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## Article

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Sven Laumer, Andreas Eckhardt, Tim Weitzel\*

## **Online Gaming to Find a New Job – Examining Job Seekers’ Intention to Use Serious Games as a Self-Assessment Tool\*\***

Serious games can be used as self-assessment tools in recruiting processes. We develop a model explaining jobseekers’ intentions to use these applications, which help them to gain a realistic idea of the job at hand and allows them to submit their application only if the job truly fits their individual profile. Drawing on organizational justice theory and the technology acceptance literature, our model is empirically evaluated using data from 1,882 jobseekers. The results indicate that jobseekers’ intention to use self-assessments is driven in particular by its perceived ease of use, perceived usefulness, perceived enjoyment, and perceived selection fairness. In contrast, the issue of privacy security has no significant impact on jobseekers’ intentions. For firms, using serious games as a self-assessment tool can lead to a reduction in the total number of unsuitable applications they receive.

### **Online-Spiele in der Personalbeschaffung – Eine empirische Analyse der Intention von Stellensuchenden professionelle Online-Spiele als ein Instrument zur Selbstselektion zu nutzen**

Professionelle Online-Spiele werden primär in der Personalbeschaffung als ein Instrument zur Selbstselektion von Kandidaten eingesetzt. Sie bieten Stellensuchenden einen realistischen Eindruck der Anforderungen einer ausgeschriebenen Stelle. Bei einer großen Übereinstimmung der eigenen Fähigkeiten mit den Anforderungen der offenen Stelle können sich Kandidaten dann bei dem betreffenden Unternehmen bewerben. Der vorliegende Beitrag entwickelt in diesem Zusammenhang basierend auf Forschungsarbeiten aus dem Bereich der Technologieakzeptanz ein Forschungsmodell, um die Intention von Stellensuchenden zur Nutzung derartiger Anwendungen zu erklären. Mit Hilfe einer empirischen Studie, an der sich 1.882 Stellensuchende beteiligt haben, wird gezeigt, dass für die Intention zur Nutzung von professionellen Online-Spielen, die wahrgenommene Einfachheit der Nutzung, die Nützlichkeit des Online-Spiels, der Spaß bei der Nutzung sowie die wahrgenommene Fairness des Selektionsinstruments signifikante Einflussfaktoren sind.

**Key words:** serious gaming, self-assessment, technology acceptance, e-recruiting, applicant selection (JEL: M12, M15)

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## Introduction

Corporate Recruiting has fundamentally changed over the past decade. The advent of the web has had a significant impact on how firms recruit. Among others, personnel marketing budgets have been shifted from offline to online to utilize the broader reach and lower costs associated with online job ads. As a consequence, firms face high numbers of incoming applications and need to establish processes ideally suited to selecting the right candidates and also to offer them rapid responses in order to maintain a favorable employer image. To achieve this, talent management systems have emerged that aim to offer electronic workflows from the attraction phase over managing incoming applications and candidate communication to pre-selection and eventual selection (Eckhardt et al., 2012). Still, even with advanced integrated systems, a major challenge is to implement selection mechanisms as process steps which help reduce the number of unsuitable incoming applications and enhance the number of applications which match perfectly with the advertised vacancies. An important reason for the large number of unsuitable applications is that many candidates have no or unrealistic ideas as to what a particular job actually is or requires. Moreover, some specific jobseekers might not even think about working at a particular organization because they do not associate this enterprise with interesting jobs. For instance, one might think that a large publishing house is mainly searching for applicants for editorial and design tasks; however, its main interest is in candidates with a strong business background who can help sell and advertise their products. Thus, this organization faces two challenges: First, to increase the fit between incoming applications and open positions, and second, to increase the number of appropriate applications overall.

In this context, some forward thinking HR executives came up with the idea that internet based game-like applications can help meet this challenge. The basic idea is that a game that consists of job relevant challenges can, at the same time, be both a realistic impression of a typical work day for a candidate and a pre-selection device for the organization (Buzzetto-More & Alade, 2006; Laumer et al., 2009b). These game-like applications are defined as self-assessments, which can be described as a tool that helps an individual appraise or develop his or her knowledge about a particular topic – in the case of recruiting about an open position – in a way that is entertaining and that helps the applicant decide whether to apply for the vacancy or not (Weiss, 1990). Thus, the benefits for organizations are, on the one side, that those jobseekers who do not perceive a fit between their profile and the open position, will not apply at the respective organization, and, on the other hand, those who perceive a strong match will apply.

However, in order to realize the benefits of these game-like applications, organizations require that candidates actually accept, play along, and use such games. By implementing these games organizations are able to realize time, cost and quality benefits (Laumer et al., 2009a, b). However, while investigating job seekers intention to use IT-based measures in the recruiting process, research studies and organizations indicate that overall job seekers remain loyal to traditional ways of searching and applying for a job and are skeptical of IT innovations which change the ways they apply for a job (Lang et al., 2011; Laumer & Eckhardt, 2010a; Laumer et al., 2010; Strohmeier, 2010;

Wiblen et al., 2010). Job seekers indicate some kind of resistance to IT innovations in the recruiting process as they regard their chances of applying successfully are higher with established forms of recruitment processes than new and innovative measures which instead seem to be of greater benefit to the recruiting organizations than to the job seekers (Bondarouk & Ruël, 2009; Bondarouk et al., 2009; Laumer & Eckhardt, 2010b; Laumer et al., 2010; Ruël et al., 2007). Also in the context of serious games in the recruiting process, organizations report that jobseekers might only to a small extent play these games voluntarily and use them as a self-selection tool in the recruiting process (Laumer et al., 2009a; Laumer et al., 2009b). Consequently, organizations are faced with the challenge of convincing job seekers that using game-like applications in the job-seeking process also provide some benefits for the job seeker rather than just the organization. Job seekers perceive online games in the recruiting process as something that is time consuming and with a low cost-benefit ratio than as a useful tool to make a decision to apply for a job or not (Laumer et al., 2009a; Laumer et al., 2009b). In order to guide organizations to implement games which will be accepted by job seekers and to establish serious gaming as an effective tool in the recruiting process a better understanding of factors influencing job seekers acceptance of these game-like applications is necessary (Laumer et al., 2009a; Laumer et al., 2009b). However, so far not much is known as to the conditions that will see candidates participate in self-assessments and how their general reaction to this novel selection tool is. We will address this challenge and provide organizations with some guidelines for designing such games by conducting an empirical study with jobseekers, and by answering the following research question within our paper:

*What influences jobseekers' intentions to use self-assessment in the form of serious games in the recruiting context?*

By extending technology acceptance literature, which focuses on the acceptance of IT innovations (Davis, 1989; Venkatesh et al., 2003, see following section), with aspects of organizational justice theory, which has been applied to candidate selection measures several times (Hausknecht et al., 2004), we answer this research question by developing a model to explain jobseekers' intentions to use self-assessment systems through serious games in the following sections. The model contains both extrinsic and intrinsic factors influencing the intention to use to reflect both the utilitarian (finding a new job) and hedonic (be entertained by the game) purpose of self-assessments implemented as serious games. After our empirical evaluation of the model and a comparison of the explanation power of the different parts using data from 1,882 jobseekers (section 4), we discuss the limitations and implications of the results in the last section.

## **Research background**

By focusing on jobseekers' reaction to game-like applications in the recruiting context for applicant selection, we will first explain in the following section the technological concept of serious games in candidates' self-assessments and afterwards discuss the theoretical background of our research model.

### ***Practical background: Serious games as self-assessment tools***

The core idea of self-assessment was forwarded in 1990 when self-assessment, implemented as a question and answer procedure, was suggested as a helpful tool to aid an individual appraise or develop his or her knowledge of a particular topic (Weiss, 1990). With advances in computer technologies several opportunities have emerged in design environments in which the self-assessment procedure is more realistic, authentic, engaging, and fun (Kirkley & Kirkley, 2004). Over the past 30 years researchers have examined the importance of enjoyment and fun in user interfaces (van der Heijden, 2004). For example, some researchers suggest using game-like interaction to increase enjoyment and engagement with software systems (Tsang et al., 2003), user motivation, and playfulness of work activities (Shneiderman, 2004). Some research projects haven taken this idea a step further and designed the user interface itself as a game (Chao, 2004). Based on this development and the growing interest from a generation that has grown up playing video games, researchers and practitioners develop the idea of serious games, which can be defined as any game that “does not have entertainment as its sole or primary purpose” (Pandeliev & Baecker, 2010, pg. 239). This includes games created by the military for recruiting, training, or tactical simulations, persuasive or advertising games, disaster response games, educational games for children, language learning games, online worlds like Second life, exercise platforms such as WiiFit, and a growing number of mental fitness games (Chao, 2004; Kirkley & Kirkley, 2004; Pandeliev & Baecker, 2010; Shneiderman, 2004; Tsang et al., 2003). The main focus of those games is on applications used in the e-learning context (Crookall, 2010).

Nonetheless, in 2002 the term “serious games” was established in the recruiting context as the US army introduced a game called “America’s Army” which is an ego-shooter game designed for the recruiting activities of the US Army. Since the introduction of this game the recruiting numbers of the US army has increased as playing this ego-shooter game has prompted individuals to be convinced that a job at the US army is interesting (Prensky, 2003). This first example of serious games illustrates that internet-based game-like applications can also be designed to provide IT support for the selection tasks of the recruiting process (Laumer et al., 2009b). These self-assessments are based on the idea that a game-like application for a serious purpose is implemented as a simulated virtual environment in which a jobseeker is introduced to the realistic tasks of a particular job. These serious games will help a person appraise and develop his/her knowledge about the requirements and required capabilities of a job and to make a well-informed decision as to whether to apply for that job or not. The primary motivation is not for an individual to satisfy his or her enjoyment; rather, it is for the participant to appraise and develop him or herself. Hence, self-assessments are conceptualized as a method of providing a realistic job preview to applicants (Caligiuri & Phillips, 2003).

This preview consists of the provision of both favorable and unfavorable job-related information to job candidates (Ployhart & Ryan, 1998). Communicating a complete picture of a job better allows a candidate to self-assess his or her likely suitability for the position and to make a more informed decision about applying for the position or not. The way in which these aspects are communicated can vary greatly.

For instance, realistic job previews, which were commonly used by organizations, consist of verbal (e.g., discussions with current employees or recruiters), audiovisual (e.g., video clips of what the job will entail) and written materials (e.g., pamphlets, orientation books) (Caligiuri & Phillips, 2003). Self-assessments enhance these possibilities as they are built as serious games simulated in virtual worlds to enable candidates within a playful environment to discover the specific characteristics of a job (Laumer et al., 2009a). Within the serious game job seekers discover the different kinds of task similar to the ones an employee has to discover when working in this position. For example, when searching for a job at a publishing house job seekers perform real-life tasks which had been an issue for the company in the past. They have to segment potential customers for a new magazine, have to select offers from suppliers, or have to decide on the different elements of the magazine cover. All these tasks were simulated in the games and after each task candidates receive feedback as to whether their decision is in concurrence with the decision by the organization or not.

Self-assessments are integrated in the corporate career websites and therefore accessible to everyone on the internet. The candidate gets an idea of how the job and job environment looks and therefore he or she is provided with a realistic job preview. Playing these online games and acting as an avatar in these virtual environments, the candidates assess their appropriateness and propensity for such a career at these companies and decide after completing the tasks whether to apply for the job or not. An ideal result of the self-assessment would be that appropriate candidates, who did not consider the companies as an employer beforehand, would now consider applying for a job due to the interesting challenges the companies have been shown to offer. On the other side candidates who intended to apply for a job in the past would now hold back from doing so if they expected a different kind of work. Both scenarios lead to better appropriateness of applicants as well as to a better personnel selection (Laumer et al., 2009a; Laumer et al., 2009b). Thus, self-assessments which focus on the self-selection of candidates in early phases of the recruiting process can be classified as a virtual world (Bray & Konsynski 2007), in which a serious (Steinkuehler, 2004) and simulated game (Schultze & Orlikowski, 2010) is implemented as a tool to select candidates (Buzzetto-More & Alade, 2006).

The basic goal of self-assessment is to generate a limited amount of suitable candidates by means of the skills and abilities of the applicants with the requirements of the job profile (Buzzetto-More & Alade, 2006). The instruments used to diagnose suitability can be classified in terms of their methodology: attribute, simulation, and biographical approach (Laumer et al., 2009b; Konradt & Sarges, 2003; Kupka, 2008). The attribute approach can be used to assess personal characteristics regarded as relatively stable. The simulation approach is intended to capture the behavior of an individual in situations of a kind that might be expected in the work environment, while the individual's biographical approach is simply the collecting of data using, for example, an online application form (Laumer et al., 2009b). Thus, serious games in self-assessments are a particular subset of IT-based selection measures focusing on the self-selection of candidates based on the simulation approach. These serious games implemented in virtual worlds are used to capture the behavior of an individual in situations of a kind that are similar to the real world and might be expected in the work



environment. The virtual environment can be built similarly to the real world of the company headquarters and real employees can be included as simulated avatars. Such game-like animating of real-world business tasks are defined as serious games because the purpose of the game is to provide some useful information or benefits while entertaining the user. In particular they “adapt computer-gaming technology for business use” (Ives & Junglas, 2008).

Beside this recruiting focused classification, other approaches suggest a means of classifying serious games by social presence, visualization, and simulation (Ives & Junglas, 2008). In terms of social presence serious games can be classified as either those games involving the social presence of real employees either as simulated avatars or as real-time actors. Visualization refers to the degree that real-life scenarios are visualized within a game, while simulation describes whether those games are simulated single player or multi-player role playing games. Serious games in recruiting can be classified according these dimensions as games with social presence, for real employees are involved as simulated avatars, with a high degree of visualization when real business scenarios (e.g. headquarter, offices) are used, and as a simulated single player game. Thus, self-assessments can be classified as a virtual world in which a simulated and serious game is implemented in order to provide a realistic job preview, to enable self-selection by candidates and to entertain the users.

### ***Theoretical background: Acceptance of serious games in recruiting***

In order to explain job seekers’ reaction to self-assessment tools with serious games in the recruiting process we base our research on general technology acceptance literature as the guiding theoretical basis for our research model. Technology acceptance research is one of the most important research streams in the information system discipline which is intended to explain an individual’s acceptance and initial usage behavior of an IT innovation. One important model in this research stream is the Technology Acceptance Model (TAM, Davis, 1989; Davis et al., 1989), which hypothesizes that user acceptance in terms of the intention to use an IT innovation can be explained according to two perceptions: perceived ease of use (“the degree to which a person believes that using a system would enhance his/her job performance”, (Davis, 1989, p. 320) and perceived usefulness (“the degree to which a person believes that using a system would be free of effort” (Davis, 1989, p. 320).

Since 1989, technology acceptance research has led to various extensions, refinements, replication and unification of technology acceptance models in order to meet the respective requirements of different technologies in different contexts (Williams et al., 2009). Several meta-analytical or scientometric approaches observe and review this development (Lee et al., 2003; Williams et al., 2009). Some of these models include TAM2 (Venkatesh, 2000), TAM3 (Venkatesh & Bala, 2008), or the Unified Theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al., 2003). Most of these models share the fact that they use “intention to use” or “IT usage” as a dependent variable to explain user acceptance (e.g., Mathieson, 1991; Venkatesh, 1999; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000).

Also, based on TAM, Davis et al., (1992) discuss the extrinsic and intrinsic motivation to use computers in the workplace and add “an important addendum to the

model [TAM]” (van der Heijden, 2004, p. 695) called perceived enjoyment (“the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences” (Davis et al., 1992, p. 1113). The different factors for extrinsic and intrinsic motivation also reflect two different purposes of information technology: utilitarian and hedonic. While utilitarian technologies (e.g. word processing, ERP-systems) are designed to provide useful benefits for their users, hedonic technologies (e.g. computer games) are built to entertain their users or provide some pleasure. The work of van der Heijden (2004) shows that for hedonic systems, intrinsic motivational factors such as perceived enjoyment are more important, while perceived usefulness and perceived ease of use are two important antecedents of the intention to use utilitarian systems.

Thus, with the TAM (Davis, 1989) and its extensions (for a detailed discussion: see Venkatesh et al., 2003) several solid models are available to explain an individual’s intention to use an IT innovation (Lee et al., 2003) which can also be applied to explain jobseekers’ intentions to use an IT-based selection measure, as will be discussed in the following section. We will base our assessment on the original TAM as it provides the starting point for many extensions to fit the respective technology characteristics or the context in which a technology is used (Williams et al., 2009).

## Research model

Based on technology acceptance research and the basic idea of self-assessments, we now develop a research model explaining the intention to use self-assessments in a more general way. Therefore, we will base our research model on the technology acceptance model and discuss some extensions in order to fit the context of job seekers’ acceptance of self-assessments in the job seeking process. The basic underlying perspective for our research model is TAM (Davis, 1989; Davis et al., 1989) as we investigate the acceptance of an IT-based selection method which can be voluntarily used by job seekers and TAM has been proposed to explain voluntary usage decisions (Davis, 1989). TAM itself has been tested various times by IS research and extended or modified in a quite similar way in order to meet the specific characteristics of various research contexts (Lee et al., 2003). As TAM is still one of the rebusts and a commonly used model to explain user acceptance (Williams et al. 2009, we will first of all assume that the technology acceptance constructs, perceived ease of use and perceived usefulness, influence the intention to use a self-assessment system as they still reflect the two most important determinants of technology acceptance (Venkatesh et al. 2003). Moreover, we will discuss in the following subsection some extensions of TAM to develop the hypotheses of our research model. The resulting model is illustrated in Figure 1.

### *Technology acceptance model*

Within the technology acceptance model, perceived ease of use and perceived usefulness are assumed to have an impact on an individual’s intention to use an IT innovation. Also in the context of self-assessments a jobseeker is more willing to use these systems if he or she perceives the system is easy to use and that it is useful for the job-seeking process. Hence, if one believes that using self-assessments is easy to learn, and



easy to operate, the system in question will be perceived as more useful for the task in question and the likelihood of actual system usage increases. Furthermore, if a jobseeker assumes that using self-assessment will simplify his or her decision to apply for a particular job, will improve the quality of her application, or increases the likelihood of getting hired, he or she is more prepared to use self-assessments in the job-seeking process. Consequently, we will use the technology acceptance model to explain jobseekers' intentions to use self-assessment as the base line model of our proposed research model. Having discussed perceived usefulness and perceived ease of use as antecedents for the intention to use self-assessment systems, following the proposition of Davis (1989) and Davis et al. (1989), we posit that

- H1: The higher a jobseeker's perceived usefulness (PU) of self-assessments built as serious games, the higher his or her intention to use self-assessments (INT).
- H2: The higher a jobseeker's perceived ease of use (PEOU) of self-Assessments built as serious games, the higher his or her intention to use self-assessments (INT).
- H3: The higher a jobseeker's perceived ease of use (PEOU) of self-assessments built as serious games, the higher the perceived usefulness (PU) of self-assessments.

### ***Perceived selection fairness***

Beside the general ease of use and usefulness of self-assessments, it is also important to consider the selection aspect of these systems, as self-assessments are designed to enable jobseeker selection in the recruiting process. Consequently, if a jobseeker does not perceive that a self-assessment system is appropriate in terms of the underlying self-selection decision or does not trust the results of such game-like applications, he or she might not be willing to use these systems in the job-seeking process. This phenomenon is known as applicants' reactions to selection procedures, which has been identified and discussed by several research approaches (Hausknecht et al., 2004). The term "applicant reactions" is used to refer to the body of literature that examines "attitudes, affect, or cognitions an individual might have about the hiring process" (Ryan & Ployhart, 2000, p.566). Researchers have recognized the importance of applicant perceptions during the selection process and have investigated fairness perceptions related to applicant selection systems in particular (Bauer et al., 2001; Dineen et al., 2004; Gilliland, 1993; Ryan & Ployhart, 2000). Applicant screening is usually seen as the first stage of a selection process, and applicant screening systems refers to "procedures organizations use to reduce applicant pools prior to contacting individuals for further employment consideration" (Dineen et al., 2004, p.127). As the screening or assessment process determines which applicants will continue in the selection process, applicants are accordingly concerned about the fairness of the procedures used (Dineen et al., 2004). For example, Bauer et al. (2001) suggest a selection procedural justice scale to evaluate the perceived selection fairness of instruments used by companies during the recruitment process. Looking at the applicants' views on the fairness of selection procedures, Ployhart and Ryan (1998) evaluate rule violations and time of measurement as effects on applicants' reaction. Elkins and Philips (2000) discuss the perceived selection fairness of applicants in term of job context, selection decision and the expected decision outcome. In addition, Gilliland (1993) discusses the perceived selection fairness from an organizational perspective.

Initial approaches to perceived selection fairness by applicants related to IT based selection instruments can be found in Wiechmann and Ryan (2003). They argue that applicants are more inclined to use IT based measures if the offering company can ensure the selection fairness of the systems. Therefore, according to Gilliland (1993) and Wiechmann and Ryan (2003) we define perceived selection fairness as an individual's perception of whether a self-assessment is appropriate for the underlying self-selection tasks, as it covers all the important aspects of the job and jobseekers trust the outcome of the game-like application. It refers to consistency, which has been evaluated as the most important determinant in terms of organizational justice theory for reactions of applicants to web-based screening systems (Dineen et al., 2004).

We hypothesize that perceived selection fairness will affect perceived usefulness (Feldman & Klaas, 2002; Dineen et al., 2004). If one believes that the self-assessment does not cover all the important aspects of the respective vacancy and one distrusts the results of the application such that the consistency is perceived negatively, one will not perceive the system as useful as, for example, using the system will not improve the quality of applications. Hence, perceived selection fairness is a predictor of perceived usefulness. Moreover, perceived selection fairness directly influences the intention to use, for if one believes that the system does not provide selection fairness and is inconsistent one will not use the particular self-assessment, and vice versa (Hausknecht et al., 2004; Ryan & Ployhart, 2000). Hence, our hypotheses assuming a partial mediation effect for perceived selection fairness are:

- H4: The higher a jobseeker's perceived selection fairness (PSF) of self-assessments built as serious games, the higher the perceived usefulness (PU) of self-assessments.
- H5: The higher a jobseeker's perceived selection fairness (PSF) of self-assessments built as serious games, the higher his or her intention to use self-assessments (INT).

### ***Perceived privacy security***

Another important factor of web-based system usage is discussed by e-commerce research which might also be important in the context of serious games in the job-seeking process. By entering data on websites the perceived privacy security that the entered data might be misused by companies or others makes perceived privacy security another important antecedent of intention to use self-assessments (Lwin et al., 2007). While conducting self-assessments, companies are technically able to collect data about applicants which can be both capability and personality based. While most of the time firms do not do so, applicants are concerned that their data is circulated within the company across different departments (Laumer et al., 2009a) and might be misused by the organization. Feldman and Klaas (2002) point out that the perceived effectiveness of online recruiting methods is driven by concerns about the security of personal information. Therefore, we assume that when using a self-assessment system the perceived privacy security of personal information has a direct effect on the intention to use it. Hence, if one believes that the data might be misused or the concrete usage of the entered data remains unclear one will not be prepared to use self-assessments in the recruiting process and vice versa. Thus, our hypothesis regarding

perceived privacy security according to Feldman and Klaas (2002) and Lwin et al. (2007) is:

H6: The higher a jobseeker's perceived privacy security (PPS) of self-assessments built as serious games, the higher his or her intention to use self-assessments (INT).

### ***Perceived enjoyment***

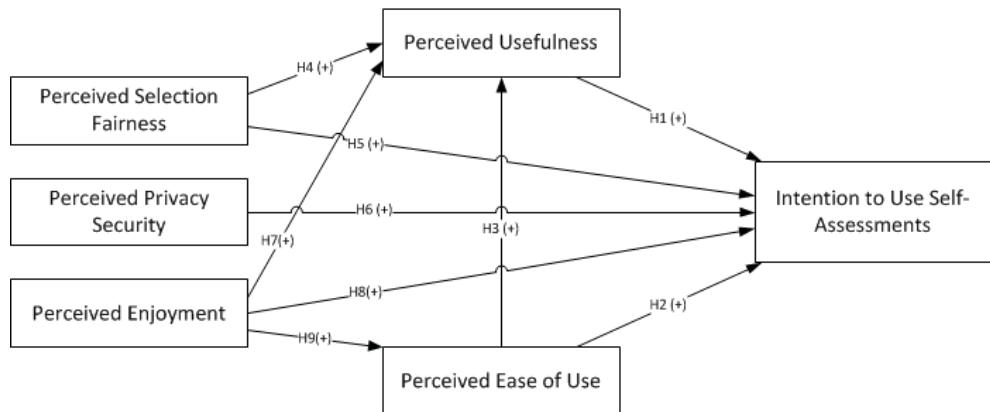
Beside the extrinsic variables PEOU, PU, selection fairness, and privacy security, technology acceptance – especially in the case of hedonic information systems (van der Heijden, 2004) – are also driven by intrinsic motivational factors (Davis et al., 1992). A hedonic information system is designed to enable the enjoyment by users rather than the usefulness related to a specific task. An intrinsically motivated user is driven by benefits derived from the interaction with the system per se (Brief & Aldag, 1977). In the context of self-assessments, users might also be driven by the perceived enjoyment of the system. As self-assessments are built as serious games implemented in virtual worlds, the interaction with the system can be fun and consequently the system might be used by individuals as it is entertaining. Moreover, if system usage is enjoyable the perception that the system is easy to use and its usefulness increases (van der Heijden, 2004). By enjoying the game-like environment of self-assessments, the applicant might perceive that self-assessments are easy to learn and easy to use as through the conveyed mood of enjoyment he or she perceives related aspects more positively (Sun & Zhang, 2006; van der Heijden, 2004). Also the perceived usefulness of self-assessments will be perceived as higher, if he or she enjoys using game-like applications such as self-assessments (Sun & Zhang, 2006). Hence, we assume a mediation effect of perceived enjoyment on intention to use (Sun & Zhang, 2006) such that perceived enjoyment has on the one side a direct influence on the intention to use self-assessments, and on the other side influence perceived ease of use and usefulness as well. Our resulting hypotheses are:

H7: The higher a jobseeker's perceived enjoyment (PEM) of self-assessments built as serious games, the higher the perceived usefulness (PU) of self-assessments.

H8: The higher a jobseeker's perceived enjoyment (PEM) of self-assessments built as serious games, the higher his or her intention to use self-assessments (INT).

H9: The higher a jobseeker's perceived enjoyment (PEM) of self-assessments built as serious games, the higher the perceived ease of use (PEOU) of self-assessments.

Our research model to explain the intention to use self-assessments of jobseekers consisting of the theoretical conjectures developed above, is illustrated in Figure 1. It contains factors reflecting both the hedonic (game-like application), and the utilitarian (realistic job preview) aspect of self-assessments.

**Figure 1: Research model**

## Research methodology

To gain empirical evidence for the research model we conducted an online study evaluating the use of recruiting methods in Germany among jobseekers in 2009. The general participants of the study were invited using an e-mail message based on our database of individuals who agreed to participate in scientific studies undertaken by our research institute. The database was built up during prior studies on recruiting issues dating from 2003 where participants agreed to be contacted again for future studies. The invitation email contains a link to a website where we introduce the general idea of the survey and the concept of self-assessments to the participants, provide a link to a particular self-assessment, and ask participants to answer the questions in our survey. Among all respondents, a total of 1,882 jobseekers' questionnaires can be used for evaluating the proposed research model, as they answered all the questions of the model meaning there are no missing values in the dataset. Moreover, they identified themselves as apprentices, students, or graduates. This is important as we provided a brief description of the general idea of self-assessments for the participants of the study and provided a link to an example of self-assessment offered by a large publishing house which is intended for trainee jobs and which will be described in the following subsection.

### *Description of the self-assessment with integrated serious game*

We introduced a self-assessment built as a serious game to the participants of our research. Within this self-assessment example candidates have to perform different tasks which are related to the advertised trainee position at the publishing house. Moreover, those individuals who completed the game are provided with feedback as to whether their decision or performance is appropriate for the open vacancy. The general procedure of the self-assessment is as follows. When starting the serious game implemented at the organizations career website job seekers are welcomed by the hiring manager who explains the general idea and procedure of the game. Afterwards, employees of different departments working in a similar position as the job seeker is interested in introduce different tasks of the game and explain their jobs in detail. In the controlling

and development department the jobseeker has to cluster customers for a potential new magazine the organization wants to publish and calculate the cost-benefit ratio of this potential magazine. In the content generation department the task is to design a cover for the new magazine and to decide on the respective headlines and title story. In the sales department the jobseeker has to design a particular sales campaign. In the marketing department the jobseeker has to work on a particular marketing campaign and decide which type of advertisement the organization should use to introduce the new magazine to the market. Moreover, the jobseeker is confronted with real business events such as the telephone ringing or receiving an email and he or she has to provide offers to interested potential advertisers. After completing all the tasks, the hiring manager provides a general feedback to the jobseeker and either welcomes an application for the job or not. If the feedback is positive a link to the online application form is provided.

### ***Data set***

As the self-assessment we referred to (see section above) is built for typical entry-level jobs for apprentices, students, and graduates we only include participants of these groups in our data analysis. Furthermore, we ask participants to play this example of a self-assessment system if they are unfamiliar with this type of technology. The data of these 1,882 jobseekers is used to evaluate the theoretical model. Within the sample of 1,882 jobseekers 44.6 per cent are male and 56.4 per cent are female, the average age is 24. 4.4 per cent are pupils, 6.8 per cent apprentices, 37.8 per cent are students and 51.0 per cent graduates. 18.7 per cent have already used a self-assessment before participating in our survey and 81.2 per cent were introduced to the concept of self-assessments for the first time within our research study. Based on this dataset we evaluated our research model as presented in the following section.

### **Research results**

In order to validate the proposed causal model of jobseekers' intention to use self-assessment in the recruitment process, we conducted an empirical study with 1,882 participants. Within this section, we describe the empirical results of our study. For the data analysis, our research model has been operationalized and transferred into a structural equation model which is analyzed using the Partial Least Squares (PLS) approach (Bagozzi & Yi, 1988; Chin, 1998a). Thus, each construct is represented by a set of reflective indicators, which are summarized in Table 1, and a 5-point Likert scale was used ranging from strongly disagree to strongly agree. The original survey was not written in English so the items from the questionnaire described in Table 1 were translated. To analyze the data with the PLS-approach, SmartPLS 2.0 M3 (Ringle et al., 2005) and SPSS 17.0 were used as software tools. Thus, we will evaluate in the following the appropriateness of the measurement model used and the explanation power of the structural model developed in section 3.

### ***Measurement model***

All items were measured using a reflective measurement model. Therefore, the quality of the measurement model can be evaluated through content validity, indicator reliability, construct reliability and discriminant validity (Bagozzi & Yi, 1988; Chin, 1998a).

### *Content validity*

A condition for content validity evaluation is a very precise definition of the content of the construct beforehand (Nunnally & Bernstein, 1994). We discussed our constructs and indicators during our case study research with HR executives and with students from our university as they are part of the target group of the research. The indicators used are illustrated at Table 1 and are based on previous empirical research studies. Intention, perceived usefulness, and perceived ease of use were measured according to Davis (1989) and fitted to the recruiting context, perceived enjoyment based on van der Heijden (2004), perceived privacy security is self-developed based on Lwin et al. (2007) and perceived selection fairness is also self-developed based on Dineen et al. (2004).

**Table 1: Operationalization of constructs**

	Item	Measurement Item
INT	INT-1	I intend to use self-assessment in the future.
	INT-1	I plan to use self-assessment in the future.
	INT-2	I will use self-assessment in the future.
PDS	PDS-1	I think that my results of a self-assessment will be treated confidentially.
	PDS-2	I think that my results of a self-assessment will not be shared with other people.
	PDS-3	I think that no other people have access to my results of a self-assessment.
PEM	PEM-1	I think using self-assessment is without stress.
	PEM-2	I think using self-assessment is appealing.
	PEM-3	I think using self-assessment is enjoyable.
PEOU	PEOU-1	Self-Assessment will increase my efficiency.
	PEOU-2	Self-Assessment will enable me to create my application faster.
	PEOU-3	Self-Assessments are easy to use.
	PEOU-4	Self-Assessments are easy to operate.
	PEOU-5	Using self-assessments is easy to learn.
PSF	PSF-1	Self-Assessments give good feedback of my appropriateness.
	PSF-2	I trust the results of a self-assessment.
	PSF-3	The results of a self-assessment are usable to draw a conclusion of my appropriateness.
	PSF-4	Self-Assessments discover all important parts to provide good feedback.
PU	PU-1	Self-Assessment will simplify my decision to apply for a particular job.
	PU-2	Self-Assessments will improve my applications.
	PU-3	Self-Assessments will improve the effectiveness of my applications.
	PU-4	Self-Assessments will improve the quality of my applications.
	PU-5	Self-Assessments will increase my chance to get hired.
	PU-6	Self-Assessment will increase my chances to find a new job.
	PU-7	Self-Assessment will enable me to find a new job faster.

Note: Items were measured using a Likert Scale from strongly agree (5) to strongly disagree (1).

### *Indicator reliability*

Table 2 summarizes the indicator reliability of our measurement model. All loadings are above the recommended level of 0.7 and significant at  $p < 0.001$ . Significance was tested using the bootstrap routine with 500 samples (Chin, 1998a; Chin, 1998c).



### *Construct reliability*

Indicators which are related to the same construct are supposed to have close correlation to each other. Using composite reliability (CR) and average variance extracted (AVE) construct reliability can be evaluated as shown in Table 2. The estimated values are above the recommended thresholds of 0.7 for CR and 0.5 for AVE (Bagozzi & Yi, 1988).

### *Discriminant validity*

Discriminant validity can be extracted by looking at the cross-loadings in order to evaluate that the loadings of the reflective indicators are higher for the corresponding construct than for any other. Furthermore the square root of AVE for each construct is higher than the correlations between the single constructs (see Table 2, Fornell & Larcker, 1981; Hulland, 1999).

Overall, the measurement model evaluation shows that our data meet all the usual quality requirements.

**Table 2: Measurement model validation**

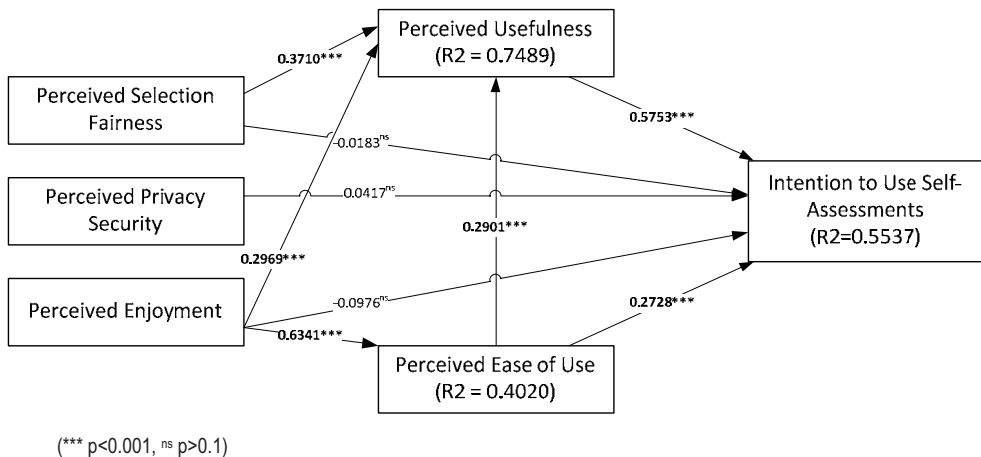
CONSTRUCT		LOADING	MEAN	STR.DEV	AVE	CR	INT	PDS	PEM	PEOU	PSF	PU
INT	INT-1	0.941	3.1712	0.9249	0.902	0.965	0.9497					
	INT-2	0.9593										
	INT-3	0.9488										
PPS	PDS-1	0.9305	3.0491	0.828	0.8598	0.9485	0.4989	0.9272				
	PDS-2	0.9173										
	PDS-3	0.9339										
PEM	PEM-1	0.8914	3.8676	1.2181	0.8637	0.95	0.5217	0.574	0.9294			
	PEM-2	0.9389										
	PEM-3	0.9566										
PEOU	PEOU-1	0.7888	3.1108	0.7124	0.6871	0.9165	0.6616	0.6146	0.6341	0.8289		
	PEOU-2	0.8097										
	PEOU-3	0.8409										
	PEOU-4	0.8451										
	PEOU-5	0.8582										
PSF	PSF-1	0.8929	3.001	0.7545	0.7418	0.9198	0.6162	0.6876	0.7466	0.768	0.8613	
	PSF-2	0.8775										
	PSF-3	0.8762										
	PSF-4	0.795										
PU	PU-1	0.8185	3.3535	0.9419	0.7573	0.9561	0.7206	0.6224	0.7578	0.7633	0.8155	0.8702
	PU-2	0.9005										
	PU-3	0.9239										
	PU-4	0.9081										
	PU-5	0.8723										
	PU-6	0.84										
	PU-7	0.8219										

Note: The square root of AVE is listed on the diagonal; Items are measured using Likert Scale from strongly agree (5) to strongly disagree (1)

### Structural model

After measurement model evaluation, the structural model is analyzed. The results of our structural model validation are summarized in Figure 2. The explanatory power of our research model can be categorized as substantive for PU ( $R^2=0.7489$ ) and average for PEOU ( $R^2=0.5537$ ) and INT ( $R^2=0.4020$ ) (Chin, 1998a; Chin, 1998b). The analysis supports the TAM hypotheses, the impact of PSF on PU, PEM on PU and on PEOU. However, the relationships between PSF, PDS, PEM and INT cannot be supported. This indicates a full mediation effect of PU and PEOU, which will be analyzed in more detail in the following sub-section. Moreover, the analysis reveals that the effect size ( $f^2$ ) of the two most important predictors of the intention to use is 0.182 (perceived usefulness) and 0.110 (perceived ease of use).

**Figure 2: Structural model validation**



### Mediation test

To test whether perceived usefulness mediates the relationship between perceived selection fairness and intention to use and the relationship between perceived enjoyment and intention to use as well as whether perceived ease of use mediates the relationship between perceived enjoyment and the intention to use, for each mediation effect we applied the three-step approach proposed by Baron and Kenny (1986), the Sobel test (Sobel, 1982), and the Goodman test (Goodman, 1960).

Baron and Kenny (1986) suggest that a mediating effect is present if three conditions are fulfilled. First, the independent variable must predict the mediator. Second, the independent variable must be also a predictor of the dependent variable. Third, the predictive power must decrease when integrating the mediator into the relationship between independent and dependent variable. Transferred to our model, perceived selection fairness has a positive significant impact on the mediator perceived usefulness and on the dependent variable intention to use. By testing the mediation effect in step three the significant impact of perceived selection fairness on intention to use diminish, whereas the influence of perceived usefulness on intention to use is significant. Thus, perceived usefulness mediates the influence of perceived selection fair-

ness on intention to use. Moreover, a significant effect of the independent on the dependent as well as the mediator variable can also be observed for the mediation effect of perceived enjoyment by perceived usefulness and perceived ease of use, whereas the effect of the independent on the dependent variable becomes insignificant while testing the mediation effect in step three. Thus, perceived usefulness and perceived ease of use mediates the influence of perceived enjoyment on the intention to use self-assessments. In addition, we used the Sobel test (Sobel, 1982) and Goodman test (Goodman, 1960), as it represents a rigorous, conservative, and confirmatory method to test mediation (Baron & Kenny, 1986). The results of both tests for the three assumed mediation effects indicate that an indirect effect exists within our model.

**Table 3: Mediation effect**

		PSF à PU à INT	PE à PU à INT	PE à PEOU à INT
Baron-Kenny-Test	IV → DP	$\beta=0.608$ ; $p<0.001$	$\beta=0.512$ ; $p<0.001$	$\beta=0.512$ ; $p<0.001$
	IV → MED	$\beta=0.819$ ; $p<0.001$	$\beta=0.780$ ; $p<0.001$	$\beta=0.632$ ; $p<0.001$
	IV → DP	$\beta=0.042$ ; $p<0.100$	$\beta=-0.068$ ; $p<0.100$	$\beta=0.170$ ; $p<0.050$
	IV → MED	$\beta=0.815$ ; $p<0.001$	$\beta=0.762$ ; $p<0.001$	$\beta=0.621$ ; $p<0.001$
	MED → DP	$\beta=0.676$ ; $p<0.001$	$\beta=0.754$ ; $p<0.001$	$\beta=0.551$ ; $p<0.001$
Sobel-Test		Z= 18.368; $p<0.001$	Z= 24.495; $p<0.001$	Z= 17.257; $p<0.001$
Goodman-Test		Z= 18.370; $p<0.001$	Z= 24.498; $p<0.001$	Z= 17.264; $p<0.001$

### **Limitations**

The methodology used has limitations like every empirical field study. For instance, it might only represent a particular group of jobseekers with a specific educational background within a specific economy, country or cultural region. There might be differences for the intention to use with different settings. The results might differ for different age groups or tenure. As we collected quantitative data from participants at the same time using the same survey instrument our results may be affected by common method variance (Podsakoff et al., 2003). Moreover, we had to use behavioral intention as our dependent variable instead of actual usage behavior. We acknowledge that behavioral intention is not the same as behavior and is sometimes weakly correlated; however, there was no way for us to centrally monitor or measure research participants' usage behavior as they might use different simulated virtual worlds at different times at different websites in the future. Furthermore, usage intention is a widely used proxy of usage behavior (Bhattacharjee & Premkumar, 2004), and hence, the use of behavioral intention as the dependent variable is widely used. Furthermore, to examine whether the constructs and relationships proposed hold over time, longitudinal research has to be undertaken. Thus, our results are only a snapshot at one particular point of time and location. There might be more factors beside the ones identified by our research influencing the intention to use self-assessments that were not checked or accounted for in our research model (e.g. service quality, technical quality, interaction quality, playfulness, etc.). Moreover, despite being asked before completing the survey not all participants of our study might have played a serious game in the re-

cruiting context. However, we were not able to confirm these facts and as such this limits our study as well.

## Discussion and implications

Introducing serious games as a self-assessment tool in the recruiting process shows that these systems can be used for a realistic job preview, which help jobseekers to decide if they will apply for a job or not. Self-assessments use components like social presence (jobseekers act as avatars), visualization (self-assessments are built as virtual worlds), and simulation (self-assessment simulate real business scenarios) (Ives & Junglas, 2008). As organizations can only realize several benefits while implementing self-assessments in their recruiting processes, when jobseekers participate in these games we focus on an explanation of jobseekers intention to use self-assessments in their job-seeking approach. Our empirical results suggest that jobseekers' intentions to use these systems is directly influenced by perceived usefulness and the perceived ease of use of the system and also indirectly by perceived selection fairness and perceived enjoyment. The influence of perceived privacy security is insignificant. In the following the results of our research will be discussed in more detail and implications for organizations implementing serious games in the recruiting process are highlighted.

The technology acceptance constructs perceived ease of use and perceived usefulness have been evaluated as significant predictors for the intention to use self-assessment. In terms of perceived usefulness jobseekers expect that using self-assessment will support them in making improved applications, simplifying their decision as to whether to apply for a job or not and improve the chances of getting hired. The mean for perceived usefulness is 3.35 such that it is above the anchor point of the 5-point Likart scale, so that job seekers perceive self-assessments as more useful than useless. Moreover, the influence on intention to use is significant to the extenet that perceived usefulness is an important predictor for the intention to use self-assessments. The usefulness of the self-assessment introduced in our research can be confirmed by illustrating different aspects and tasks of the job (e.g. from different departments, requiring different skills, etc.). Armed with this kind of information jobseekers are able to conclude for themselves whether the advertised job is appropriate and if an application might be successful. Thus, while providing a variety of information organizations can enable perceived usefulness by jobseekers which in turn will influence their willingness to use serious games in recruiting.

Another significant determinant of the intention to use is perceived ease of use which is evaluated with a mean of 3.1. The system used in our research is easy to learn and to execute as applicants only need to use an internet browser. Using self-assessment will improve the effectiveness and quality of applications and will increase the chances of finding a job. The procedure used in self-assessments is easy to follow while the feedback given to individuals is easy to receive. Furthermore, the support given by the organization offering self-assessments on their career website enables jobseekers to use self-assessments easily and to assess their person-organization fit simply by using the internet and playing an online game. Consequently, self-assessments should be implemented as a system that is easy to use (e.g. system requirements should be reduced to a minimum as in our research where the navigation

within the system is reduced to a minimum of options). The system should be built in a way that the focus is instead on the content rather than on the technical requirements for keeping the system running.

Perceived selection fairness – derived from the organizational justice literature and defined as the consistency aspect of web-based selection measures – is an important antecedent of perceived usefulness of self-assessments. It is evaluated by jobseekers rather than counterbalanced as the mean is 3.00. There are jobseekers who perceive selection fairness of self-assessments as positive and others who see this aspect as negative. Nonetheless, it has no direct effect on intention to use but is fully mediated by perceived usefulness. The results show that those jobseekers who agree that self-assessments give good feedback about the person-organization fit, that they trust the results of the self-assessment and that self-assessments reveal all-important aspects that provide valuable feedback, are more inclined to use self-assessments in the future as they find self-assessments based on this evaluation useful for the job-seeking process. As the self-assessment used in our research explains, the results of the games and the advice given by the system to the jobseeker and the empirical analysis reveals that those jobseekers who believe that the results of the self-assessment are useful in drawing a conclusion regarding the individual person-organization fit are intended to use self-assessments. Moreover, the feedback given by the system is highly correlated to the respective task an individual has to perform. Hence, the feedback given to jobseekers is transparent such that job seekers perceive a high level of selection fairness as based on the assessment of their results they can assess why the system is giving a positive or negative feedback. Consequently, organizations that want to implement self-assessments should ensure that jobseekers can make assessments based on the information provided and the feedback given by the system in order to ensure perceived selection fairness which is in turn is an important antecedent of perceived usefulness and consequently for the intention to use.

In terms applicant reactions to IT-based selection procedures the results of our study indicate that the reaction to an IT-based selection measure used in early phases of the selection process are determined by technology acceptance variables as well as perceived selection fairness. Thus, also for IT-based measures used for early selection tasks in the recruiting process, applicants are more inclined to use them if the company offering them can ensure the selection fairness of the systems. This is a direct response to Dineen et al. (2004) who point out that it is necessary to investigate applicant reactions during the initial screening stage. We can show that also in the initial screening stage the perceived fairness of selection instruments is important, however, we also provide evidence that for the IT-based self-selection instrument technology acceptance factors are more important. Applicant reactions to IT-based selection measures in initial screening stages such as the investigated game-like applications are determined more strongly by such technology characteristics as perceived usefulness and perceived ease of use than the hedonic purpose of the system (perceived enjoyment) and fairness in terms of consistency based on organizational justice theory.

Moreover, perceived privacy security as a variable known from e-commerce and web-based system research is an insignificant factor for the intention to use self-assessments with a mean of 3.04. Hence, perceived privacy security is evaluated as rather counterbalanced. Although, Feldman and Klaas (2002) point out that those concerns about the security of personal information are related to the intention to use the internet for job-hunting, we were not able to show a significant effect in our study. The factor is evaluated as insignificant as the organization explicitly communicates that self-assessments are not used for data collection and privacy concerns might be sufficiently addressed. Hence, establishing a self-assessment procedure that is implemented separately from regular recruiting tools and pointing out several times that self-assessments are in fact tools only used by jobseekers for their self-selection and not by the company for candidate selection, reduce jobseekers concerns about privacy security and hence increase their willingness to use self-assessments in the recruiting process.

In addition to the two technology acceptance variables and the rather extrinsic variables discussed above, perceived enjoyment was hypothesized following Sun and Zhang (2006) as an antecedent of perceived ease of use, perceived usefulness, and intention reflecting the hedonic purpose of self-assessments. With 3.86 we can observe the highest mean for this construct such that job seekers evaluate serious games in self-assessment as rather enjoyable. Nonetheless, the effect on intention cannot be supported in our research model, a fact which is inconsistent with the results of technology acceptance research (van der Heijden, 2004; Venkatesh, 1999; Venkatesh & Davis, 1996). However, we identified an indirect effect, mediated by perceived usefulness and perceived ease of use. Perceived enjoyment as an intrinsic motivational factor reflecting the hedonic purpose of self-assessments is not as important as the extrinsic ones evaluated in the research model. This might be explained by the fact that jobseekers' intention to use e-assessment is driven more by utilitarian purposes such as finding an adequate profession or improving applications and less by a hedonic aim such as individual enjoyment (van der Heijden, 2004). For jobseekers it is more important that companies ensure selection fairness, ease of use, and usefulness of the system instead of offering really enjoyable systems. However, as the results show, enjoyment is an important antecedent for perceived ease of use and usefulness. If jobseekers perceive the system as enjoyable they also perceive the system as easy to use and useful. Hence, perceived enjoyment in terms of implementing self-assessments as an online game is an important predictor for ensuring perceived ease of use and usefulness, but not to increase the intention to use such games in the recruiting process. Moreover the results of the TAM constructs within our model to explain jobseekers intention to use self-assessments show that factors reflecting the utilitarian aspect of the system are more important, as perceived usefulness is the strongest predictor of the intention to use these systems. Consequently, organizations should focus more on the content of self-assessments than on the game environment the self-assessment is implemented in, in order to increase job seekers' acceptance and intention to use.

Another important characteristic of self-assessments is their human design component that enables organizations to offer a self-selection tool that jobseekers



perceive as fair, useful, and easy to use. In general, applicants perceive a human agent as procedurally fairer than automated agents (Dineen et al., 2004). Therefore, in the context of self-assessments consistency as an aspect of perceived selection fairness and perceived enjoyment are important determinants for reactions of applicants to web-based screening systems. Based on our results we can provide evidence that this human design component influences the perceived usefulness and ease of use of the system, however, not the intention to use directly. This is an important implication for organizations implementing self-assessments. Regarding the human-design component built as a serious game, it is on the one hand important that applicants perceive the systems as useful and easy to use; however, on the other hand, ensuring the usefulness of the systems is more important as perceived usefulness is the strongest predictor of the intention to use. Thus, the realistic and consistent job preview as well as the utilitarian purpose of the system is more important than the hedonic aspect of self-assessments. Thus, organizations should focus more on this aspect while designing and implementing game-like applications in the recruiting process.

Future research might build on the ideas and results presented in this research paper. For instance future research might discuss the importance of different components of organizational justice theory, and how the theory is different for selection procedures used at different stages of the recruiting process, as most research papers investigate one instrument used at one particular point of time. Alternatively, future research might evaluate how the perceptions of different selection procedures influence each other. For example, self-assessment can lead to a more comfortable environment when job interviews are conducted as jobseekers already know the people involved and the environment (Laumer et al. 2009b). However, we did not focus on this aspect in detail and therefore we would encourage future research to investigate how self-assessments reduce applicants' uncertainties towards aspects such as the perceived selection fairness of subsequent selection procedures in the recruiting process. Moreover, we focused solely on online games in relation to a realistic job preview, while, as the literature indicates, online games are also used for web-based application screening procedures in the later stages of the recruiting process. Future research might apply organizational justice theory and the technology acceptance model to these e-assessment systems in order to consider whether the results are different for self-assessment on the one side and for regular e-assessment in later stages of the recruiting process on the other. One possible effect might be that selection fairness and perceived privacy security can be evaluated as important direct antecedents of the intention to use if an online game is used at a later stage of the recruiting process for selection tasks. Hence, future research might analyze whether the specific point of time an online game is used in the recruiting process (pre or post application submission) moderates the influence of perceived selection fairness and privacy security on the intention to use serious games in the recruiting process. Nonetheless, we are able to show that jobseekers' intentions to use serious games in self-assessments are mainly predicted by perceived ease of use and usefulness and indirectly by perceived selection fairness and privacy security.

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