

## I. Introduction

The first section (I.1) addresses the motivation and relevance of this thesis. This is supplemented by an identification of research gaps and consequent research questions (I.2), followed by the structure of this thesis (I.3), the research design (I.4), and the anticipated contributions (I.5).

### I.1 Motivation

A growing number of work is solved with the support of information systems (IS) and information technology (IT), leading to drastically changing the way many work arrangements are structured and organized (Baptista et al., 2020). Vast amounts of data can be saved to databases, and information saved in the database can be called up within seconds (e.g., employees answering a service hotline can view a customer's orders instantly) (Banker & Kauffman, 2004). Another example is interacting with a person in a different country or time zone can happen without any delay (e.g., weekly cross-location meetings for project management (Bailey & Kurland, 2002)). Utilizing IS improves not only task execution but also the way IS users approach tasks. For instance, following Hackney et al. (2022), accelerated communication enabled by direct messaging and collaboration platforms, which include facilitating project management or video conferencing, has brought a leap in productivity and efficiency. Such IS-improved collaboration disrupts traditional work by equipping individuals to perform activities independently of time and location (Durward et al., 2016). This provides companies with the advantage of employing or offering products to individuals all over the world. One emerging IS trend building upon these IS advantages is the platform economy. The platform economy is defined as platforms being a digital marketplace connecting customers and suppliers (Vallas & Schor, 2020). One prime example of such platforms is connecting companies with freelancers for problem-solving (e.g., crowdworking on Amazon Mechanical Turk (MTurk)) (Vallas & Schor, 2020).

While working on digital labor platforms is flexible and autonomous, the traditional employer-employee relationship does not exist (e.g., communicating with other employees, having a supervisor, or receiving feedback on one's performance (Brawley & Pury, 2016)). This can lead to psychological problems of feeling lonely, isolated (Tavares, 2017), less motivated (Gagné et al., 2018), and frustrated (McInnis et al., 2016). These psychological problems are reported also to impact behavioral outcomes, such as higher turnover and reduced performance (Brawley & Pury, 2016). Overall, negative mental- and somatic health impacts are reported when work is done digitally and without much social interaction (Schlicher et al., 2021).

IS are generally designed to support task completion. Still, they could also be designed to integrate features that tackle the described problems (e.g., increase motivation or provide social interaction) (Oinas-Kukkonen & Harjumaa, 2009). Current crowdworking platforms are designed to be neutral and act as intermediaries (i.e., merely connecting supply and demand for work tasks) (Swords, 2020). Nonetheless, future platforms could be designed to positively influence the cognition and behavior of users, preventing negative effects on workers' well-being (e.g., social isolation) (Oinas-Kukkonen & Harjumaa, 2009).

This conceptualization of a dichotomy in functionality (task support and support of worker well-being) is based on the IS classification of Benbasat (2010), who distinguishes two types of IS designs: (1) neutral- and (2) agenda-driven. While neutral IS are designed functionally (i.e., usable, performant, etc. (Davis, 1987)), agenda-driven IS encompass principles to achieve desired outcomes (e.g., by IS developers) for user behavior and cognition. The approach to designing and integrating agenda-driven elements into an IS is called "persuasive system design (PSD)." It has been conceptualized by Oinas-Kukkonen & Harjumaa (2009), providing an overview of principles that can lead to changes in individuals' behavior and cognition.

As one of the problems identified in the crowdworking platforms is not being acknowledged for working and reducing motivation, PSD can be utilized to provide rewards as acknowledgments for digital work (e.g., badges or points). Acknowledgments are understood as recognition or expression of gratitude towards individuals or groups for their contributions, efforts, support, or influence in various contexts (Brun & Dugas, 2008). Badges or points are game-like elements and are commonly called "Gamification," which is defined as the "use of game design elements in non-game contexts" (Deterding et al., 2011). The successful application of gamification leads to users experiencing a mental state similar to playing games (e.g., being motivated to perform an action). Common examples of gamification are leaderboards (Jia et al., 2017), point systems (Koivisto & Hamari, 2019), or badges (Hamari, 2017). Gamification is implemented in various application fields, such as medicine and education (Koivisto & Hamari, 2019). In medicine, it can promote health-enhancing behavior, such as by addressing smoking habits (El-Hilly et al., 2016). In education, it encourages the repetition of learning sessions/materials (Huynh et al., 2016).

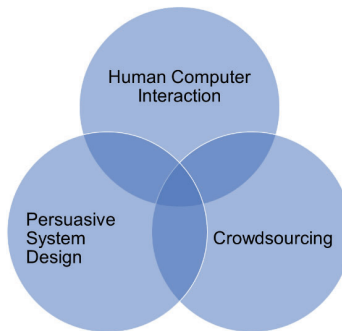
In the work context, gamification is used to achieve higher productivity or reduce mistakes (Swacha & Muszynska, 2016). Examples of gamification in the work context are gamifying training sessions (Obaid et al., 2020), transparent competition between teams of workers (Korolov, 2012), or earning digital rewards for achieving work goals (Thom et al., 2012). For instance, Cunha Leite et al. (2016) found that integrating gamification (badges and leaderboards) to support construction workers increased their motivation and

performance. However, implementing gamification only sometimes leads to the desired effects and can even be counterproductive, necessitating further research. For instance, offering badges as rewards for performing an activity can motivate some users (Hamari, 2013), while comparing various users' performances could lead to many users rejecting the IS (Maier et al., 2022). In summary, introducing gamification elements to digital labor platforms promises to address workers' demotivation and a lack of acknowledgment. However, research on gamification is heterogeneous, and further research is required to determine how gamification influences workers' needs (e.g., well-being or motivation).

While gamification promises a solution to some of the issues of crowdworking (e.g., induce motivation), the issue of social isolation remains. In this context, introducing conversational agents (CA) to the digital workplace could be a remedy. CAs are IS capable of interacting with individuals by using human language via chat or voice interfaces and can be designed to appear humanlike (Feine et al., 2019). This appearance and mode of interaction lead to the perception of them as a social actor (i.e., an entity that triggers individual behavior and cognition similar when interacting with other humans) (Nass & Moon, 2000; Nass et al., 1994)). Examples of CA are Apple's Siri and Amazon's Alexa, which control smart home devices or select music to play from a smart speaker (Sciuto et al., 2018). From a business perspective, CAs can be implemented to automate processes, such as customer services, reducing costs while improving convenience (Adam et al., 2021). In the context of work, CAs can give support either proactively or on request (Meyer von Wolff et al., 2019), which leads to improved productivity and work engagement (Marikyan et al., 2022). While CAs are commonly introduced to support task completion, they could also address the issues of working digitally (i.e., social isolation). They could be integrated into digital work environments to provide psychological support, for instance, by acknowledging workers for good work. However, integrating a CA could have negative side effects, such as pressuring workers to perform well by the CAs social presence. This effect has been reported in the context of human-to-human interactions and is called the "mere presence effect" (Markus, 1978). In short, there is the upside of feeling related to a CA tackling social isolation, while this relatedness could lead to pressure to increase one's performance. Thus, like the application of gamification, introducing CAs to digital labor platforms needs further research to ensure positive effects and prevent negative ones.

In summary, integrating gamification and CAs as additional elements to IS potentially addresses the issues of crowd-sourcing/working (e.g., overcoming social isolation or demotivation). However, exposing workers to these elements can have contradicting effects on workers' behavior and cognition. Additionally, these elements can be utilized for mere personal goals as pro-user elements (e.g., induce feelings of personal relatedness or enjoyment) or as pro-task elements to achieve pro-task outcomes (e.g.,

improved performance by provoking social comparison (Wenker, 2022)). To address these issues, this thesis integrates research from multiple research disciplines to develop a theoretical base for investigating the human-computer interaction (HCI) aspects of introducing gamification and CAs to digital labor platforms (see Figure 1).



**Figure 1: Engaged Research Areas**

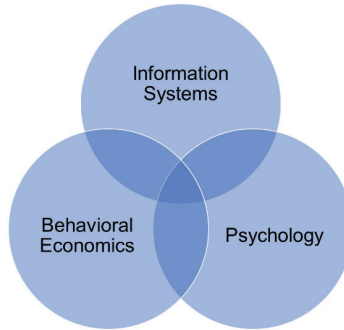
In addition to addressing the knowledge from different research areas, this thesis also integrates methods and theories from different disciplines. This approach is in the spirit of IS research:

*“Research in the information systems field examines more than just the technological system, or just the social system, or even the two systems side by side; in addition, it investigates the phenomena that emerge when the two interact”* (Lee, 2001, p. iii).

Based on this statement from a former editor of the leading journal<sup>1</sup> in IS research, this thesis integrates theoretical perspectives to explain and predict the behavioral and psychological outcomes when individuals interact with IS and the included PSD elements. The PSD elements are developed and informed by research from the IS perspective to contribute to this research community. As PSD aims to target behavior and cognition alike, this thesis explicitly draws from the IS, behavioral economics, and psychology disciplines.

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<sup>1</sup> Management of Information Systems Quarterly – <https://misq.umn.edu/>



**Figure 2: Relevant Research Perspectives**

Integrating the psychological perspective is necessary to conceptualize the needs of workers that are not fulfilled by working on digital labor platforms. For instance, the issue of social isolation is based on the human need for social relatedness – i.e., to understand and feel the presence of others (Aiello & Douthitt, 2001). Yet, the presence of others can also provoke feelings of being observed, negatively impacting individuals' well-being (Markus, 1978). Similarly, the potential effects of gamification can be derived when applying the SDT (Deci & Ryan, 2000) to understand the formation of workers' motivation. Generally, external influence can reduce motivation because of a feeling of being controlled (Deci & Ryan, 1985a). In this context, some studies find that tangible rewards reduce internal motivation due to an external stimulus reducing the individual's autonomy (Deci et al., 1999). This thesis aims to extend these findings, considering that PSD elements are non-tangible (i.e., digital).

In addition, a behavioral economics perspective is integrated to address the interaction between individuals and CAs. While there is research on the perception of CAs as human-like, which leads to interactions similar to those between humans (Diederich et al., 2022), it remains unclear whether individuals behave similarly in the context of work (Meyer von Wolff et al., 2019). As stated above, individuals can feel relatedness when other individuals are around (Aiello & Douthitt, 2001). However, this can influence not only their mental state but also their behavior in that, e.g., people overperform due to the presence of others (Markus, 1978). Thus, the question remains whether a CA can lead to similar findings. Additionally, when people are rewarded for their work, this extrinsic motivation increases their performance (Gagné et al., 2018). Durward et al. (2020, p. 88) analyzed crowdworkers reasons for crowdworking finding that “*financial compensation has no direct effect on satisfaction*”. Thus, the question arises of whether this is consistent when a reward without financial value (i.e., a gamification reward) is presented as a reward. In

addition, this leads to the question of whether PSD elements can lead to motivation or satisfaction when financial compensation can't.

In summary, this thesis addresses the identified challenges of crowdworking by researching how PSD elements influence workers' behavior and well-being on digital labor platforms, focusing on the HCI perspective. Precisely, its potential regarding psychological outcomes (e.g., motivation) and related behavioral outcomes (e.g., performing activities) are of interest. Experiments connecting specific psychological outcomes induced by PSD elements and their related behavioral outcomes were conducted to present empirical evidence. First, the most prominent gamification elements were brought to a work context to isolate the effects of a social comparison mechanism and users being acknowledged by rewards, analyzing psychological outcomes and behaviors. Second, a praising CA was introduced to a work context to analyze the effect acknowledgments by a CA have on individuals. Third, the isolated and combined effects of badges' design principles are analyzed based on the findings of the preceding experiments. Fourth, a novel gamification element is to be introduced, and the reward mechanism is analyzed to assess the element's meaningfulness by providing task-facilitating acknowledgment. Lastly, CAs are integrated as PSD to improve psychological states while controlling for the instrument's negative effects.

## I.2 Research Questions

This thesis focuses on workers' issues (e.g., isolation and demotivation) on crowdworking platforms. Specifically, it investigates how integrating PSD elements (CAs and gamification) into a digital labor platform affects workers. In this context, this thesis will address three interrelated research questions.

First, according to Oinas-Kukkonen and Harjuma (2009), PSD principles exist in four categories. Each category has one main feature that can alter a system's interaction without changing the general activity (i.e., changing the interface of an IS without changing any function). All categories and related principles (introduced in the following) are applied in most IS integrations in different forms or combinations (Lehto, Oinas-Kukkonen, & Drozd, 2012): (1) primary task support, (2) dialog support, (3), system credibility support and (4) social support.

For instance, IS can support the *primary task* of helping a user become healthier. This is enabled by self-monitoring the user's step counts (Consolvo et al., 2006). In the work context, a similar principle would be that workers can monitor their progress in the number of finished tasks (Schuldt & Friedemann, 2017). *Dialog support* can be given through praise in the form of sounds or images announcing the completion of an exercise (Toscos et al., 2006). In the context of work, Uber drivers earn badges for "excellent service" to sustain their service behavior (Wiener et al., 2021). *System credibility support* is achieved

by referencing the origin of specific information (Oinas-Kukkonen & Harjumaa, 2009). In the context of work, the names of authors responsible for a company's knowledge management content can be displayed (Bolisani & Scarso, 2016). Lastly, *social support* can offer social comparison in the form of a user comparing, e.g., their smoking behavior over time (Sohn & Lee, 2007). In the work context, individuals can monitor and compare their progress for compliance or participation in security education (Busch et al., 2016).

A common practice in designing IS, including PSD, is to combine multiple principles to provide a "more complete" experience during the interaction (Oduor & Oinas-Kukkonen, 2021). For instance, offering points for self-monitoring, which can be shared with others, induces social comparison (Merz & Steinherr, 2022). Such combinations are also found in gamification. For instance, rewards as feedback are combined with competition by showing leaderboards, and CAs acknowledge users' behavior after monitoring their activities (Fogg, 2003; Hamari, Koivisto, & Pakkanen, 2014).

Aside CAs and gamifications potential to bring psychological and behavioral changes (e.g., motivating users to increase their performance), the actual impacts of introducing these elements to individuals in crowdworking remain unclear. Both PSD elements can trigger social influence and feedback effects to address the digital workplace problems introduced above (e.g., social isolation and demotivation). Although gamification and CA address the same problem, their capabilities, designs, and implementation differ significantly. Therefore, the following research question to address the uncertainties related to introducing CA and gamification elements into the context of digital activities/work is formulated:

**RQ 1:** *How do PSD elements induce changes in individuals behavioral and psychological outcomes in context of digital labor?*

Besides their commonalities regarding their potential influence on individuals (e.g., motivation), the CAs and gamification elements differ significantly in *how* they achieve particular outcomes. For this reason, RQ 1 is divided into two sub-questions.

The first sub-question addresses the most applied gamification elements. In a comprehensive literature review, Koivisto and Hamari (2019) found 273 empirical studies encompassing 47 different implementations of gamification elements across 12 domains, in which badges and leaderboards were predominantly implemented. These studies found reports on 53 different psychological and 44 different behavioral outcomes, with primarily mixed results regarding these elements' positive and negative influences on individuals (e.g., reduced motivation or lower performance after receiving rewards). Yet, in all these empirical studies, only one reportedly addresses gamification in the context of work. Thus, the first sub-question refers to two mechanisms of PSD elements: the first relates to inducing social influence by providing a leaderboard, and the second presents

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feedback by awarding badges or points for work progress, leading to the following research question:

**RQ 1.1:** *What are the impacts of leaderboards, badges, and progress bars on individuals' motivation and performance in crowdworking?*

CAs are used in multiple application fields. Diederich et al. (2022) identify 262 studies addressing CAs within nine application domains in an extensive literature review. They find that less than 5% of the studies address professional tasks, while less than 13% address psychological issues (e.g., social influence or enjoyment). Besides proving that social presence impacts individuals in ways that bring about psychological and behavioral change (Fogg, 2003), it has been noted that the social presence of a CA could utilize the PSD dialog support as praise (Oinas-Kukkonen & Harjuma, 2009). Praise generally coincides with motivation and ultimately leads to improved performance if the individual perceives the praise as genuine (Carson & Langer, 2006; Deci et al., 1999). Despite evidence that CAs are perceived as social actors (Nass et al., 1994), it remains unclear how a CA should be designed to praise individuals in a way that feels appropriate in digital activities promoting specific outcomes. Thus, the second sub-question is formulated as follows:

**RQ 1.2:** *How does praise by a CA influence individuals' performance?*

Insights on the antecedents of motivation are crucial to understanding the behavioral changes prompted by PSD elements. According to the Self-Determination Theory (SDT), motivation is a continuum of different motivational features (Deci & Ryan, 2000). The continuum ranges from intrinsic self-determination to perform an activity (e.g., the enjoyment of a hobby) to external regulation facilitated by rewards for performing or sanctions for not performing a given activity (e.g., monetary compensation for work) (Volpone et al., 2013). However, these two extremes of motivation are not mutually exclusive and can interfere. From a theoretical perspective, receiving a (tangible – i.e., physically touchable) reward for an activity offers extrinsic motivation, which could also trigger a feeling of being controlled, thus reducing autonomy, which ultimately decreases the individual's intrinsic motivation to proceed with the activity (Deci & Ryan, 1985b). This has been further researched in multiple studies, which has led to contradicting results. In a meta-review of 950 articles, Cerasoli et al. (2014) analyzed the tension that arises due to the impact extrinsic incentives/rewards have on intrinsic motivation and found that rewards don't necessarily have a negative effect. The same is true in gamification, where mixed results prevail (Koivisto & Hamari, 2019). For instance, in their experiment, Hakulinen et al. (2015) found that badges could be motivational for some, but not all, participants. De-Marcos et al. (2014) found that gamification has different impacts depending on the task. For example, students rewarded for work well done did more practical assignments but would do fewer written assignments.



However, there is little room for comparison when analyzing the design of gamified systems and the related rewards. Liu et al.'s (2017) theoretical framework for designing gamification distinguishes between gamification mechanisms and elements (see Figure 7). Elements, for example, are badges, and obtaining these badges as rewards is understood as the mechanism. However, most gamification reward elements are individualized (e.g., designed with sustainable colors for an IS that promotes sustainable behavior), and their mechanisms are randomly combined (e.g., providing an achievement popup in addition to the reward) (Abramovich et al., 2013; Denny, 2013; Dominguez et al., 2013; Koivisto & Hamari, 2019; Laschke & Hassenzahl, 2011; van Roy et al., 2019). Thus, the findings refer to entities so different that they are incomparable, nor do they work as a blueprint for future gamification implementations in IS, which various scholars find imperative (Lowry et al., 2020; Morschheuser et al., 2017). The following research question addresses these issues related to gamification reward design to measure their impact on extrinsic- and intrinsic motivation and performance.

**RQ 2:** *How do gamification rewards induce motivation?*

This research question is divided into two sub-questions. According to Liu et al. (2017), gamification design elements are a combination of the gamification object (e.g., badges or leaderboard) and its mechanisms (e.g., being awarded or ranked for behavior). While most gamified IS are based on this guideline in their implementation, they further adapt and individualize the design by combining mechanisms or elements, even without a scientific foundation (Lowry et al., 2020). For example, a user who gets to unlock a badge also unlocks an achievement that can be displayed to other users (Haaranen et al., 2014)). While the mechanism of awarding a badge and the presented object is pre-defined, Liu et al. (2017) marginally refer to design principles of gamification elements (e.g., presenting badges ranging between gold, silver, and bronze, stating their rarity and rank). Thus, the implemented designs are inconsistent as they are presented differently, which explains the varying outcomes of gamification implementation, leading to the problem of comparability and application in another IS (Koivisto & Hamari, 2019). Thus, in a first step, the state-of-the-art gamification element "badge" will be analyzed (i.e., deconstructed into the principles all badges share based on marking and the endowment effect). In this process, the different effects of the isolated and combined principles are compared. This analysis aims to provide insights comparable with other studies by explicitly explaining the different principles of a gamification element. Overall, the addressed research question is:

**RQ 2.1:** *What principles of badges exist, and how do they drive motivation and performance?*

In addition to badges as one of the most prominent gamification elements, a novel trend in the gaming industry is lootboxes, which accounted for \$15 billion in revenue in 2020

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(Amano & Simonov, 2023). Like badges, lootboxes follow the mechanism of being awarded for certain behaviors. However, they are introduced as containers with random rewards rather than the certainty of being rewarded with a badge. To obtain lootboxes, users must purchase them with real money or unlock them by completing given activities within the game. In games, the lootboxes contents are random and either cosmetic (e.g., changing the appearance of a game's contents) or empowering (e.g., improving the user's capabilities within the game). However, this randomness is highly criticized<sup>2</sup> because the mechanism of this type of awarding has principles like gambling, triggering similar effects that motivate users to obtain more lootboxes. For example, recipients can fall into the gambler's fallacy of expecting a desired reward in the next lootbox after an undesired reward is found in the last lootbox (Ritchie, 1954)).

Besides all the criticism, obtaining lootboxes without paying for them can be expected to have the same motivational effects but without the ethical pitfalls, as this does not drive any individual to financial problems (Koeder et al., 2018). Therefore, transferring this game element to gamification can lead to a novel gamification element worth exploring for the possibility of profiting from its potential without the risk of harming individuals. Yet, in contrast to badges, the question arises of how lootboxes can be utilized as gamification elements outside of games. Thus, the following research question is formulated.

**RQ 2.2:** *How do lootboxes as gamification rewards influence motivation?*

Besides the behavioral and psychological outcomes that lead to task outcomes (i.e., motivation that increases performance), individuals strive for personal outcomes that benefit no one but themselves (Deci & Ryan, 2000). Specific examples of such benefits are enjoying an activity, feeling related to others during an activity, or reaching personal goals (Deci & Ryan, 2000). In the health context, El-Hilly et al. (2016) implemented PSD to address smoking habits. In education, Antonopoulou et al. (2022) show that students can improve regarding multiple personal aspects, such as self-perception or communication skills, after using a learning system with PSD elements. In the work context, only a few examples – mostly healthcare-related (Wozney et al., 2017) – of personal PSD elements prevail. Usually, they are utilized to achieve task goals such as performance (Wiener et al., 2021).

Working has a core difference to the context where PSD is commonly applied and researched: work is primarily extrinsically motivated because individuals work to make a living by being paid for their effort. In contrast, being informed about health issues (e.g., decreasing tobacco consumption to become healthier) is related to intrinsic personal goals (Deci & Ryan, 2000). However, working can also encompass situations where

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<sup>2</sup> Several European countries are discussing whether Lootboxes should be subject to the same regulations as conventional gambling (Simmons & Simmons, 2023)