ENHANCING HEALTH AND PRODUCTIVITY AT WORK: TOWARDS AN EVALUATION MODEL FOR JOB CRAFTING INFORMATION SYSTEMS

Research-in-progress

Flavius Kehr, University of St. Gallen, St. Gallen, Switzerland, flavius.kehr@unisg.ch

Georg F. Bauer, University of Zurich, Zurich, Switzerland, gfbauer@ifspm.uzh.ch

Gregor J. Jenny, University of Zurich, Zurich Switzerland, gjenny@ifspm.uzh.ch

Stefan T. Güntert, ETH Zurich, Zurich, Switzerland, sguentert@ethz.ch

Abstract

Today's work environments are characterized by steadily increasing demands, such as high workloads and job-related pressure, resulting in negative health and productivity outcomes for employees, organizations and society. In this regard, the concept of job crafting suggests that individuals can take actions to reduce imbalances of job demands and available job resources by proactively shaping the characteristics of their jobs. However, job crafting interventions require trained work and health specialists, resulting in restricted dissemination in practice. Information systems supporting employees' job crafting activities, denoted as job crafting information systems (JCISs), have the potential to be both cost-efficient and effective in preventing negative health and productivity outcomes, such as stress and burnout. Building on foundations derived from IS research, psychology and research on organizational and public health, the current research-in-progress develops an integrated evaluation model of JCISs and describes an approach to experimentally test the assumptions of the model. Both individual antecedents (e.g. self-efficacy) as well as organizational factors (e.g. team climate) are identified as main predictors of successful JCIS-based interventions. Furthermore, the role of intrinsic motivation and continued system use are discussed in this context.

Keywords: Job Crafting, Health Information Systems, IS evaluation, Organizational Health.

1 Introduction

According to a recent survey conducted in the European Union (EU, 2010), work intensity (e.g. working to tight deadlines) has increased by nearly 15% over the past 20 years, with almost three-fourths of today's employees feeling required to meet very exact quality standards. As a consequence, more than 80% of German employees have experienced at least one discomfort like headaches, back pain or sleeping disorders due to increasingly overwhelming job demands (Lohmann-Haislah, 2012). Similarly, a study investigating burnout among Israeli physicians between 1994 and 2001 revealed significant increases in burnout rates, with almost 60% of participating family physicians reporting very severe burnout symptoms by the end of the study period (Kushnir et al., 2004). Moreover, a study conducted among Israeli border police officers found that 52% of participants reported high or very high stress levels caused by stressors like low salary, lack of resources and overload (Malach-Pines and Keinan, 2006). Against the background of these dramatically changing work environments, the WHO forecasts stress-related symptoms to account for up to five of the top ten medical problems in near future (Cartwright and Cooper, in press). Increasing workloads and job-related pressure, however, do not only unfold negative consequences on individual health outcomes like stress and burnout (Boedeker and Klindworth, 2007; Geurts, in press), but also cause productivity losses of organizations and strain the public health care sector (Kuoppala et al., 2008).

In this regard, the concept of *job crafting* has drawn attention by researchers and practitioners (Tims and Bakker, 2010; Tims et al., 2012; Wrzesniewski and Dutton, 2001). Adopting a cost and benefit view on job-related stress, the concept of job crafting suggests that employees can take individual actions to reduce imbalances in straining job demands (or costs) and compensating job resources (or benefits) by proactively shaping the characteristics of their jobs. That is, employees learn to align their job situation to better fit to their own abilities, needs and preferences in order to "achieve greater compatibility between one's own attributes and the organizational environment" (Tims et al., 2013b, p. 3). For example, employees might reorganize their daily routines in order to prevent interruptions during phases of high workload, or learn to proactively request support upon excessive demands. Organizational health intervention research revealed positive effects of job crafting behavior with regard to health and productivity outcomes, such as work engagement (Bakker et al., 2012; Nielsen and Abildgaard, 2012) or team performance (Tims et al., 2013a). Despite empirical evidence on the effectiveness of such interventions, however, job crafting programs require highly trained work and health specialists, resulting in a rather limited dissemination in practice (Bauer and Jenny, 2012a).

Information System (IS) scholars, in contrast, have extensively discussed IT support as a valuable mean to reduce costs and increase scalability of health interventions (Agarwal et al., 2010; Kowatsch and Kehr, 2014; Martin et al., 2010; Spring et al., 2013; Vishwanath et al., 2012). Moreover, numerous studies showed that IT-supported health interventions have the potential to effectively promote healthy behavior in several areas, such as nutrition, smoking, drinking, and also workplace stress (see Webb et al., 2010, for a review). Building on these foundations, we argue that ISs tailored to appease the sources of stress by strengthening individuals' capabilities to shape their work environments – denoted as job crafting information systems (JCISs) – have the potential to (1) offer a highly scalable and cost-efficient solution to an increasingly important issue and (2) enhance individual health and productivity outcomes of employees and consequently foster organizational performance. Despite their potential capacity, however, prior research in the field of IT-supported health interventions has predominantly focused on how to reduce high stress levels (Hänggi, 2006; Webb et al., 2010), neglecting the possibility to guide employees to influence the sources of stress by (1) reflecting on their own job situation, (2) identifying situations of imbalanced job demands and job resources, and (3) proactively restructuring these stress-causing conditions. As a consequence and to the knowledge of the authors, concrete instantiations of JCISs are missing. Yet, first attempts have been made to clarify the theoretical underpinnings, requirements and overarching design principles of such systems (Kehr et al., 2013). Building on these foundations, this paper strives to extend the

available knowledge on the design and evaluation of JCISs by proposing an integrated research model that covers the main drivers of successful JCIS implementation. For this purpose, prior work from several fields, including IS research, psychology, and research on organizational and public health, is integrated.

In the following, we develop our research model and briefly introduce the underlying theoretical assumptions of a JCIS (for a detailed discussion see Kehr et al., 2013). Then, we propose a methodological approach capable to test the assumptions of the model within two evaluation cycles, and provide an outlook on the potential scientific impact and future work towards the design and evaluation of JCISs.

2 Research Model and Hypotheses

Depicted in figure 1, the proposed theoretical model relies on two basic assumptions related to the nature of job crafting behavior: First, job crafting is widely regarded as an ongoing process rather than a sudden alteration (Tims et al., 2013a), resulting in a need to assess and adjust one's own job situation on a regular base. Referring to an IS as a mean to achieve this goal, continued and repeated IS use hence constitutes a crucial pre-condition of effective JCISs.

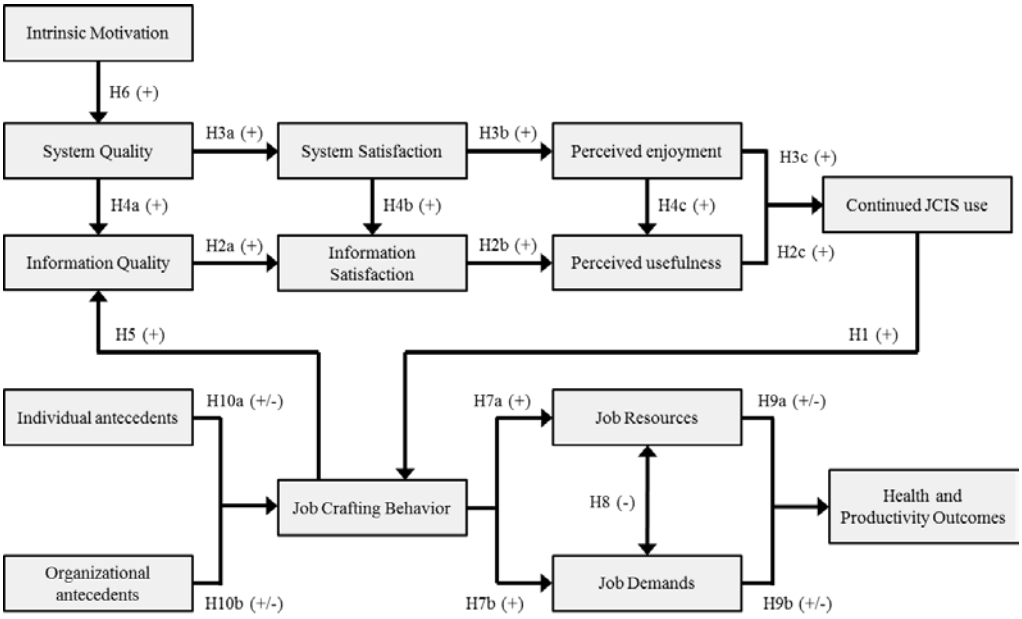

Figure 1. Integrated evaluation model for Job Crafting Information Systems (JCISs).

Second, prior research revealed that positive health and productivity outcomes mainly rely on a *balanced* ratio of one's own job demands (e.g. high time pressure) and job resources (e.g. social support) (Tims et al., 2013a), while employees undertake job crafting activities in order to overcome existing *imbalances* (ibid.). As such, the assessment of the balance or imbalance of job demands and job resources constitutes an important target with regard to the assessment of JCISs. The balance or imbalance of job demands and job resources, however, does not solely rely on individual characteristics and efforts, but also on the organizational structures and opportunities provided by the work environment (Tims et al., 2013b). Therefore, both individual and organizational antecedents of effective or ineffective balancing of job demands and job resources should be included to a model of JCIS evaluation in order to cover differential aspects that foster or mitigate the effectiveness of a JCIS. Resorting to these basic assumptions, the proposed model combines theories and models on (1)

continued use and its motivational antecedents, and (2) job demands and job resources as well as its antecedents on an individual and organizational level.

2.1 Continued Use and motivational antecedents

As argued above, job crafting behavior is regarded as an ongoing process rather than a sudden reversal, raising the need to repeatedly assess one's own job situation and adjust own activities to fit to the work environment. This view is in line with research from health psychology, defining most changes in individual behavior as long-term processes with intervention adherence constituting a major predictor of successful change (Martin et al., 2010, p. 176). Against this background, continued IS use becomes a crucial predictor of success in an IT-supported health intervention program, given that behavior change is tailored by IS and its usage. With regard to job crafting information systems, therefore, it becomes feasible to assume that employees who use a JCIS more often will benefit with regard to the duration and frequency of job crafting behavior:

H1: Continued JCIS use is positively associated with job crafting behaviour.

Building on these foundations, an integrated evaluation model for JCISs has to consider prior work on critical factors that guide continued technology use, such as the IS continuance model (Bhattacherjee, 2001), the extended unified theory of acceptance and use of technology (Venkatesh et al., 2012), the DeLone and McLean IS success model (DeLone and McLean, 1992; DeLone and McLean, 2003), or the integrated model of User Satisfaction and Technology Acceptance (IM-USTA) (Wixom and Todd, 2005). Linking research streams from IS success literature and technology acceptance, the latter offers a comprehensive view on IS adoption and usage by systematically distinguishing "attitudes *about* a system […] from those beliefs about *using* a system" (Xu et al., 2013). More precisely, IM-USTA describes (continued) IS use as an outcome of two parallel processes: First, information quality beliefs, informed by system attributes such as the completeness and accuracy of information provided by an IS, foster feelings of satisfaction associated with the provided information, which in turn increase the likelihood users build positive attitudes with regard to the use of a system, such as perceived usefulness. Following this argumentation, we expect JCIS usage to be an outcome of information-related beliefs, feelings and attitudes:

H2a: Information Quality of a JCIS is positively associated with JCIS information satisfaction.

H2b: JCIS information satisfaction is positively associated with perceived usefulness of JCIS use.

H2c: Perceived Usefulness of JCIS use is positively associated with continued JCIS use.

Second, IM-USTA predicts that system quality beliefs, relying on attributes such as flexibility and reliability of a system, lead to feelings of satisfaction with regard to the functionality of a system. In the original model, this system satisfaction belief is described as a predictor of positive attitudes connected to the manageability of system use, such as ease of use. As recent research (Gerow et al., 2013; Xu et al., 2013), in contrast, repeatedly found perceived enjoyment to constitute an important antecedent of ease of use in both utilitarian and hedonic systems, it becomes feasible to assume feelings of satisfaction to increase the fun and joy employees experience during system use. Apart from this modification, we follow the argumentation of Wixom and Todd (2005), stating that system quality beliefs impact information quality beliefs, system satisfaction attitudes shape information satisfaction attitudes, and perceived usefulness is influenced by other usage-related attitudes, such as perceived enjoyment (Xu et al., 2013).

H3a: System Quality of a JCIS is positively associated with JCIS system satisfaction.

H3b: JCIS system satisfaction is positively associated with perceived enjoyment of JCIS use.

H3c: Perceived enjoyment of JCIS use is positively associated with continued JCIS use.

H4a: System quality of a JCIS is positively associated with information quality of a JCIS.

H4b: JCIS system satisfaction is positively associated with JCIS information satisfaction.

H4c: Perceived enjoyment of JCIS use is positively associated with perceived usefulness of JCIS use.

Besides and in line with research on IS success in organizations (DeLone and McLean, 2003; Petter and McLean, 2009), we expect attitudes on information quality, information satisfaction and perceived usefulness to increase when employees experience the task-supporting efficiency of the JCIS in reality, i.e. when they use it and experience its positive influence on their job crafting behavior.

H5: Job crafting behavior is positively associated with information quality of a JCIS.

Furthermore, recent studies increasingly argue individual intrinsic motivation to constitute a major driver of both IS use and health intervention adherence. Analysing the adoption of IS in organizations, Mitchell et al. (2012a), for example, found intrinsic motivation to be positively correlated with IS use. Similarly, studies by Wunderlich et al. (2013), and Gerow et al. (2013) revealed evidence on intrinsic motivation as a major driver to technology perception and (continued) use, whereas extrinsic motivation was found to only moderately impact usage predictors, such as ease of use or perceived usefulness. Webber et al. (2010), finally, reported a higher health intervention adherence and better success rates for participants who succeeded to develop a higher level of intrinsic motivation throughout an IS-supported weight-loss program.

Against this background, we expect user perceptions to be shaped by intrinsic motivation. More precisely, we hypothesize intrinsic motivation to reflect in system quality attributes, such as flexibility, and to drive perceptions of enjoyment while using the IS due to the conceptual proximity of intrinsic motivation and feelings of joy (Deci and Ryan, 2000).

H6: Intrinsic motivation is positively associated with system quality beliefs.

2.2 Job Demands and Job Resources

Organizational health intervention research considers individual health and productivity outcomes, such as stress and burnout (Pejtersen et al., 2010), work engagement (Schaufeli et al., 2006) and self-rated productivity (Kessler et al., 2003), as an outcome of imbalanced job demands and job resources (Bakker and Demerouti, 2007; Tims et al., 2013a). More precisely, high job demands such as high time pressure or interruptions at work lead to negative health outcomes (e.g. stress and burnout), while job resources such as social support and recognition by colleagues and supervisors lead to positive mental health and productivity results (e.g. decrease in stress and burnout, increased work engagement). Referring to this cost and benefit view on job demands and resources, the job-demand-resources model (JDR) (Bakker and Demerouti, 2007) predicts that high job resources may mitigate the negative health impact of high job demands, resulting in an overall positive balance of impairments and motivational factors at work. Job resources and job demands cover, for example, clear and compatible responsibilities, suitable workloads, control over pace and patterns of work, conflict handling, social support or adequate change management (MacKay et al., 2004; Mackay and Palferman, 2013). Job crafting behavior, in turn, subsumes desirable activities with regard to the avoidance of job demands and the enhancement of job resources (Tims and Bakker, 2010; Tims et al., 2012; Wrzesniewski and Dutton, 2001), rendering job crafting behavior an antecedent of a balanced, or imbalanced, job demands and resources ratio. In line with this argumentation, we predict:

H7a: Job crafting behavior is positively associated with job resources.

H7b: Job crafting behavior is negatively associated with job demands.

H8: Job demands and job resources are correlated negatively.

H9a: Job resources are associated with individual health and productivity outcomes.

H9b: Job demands are associated with individual health and productivity outcomes.

Referring to a further characteristic of job crafting behavior, Tims et al. (2012, p. 175) conclude that job crafting "[…] may occur at all organizational levels". That is, a successful implementation of job crafting behavior does not only depend on individual characteristics, such as the employee's personality (Bakker et al., 2012), but also on specific organizational factors such as leadership behavior, team norms, social learning or emotional contagion as potentially enhancing or diminishing variables. Following this argumentation, we therefore adopt a *systemic* view on organizations by regarding them as complex social systems where structures channel process and are simultaneously shaped by these processes in a circular manner (Jenny and Bauer, 2013). Organizational policies, for example, may stimulate certain work practices, while simultaneously being influenced by them (Jenny and Bauer, 2013; Rüegg-Stürm, 2003). In order to grasp this complexity and the consequences for health promotion in organizations, we adopt the organizational health development (OHD) model (Bauer and Jenny, 2012b; Jenny and Bauer, 2013) to JCIS evaluation, as it integrates knowledge from psychology (Seligman, 2008), medical sociology (Antonovsky, 1996) and management sciences (Rüegg-Stürm, 2003). As such, the OHD model illustrates (1) the impact of job demands and job resources on health and productivity outcomes, and (2) how job demands and resources result from continuous interactions between employees (with their individual characteristics of competency, motivation, and identity) and the organization (with its characteristics of structure, strategy and culture). With regard to an integrated evaluation model for JCISs, we therefore expect organizational antecedents as well as individual predictors to shape employees' opportunities to execute job crafting behavior. In this regard, prior work has revealed positive and negative relationships of job crafting behavior with numerous factors: While low self-efficacy (Bakker, 2011) or a team climate that prevents innovative thinking and action, for example, were found to prevent successful job crafting behavior (Anderson and West, 1998), scholars described positive relationships of job crafting behaviour and a proactive personality (Bakker et al., 2012) or the organization's current activities and future commitment to change with regard to health-promotion and work design improvements, denoted as the health-oriented readiness of change (Mueller, 2012). Therefore, we hypothesize differential positive or negative effects of both individual and organizational antecedents on job crafting behavior:

H10a: Individual antecedents are associated with job crafting behavior.

H10b: Organizational antecedents are associated with job crafting behavior.

3 Methodological Approach

In the next section, we explain the methodological approach proposed for JCIS evaluation. Following principles derived from design science research (Hevner et al., 2004; Peffers et al., 2007), we will run through several evaluation cycles, evolving from a set of preliminary laboratory experiments to a field test integrating all important aspects of the JCIS evaluation model. For a description of the design model and preliminary design principles for JCISs, interested readers are invited to consult Kehr et al. (2013).

3.1.1 Evaluation phase 1: Preliminary experiments

Starting with a theoretically-informed set of design principles for JCIS design, we aim to conduct a series of cross-sectional laboratory experiments, systematically testing different implementations and combinations of JCISs that follow these design principles. The evaluation phase will end with one short-term longitudinal RCT, primarily assessing continued use of the resulting JCIS and its potential

to promote job crafting behavior. Long-term outcomes, such as changes in individual performance, in contrast, will be addressed in the second evaluation phase.

In the first evaluation cycles (cross-sectional experiments), research will primarily address the JCIS' potential to (1) foster intrinsic motivation, system quality/satisfaction and perceived enjoyment, (2) information quality/satisfaction, perceived usefulness and job crafting behavior and (3) continued JCIS use (H1-H4, H6). Standardized and validated self-assessment tools will be adopted wherever possible. In detail, we aim to apply the following scales: IT-directed attitudes and beliefs (i.e. information/system quality and satisfaction) by scales adopted from Wixom and Todd (2005). Perceived usefulness and perceived enjoyment will be measured by scales adopted from Venkatesh et al. (2012) and van der Heijden (2004). (Intention to) continuously use the JCIS will be assessed by scales adopted from Kang (2013). Intrinsic motivation and job crafting are elevated using standardized scales adopted from Peng et al. (2012) and Petrou et al. (2012), respectively. Furthermore, relevant demographical data (e.g. company size, economic sector, team size, age, gender, education) as well as IS-related covariates will be assessed (e.g. Venkatesh et al., 2012), and qualitative data will be collected to gain deeper insights on possible improvements.

The longitudinal short-term trial, in contrast, will primarily target JCIS' potential to promote job crafting behavior as well as its interaction with continued IS use (H5). Objective data sources, such as user log files, will inform usage variables (such as continued use) and complement repeated questionnaires using similar scales as described above. Furthermore, in-depth interviews with selected participants will be conducted to gain insights on possible improvements of the used system with regard to the second evaluation phase.

Experimental approaches with control groups will be applied whenever possible. Data analyses will be conducted by means of variance and covariance-based procedures, such as ANOVA, regression analysis or structure equation modeling. Furthermore, latent growth modeling will be applied to retain valuable results from the longitudinal field study. Qualitative data will be analyzed using structured data coding techniques (Creswell, 2009; Saldaña, 2012).

3.1.2 Evaluation Phase 2: JCIS Field Test and integrated model evaluation

Using a longitudinal randomized control trial approach in the broad field, the second evaluation phase aims to address (1) the impact of continued use on (change) in job crafting behavior, as well as its impact on the (im)balance of job demands and job resources (2) long-term individual health and productivity outcomes, such as stress, burnout and emotional exhaustion, work commitment, or self-rated productivity, and (3) individual and organizational variables accounting for differential effects of JCIS use and stimulated (change in) job crafting behavior (H1-H10). Participants will be randomly assigned to either an intervention or a control group. The intervention group will receive the JCIS along with information on why and how to use it. The control group will receive regular information mails on how to perform job crafting behavior as a basic intervention. In order to observe both short-term and mid-term usage patterns and induced changes, the trial will span ten months, starting with a web-based survey at baseline, after five months and a final follow-up after ten months. In the intervention group, additional data will be continuously collected via JCIS usage – for example, data on frequency of use as well as self-report data on job and resources as well as job crafting behavior.

With regard to individual antecedents, we aim to include relevant covariates derived from organizational health intervention research and IS research, such as *self-efficacy* (Bakker, 2011), *personality traits* (Bakker et al., 2012), *previous IT experience* (Venkatesh et al., 2003), or *habit* (Venkatesh et al., 2012) to the study. On the organizational level, we will initially consider two institutional characteristics that showed to constitute key potential barriers or facilitators of individual job crafting activities (Tims et al., 2013a): The dynamics and norms of the team the individual is working in, such as *team climate for innovation* (Anderson and West, 1998), and the organization's

current activities and future commitment to change with regard to health-promotion and work design improvements, denoted as the *health-oriented readiness of change* (Mueller, 2012). Concerning the individual health and productivity outcomes, we aim to focus on stress and burnout (Pejtersen et al., 2010), work engagement (Schaufeli et al., 2006) and self-rated productivity (Kessler et al., 2003).

Scales and questionnaires used in evaluation phase 1 will be applied wherever possible. In order to assess the other relevant predictors and outcomes mentioned in the model, the following scales will be additionally used: Job demands and resources will be measured by scales adopted from (MacKay et al., 2004). Health and productivity outcomes will be assessed by stress and burnout scales (Pejtersen et al., 2010), work engagement scales (Schaufeli et al., 2006), and self-rated productivity scales (Kessler et al., 2003). Individual variables comprise self-efficacy scales (Rigotti et al., 2008), a personality trait inventory (Schallberger and Venetz, 1999), previous IT experience (Venkatesh et al., 2003), and habit (Venkatesh et al., 2012). Organizational variables are elevated by scales of team innovation climate (Anderson and West, 1998) and the organizational readiness of change (Mueller, 2012). Furthermore, many of the potentially relevant individual and organizational characteristics are supposed to be measureable by self-developed items and scales (e.g. company size, economic sector, team size, age, gender, education, employment grade, tenure, professional position, profession etc.).

General linear modeling with repeated measurement (group x time) will be conducted to compare changes over time between the intervention and control group in regard to job crafting, job demands and resources, as well as health and productivity outcomes. In a final step, contextual variables on the individual as well as organizational level will be analyzed as moderating variables within the intervention group, potentially influencing size of change in the dependent variables. For this, hierarchical linear modeling will be applied (Raudenbush and Bryk, 2002).

4 Scientific Impact and Future Work

By designing and evaluating a particular JCIS, we expect to uniquely contribute to IS research in at least three ways: First, our research model suggests intrinsic motivation to affect user perceptions and usage behavior, in particular with regard to system quality beliefs. Although a growing body of literature considers individual motivation as a driver to IS use (e.g. Mitchell et al., 2012; Wunderlich et al., 2013), knowledge on the exact interplay of intrinsic motivation and IS-related attitudes and behaviors is scarce in IS research (Zhang, 2007). Our approach may therefore help to broaden the knowledge on potential antecedents of continued IS use. Second, we explicitly hypothesize on interactions between IS use, user behaviors, and IS-related attitudes. More precisely, we predict continued use of a JCIS to impact job crafting behavior, which in turn shape information quality beliefs. Over time, we expect these dynamic relationships to build a reinforcing circuit: Feeling that the IS supports a certain target behavior (i.e. fostering job crafting behavior), users improve their attitudes toward the IS, which in turn reinforces continued usage. This view is in line with the actor network theory (Walsham, 1997), stating that both individuals as well as objects (e.g. ISs) can be regarded as equitable parts of a social network in which all parts may exert influence on each other. As such, our work may help to deepen insights on how actor networks evolve over time. Third, we have argued stress-related symptoms to become an increasingly severe threat in the organizational context, and have discussed JCISs as a mean to influence and decrease the sources of stress by supporting employees to balance job-related demands and resources. Designing and evaluating a JCIS, our work may thus help to gain insights on how to effectively promote health and productivity in organizations via information systems.

As a next step, we will develop a set of design principles for JCISs by designing and implementing JCIS prototypes, resorting to the justificatory knowledge described in the JCIS design model (Kehr et al., 2013). Then, we strive to proceed with a first evaluation cycle as described above, with first empirical results accruing in 2015.

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