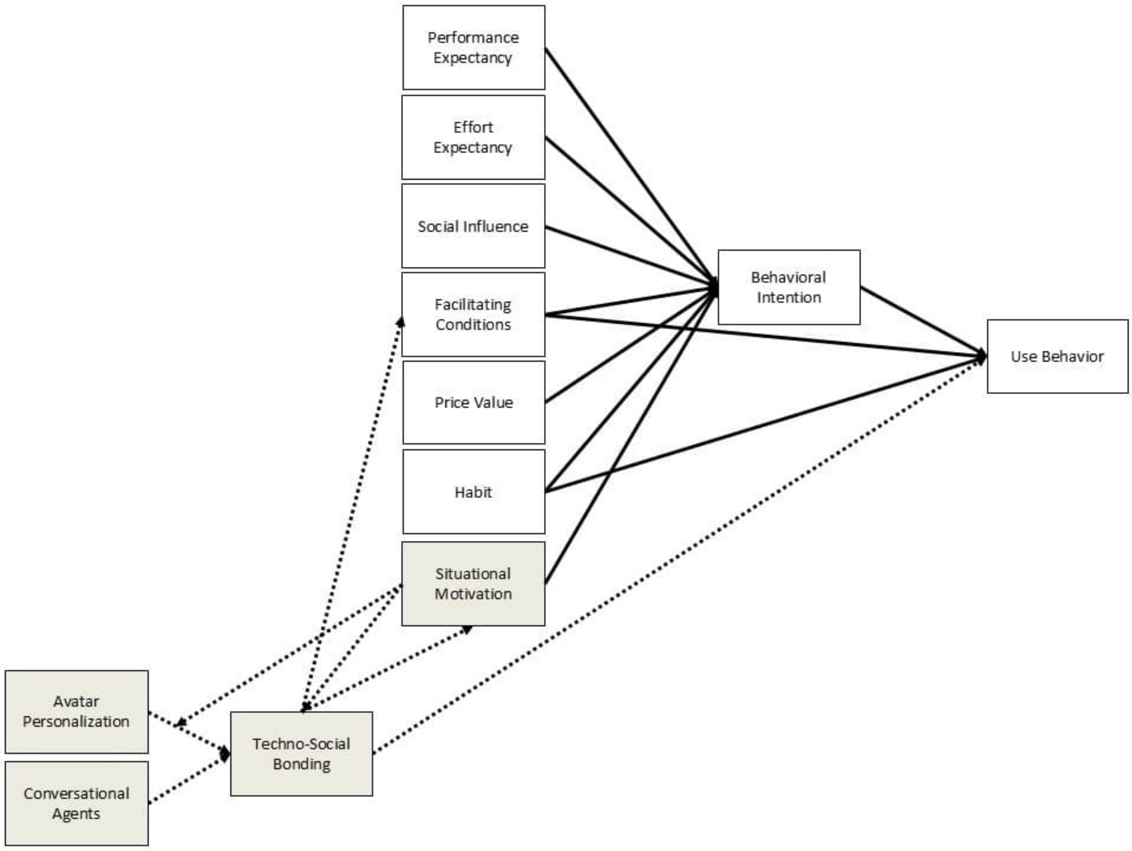

Figure 1: Conceptual Extension of UTAUT2 (following Vekantesh (2012) [43], p.160).

3.2.2. Hypotheses Development

This paper proposes an experimental design to validate the various relationships of the additional elements proposed within UTAUT 2. Based on the related work discussed in Chapter 2, the following hypotheses can be formulated.

The ability to personalize avatars supports the user in expressing their individuality and identifying with their digital representation [17, 18, 19, 20]. This individualization not only enhances social presence, but also fosters emotional bonds with interactive digital systems [21, 22, 23, 24]. The ability to personalize avatars may therefore be a central factor in the development of techno-social bonding with a digital interactive system. We therefore propose the following hypothesis **H1**: **The ability to personalize an avatar leads to a stronger social bond with the system than static avatars.**

CAs, such as chatbots, enable natural language interactions and foster social and emotional connections with users through their adaptive behavior [25, 26, 27]. In contrast to purely functional, form-based interfaces, they create a dialogic, supportive relationship layer that significantly increases long-term adoption [28]. Attachment theory supports the idea that emotional support and psychological safety provided by CAs enhance the willingness to form social bonds [29]. In addition to functional benefits such as efficiency and personalization, CAs also offer emotional added value, a potential that has remained so far largely untapped in CI processes [30]. This leads to the assumption stated in **H2: The use of a conversational**

chatbot in CI processes leads to a stronger social bond with the system than the use of a form-based interaction.

In digital environments, both personalized avatars and CAs promote social bonds, although in different ways. Avatars improve the sense of social presence and emotional well-being through self-representation and alignment with self-image [19, 20, 21, 22, 23, 24], while CAs foster emotional closeness and quality of interaction through adaptive and dialogic communication [25, 26, 27, 28].

Such emotional bonds have been shown to increase long-term adoption, a key criterion for the high-quality use of CI systems. Attachment theory supports this assumption by demonstrating that perceived emotional support from digital systems enhances subjectively experienced quality of use [29]. Combined with functional benefits such as efficiency and personalization [30], this leads to the formulation of **H3: Social bonds improve the quality of the use of a CI system.**

This social bonding not only increases long-term adoption, but, according to attachment theory, also positively influences people's perception of situations [29]. Combined with functional benefits such as personalization and cognitive relief provided by CAs [30], social bonding can ease the subjective experience of tasks. This leads to the formulation of **H4: Social bonds promote perceived ease of the task.**

Bonding processes in digital environments are particularly effective when users are intrinsically motivated, i.e. when they interact with the system out of personal interest or enjoyment [31, 32, 38]. Intrinsic motivation fosters sustained use behavior, deeper participation, and more meaningful social relationships by satisfying fundamental psychological needs such as the need to belong [31, 32, 35, 36, 37, 38]. In contrast, extrinsic motivation, such as identified or introjected regulation, tends to result in more superficial, goal-driven connections that lack emotional depth and a sense of closeness [33].

Based on these insights, the following hypotheses are proposed.

H5: Social bonds enhance intrinsic situational motivation.

H6: Intrinsic motivation strengthens the positive effect of avatar personalization on social bonding.

H7: Extrinsic motivation has a weaker impact on social bonds than intrinsic motivation.

H8: motivated users develop little to no social bonding with conversational interface systems.

4. Experimental Design

The hypotheses formulated above are planned to be tested in recently developed intelligent CI systems for production environments. The system is designed to enhance long-term adoption and streamline feedback processes through the integration of personalized avatars and conversational chatbots.

4.1. Continuous Improvement System

The application case of this paper is a CI system for production environments. The system was developed in an iterative user-centered design process based on an interview study [49]. The system addresses employees of sheltered workplaces in Switzerland. Sheltered workplaces provide employment opportunities for people with disabilities. The system provides an intuitive interface to encourage people to provide suggestions for improvements to the work environment.

The main components are a conversational chatbot that prompts users to submit detailed suggestions and personalized avatars designed to strengthen the sense of connection within teams in production environments.

4.1.1. Conversational Chatbot

The system incorporates an AI-based conversational chatbot that helps users submit structured feedback on CI initiatives and workplace issues. Figure 2 shows an interaction of a user with the chatbot. Instead of requiring users to draft reports manually in a form, the chatbot guides them through a structured inquiry process, ensuring comprehensive and actionable feedback.

Upon receiving an initial input, the chatbot generates context-specific follow-up questions, such as:

- "Where is the problem located?"
- "How long has this issue persisted?"
- "Is your ability to work currently affected?"

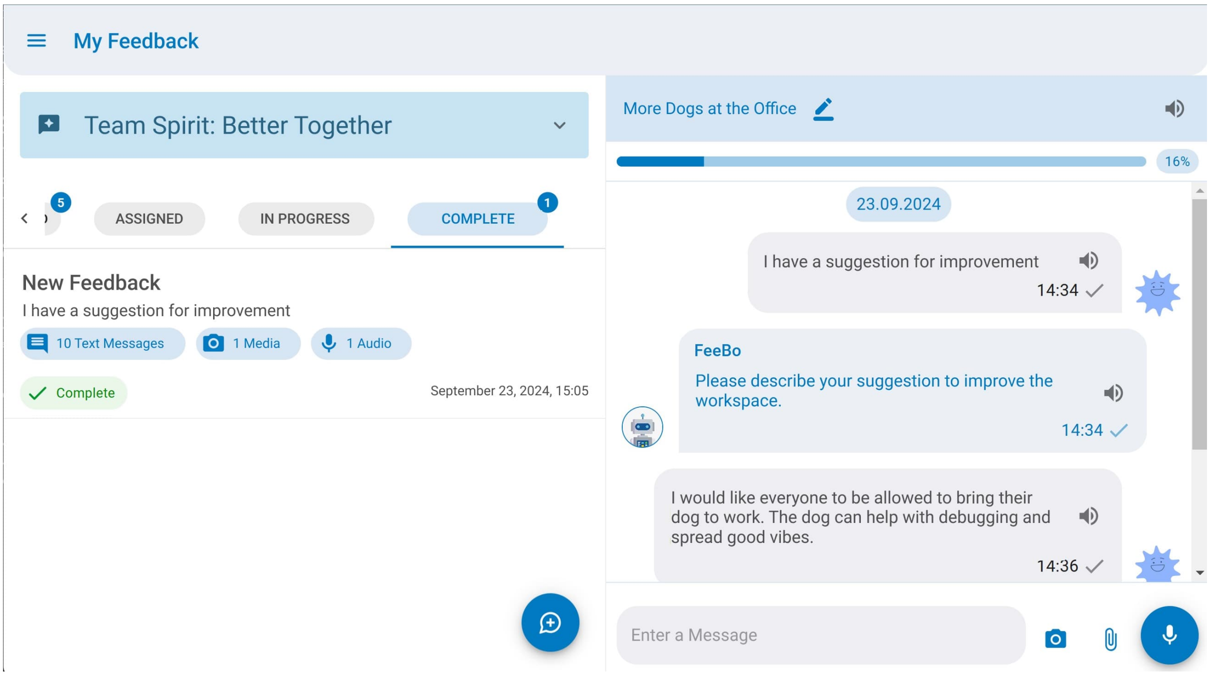

Figure 2: Translated interaction with the chatbot. The chatbot prompts the user to provide additional information on her or his report.

This structured dialogue reduces cognitive effort for feedback submission, leading to more precise and complete reports. By ensuring that key details are collected from the outset, the chatbot reduces the need for further clarification by human reviewers. Designed to maintain neutrality and professionalism, the chatbot aims to mitigate frustration among users while providing a perception of responsiveness and recognition.

4.1.2. Personalized Avatars

The avatar feature enables users to visually communicate their mood, providing an additional layer of expression in digital interactions. The avatar editor is shown in Figure 3. The implementation of avatars serves two primary purposes: (1) enhancing use behavior through personal customization and (2) facilitating emotional self-expression in a non-disruptive manner.

Unlike conventional avatar designs, which may include humanoid or anthropomorphic characteristics, avatars consist of abstract shapes and modifiable colors. This was an important design decision for the application in sheltered workplaces, as it ensures an inclusive user experience by preventing any visual differentiation based on physical attributes.

4.2. Methodological Approach

The in chapter 3.2.2 developed hypotheses are tested in an industrial setting:

- H1: The ability to personalize an avatar leads to a stronger social bond with the system than non-personalizable avatars.
- H2: The use of a conversational chatbot in CI processes leads to a stronger social bond with the system than the use of a form-based interaction.
- H3: Social bonding increases the quality of use of the CI system.
- H4: Social bonding promotes the perceived ease of the task.
- H5: Social bonding enhances intrinsic situational motivation.
- H6: Intrinsic motivation strengthens the positive effect of avatar personalization on social bonding.
- H7: Extrinsic motivation (e.g., identified or introjected regulation) has a weaker influence on social bonding than intrinsic motivation.
- H8: Amotivated users develop little to no social bonding with CI systems.

It is planned to follow a Micro-Randomized Trial (MRT) design, allowing for an adaptive and iterative assessment of intervention components in real-world conditions. Furthermore, these within-subject comparisons allow statistically robust conclusions to be drawn with significantly fewer participants than traditional experimental designs require. [50].

A sample of 100–200 participants will be randomly assigned to experimental conditions at each system interaction, ensuring within-subject variation. Before starting the analysis, a formal power analysis (for example, using G * Power) will be performed to ensure that the sample size is sufficient to detect the expected effect size with 80 Percent statistical power, as recommended in standard guidelines for empirical research [51]. In each access to the system, participants will be exposed to one of the following conditions:

Interaction Mode:

- Chatbot-based interaction
- Form-based interaction

Avatar Customization:

- Fixed standard avatar (fixed)
- Personalized avatar (customizable)

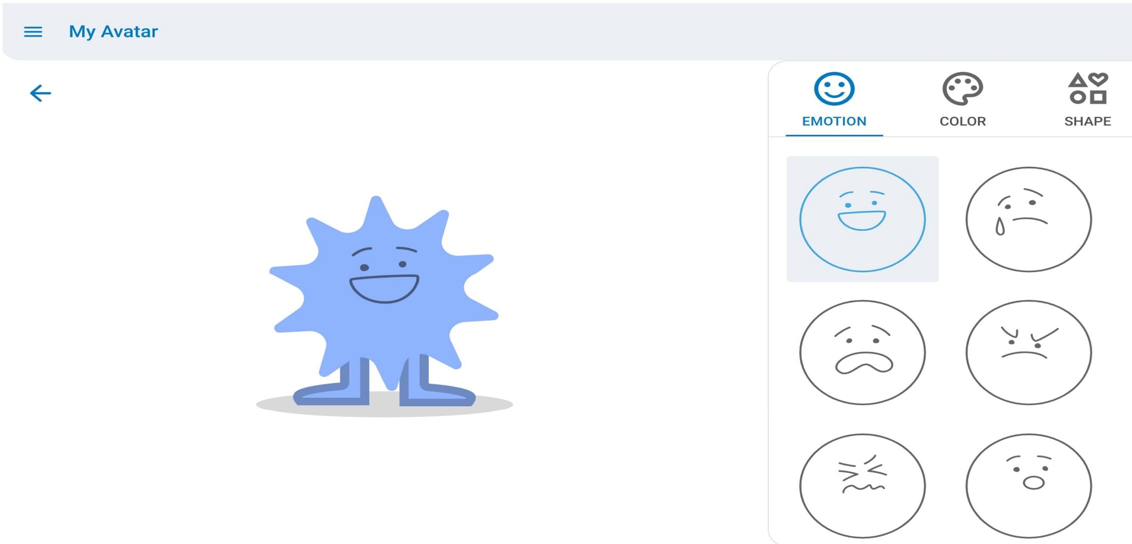

Figure 3: Translated screenshot of the avatar editor. The emotion, color, and form of the avatar can be changed.

This factorial combination allows for the evaluation of the isolated and interactive effects of interaction modality and avatar personalization on long-term adoption and perception of the system.

Participants will be asked to complete short ecological momentary assessments (EMAs [52]) immediately after system access and interaction. The self-report research method to collect subjective data repeatedly from individuals in their natural environment, close to the experience being reported, fits our approach best. Maximizing ecological validity while avoiding retrospective recall, these EMAs will capture real-time responses related to social and emotional connection to the system, user perception, and situational motivation.

Additionally, log data will be collected to analyze user feedback behavior (KVP), tracking how users engage with and respond to the different conditions. Following data will be collected at multiple time points to assess temporal variations in user responses.

t0 (Baseline): Initial situational motivation, social-technological bond to the system and expectations before the first interaction (performance expectancy, effort expectancy, social influence, facilitating conditions, price value, habit).

Measures collected after each system access, capturing real-time user experiences: situational motivation, techno-social bonding, facilitating conditions, and actual use (duration, frequency, quality of CI-Feedback).

t1 (Post-Interaction Assessments): Ultimate situational motivation, social-technological bonding to the system, habit, and satisfaction.

The data collected will be analyzed using the following: Multilevel modeling (MLM) to account for variability within a subject between repeated assessments; generalized estimation equations (GEE) to analyze behavioral patterns and intervention effectiveness; mediation and moderation analysis to explore the influence of motivation, social presence, and emotional reactions on system acceptance.

This methodological approach ensures that the study captures the dynamic, real-world effects of persuasive system design on long-term adoption and use behavior of the system. As the study involves the processing of potentially sensitive personal data, ethical approval will be sought from the relevant institutional review board before any data collection takes place.

5. Implications and Outlook

Our conceptual model significantly advances the theoretical framework by extending traditional technology acceptance models (TAM/UTAUT/UTAUT2) with the constructs of social bonding and situational motivation. This integration offers a more nuanced understanding of how interactive features, specifically personalized avatars and conversational chatbots, affect user acceptance, use behavior, and long-term adoption of CI systems. By integrating personalized avatars and social chatbots, the presented system serves not only as a tool to improve technology acceptance, but also as a targeted BCSS, based on motivational and affective mechanisms.

Furthermore, the planned empirical study, which uses a microrandomized trial in an industrial setting, aims to provide robust, context-sensitive evidence on the interaction between motivational factors and technology use, thus addressing a critical gap in the current literature.

The study findings are expected to provide actionable insights for the design and development of intelligent CI systems. By demonstrating the impact of social bonding and situational motivation on user behavior, research can inform best practices for integrating gamification elements, such as customizable avatars and conversational chatbots, into these systems and into other interactive systems for behavioral change. This, in turn, can improve user experience, strengthen sustained adoption, and ultimately contribute to improved operational efficiency and innovation within industrial environments.

Despite its valuable contributions, this study is subject to several limitations. First, the empirical evaluation is confined to sheltered workplaces in Switzerland, which can limit the generalization to other environments. Future research should replicate the study in diverse organizational contexts and cultural settings to enhance external validity. Second, the intervention period of four weeks may be too short to capture long-term adoption patterns or the development of habitual use. Extending the duration of the study and including follow-up evaluations could provide deeper insights into sustained system adoption. The system design, including abstract avatars and a neutral chatbot tone, was designed for accessibility. This may limit emotional resonance. Future iterations could explore more expressive design alternatives to foster deeper social bonds. Lastly, while the study emphasizes accessibility and inclusion, the homogeneity of the participant group limits the applicability of the results to a wider user base. Broader demographic sampling is recommended to verify the robustness of the proposed model.

Declaration on Generative AI

For linguistic translation, refinement, and proofreading, AI language models (such as ChatGPT) were used. However, all intellectual contributions and arguments remain the responsibility of the authors.

Acknowledgments

This study was funded by the Swiss Innovation Agency through the project "Smart-KVP: Intuitive und motivierende Unterstützung für den kontinuierlichen Verbesserungsprozess in der Produktion" (grant number 108.093.1).

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