

Towards a Design Theory for IS Services Enabling Incentive-based Health Promotion in Organizations

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Abstract

Health information system services (HISS) have the potential to improve well-being of employees which, in turn, leads to a reduction of days of sickness absence and an increase in individual and organizational performance. However, low participation rates indicate a need to better understand incentives that motivate employees not only to join but also to stick to HISS-supported health promotion programs. Two concepts from behavioral choice theory, i.e. reinforcing value and delay discounting, may help improve our understanding in this regard. Thus, we present a very first version of a design theory for HISS that enable organizations to implement results-based incentives for health promotion programs, denoted as RIHISS. Selected aspects of this design theory are then evaluated by an online study with 249 employees. Results show that RIHISS are accepted for smoking cessation programs. An overview of future work concludes this work-in-progress.

1 Introduction

Health information system services (HISS) have not only the potential to improve outcomes and reduce costs of health interventions [1, 23, 30] but also to support health promotion and disease prevention strategies of (business) organizations. For example, mobile applications such as FitBit (<http://www.fitbit.com>) or nutrition-management tools [e.g. 5] are capable to promote a healthy lifestyle which, in turn, leads to a reduction of sickness absences [18] and an increase of organizational performance [31]. Unfortunately, incentives necessary to motivate employees to participate in so-called workplace wellness programs are not yet understood. This results in low participation rates despite organizational penetration rates of up to 90% [24]. In line with this, adherence to health-related goals is of major concern to both healthcare providers and academia [8, 23, 24, 26].

Two concepts from behavioral choice theory, namely relative reinforcing value and delay discounting, may help to improve our understanding of the forces that drive health-related behavior [9]. First, relative reinforcing value can be described as the concurrent choice of a behavior rather harmful to

health (e.g. binge eating) versus a healthy but probably more laborious behavior (e.g. hiking); delay discounting by contrast represents the choice of a behavior that leads to an immediate but rather minor reward (e.g. an instant state of satisfaction) versus behavior which results in a major reward in the long-term (e.g. an increase in life expectancy). However, just about 3% of employer-administered health promotion programs have offered results-based incentives, that is rewards that may help one to reject choices leading to short term gains in favor of long-term gratification [24]. Likewise, the diffusion of HISS that enable those programs in organizations is limited. GymPact (<http://www.gympact.com>), for example, allows users to win or lose money if pre-defined goals for physical activity are (not) achieved. But this application is designed for the individual consumer and thus, lacks characteristics required for their successful implementation in organizations [21]. Although the value of these kinds of HISS were already discussed in the IS community [17], it is still unclear how they must be designed for organizations and “how the type (e.g. cash or noncash), direction (reward versus penalty), and strength of incentives are related to employee engagement and outcome” [25, p. 6f].

Due to the lack of research at the intersection of IS, behavioral choice theory, health promotion and organizational research, we investigate HISS that enable organizations to implement results-based incentives for health promotion, denoted as RIHISS, by questioning (1) whether and why employees would adopt RIHISS in general (2) how to design theoretically sound RIHISS, and (3) whether continued use of RIHISS have positive effects on health outcomes of employees and on the performance of organizations.

In order to answer these research questions, we aim to develop a design theory for RIHISS. In the next section, we therefore describe an initial version of a design theory for RIHISS by addressing the following components that are relevant to IS design theories in general [12, p. 322]: purpose and scope, justificatory knowledge, constructs, principles of implementation and testable propositions. Afterwards, first empirical results are presented that justify the purpose and scope of the proposed design theory and that provide relevant input for further refinements. A summary and outlook on future work concludes this work-in-progress.

2 Design Theory for RIHISS

The purpose and scope of the proposed design theory for RIHISS aims to develop HISS that improve the health condition of employees and organizational performance by applying principles from behavioral choice theory, namely relative reinforcing value and delay discounting. In line with prior work [37], a design theory prescribes both “the properties an artifact should have if it is to achieve certain goals and the method(s) of artifact construction” (p. 41, in reference to [29]), Figure 1 depicts not only the relevant constructs and justificatory knowledge of the proposed design theory, but it also outlines the principles of implementation and testable propositions. A detailed description of the rationale of these components and relationships is provided in the following paragraph.

It is apparent that the exclusive use of behavioral choice theory [15, 28, 32] and, in particular, the concepts of relative reinforcing value and delay discounting [9] as justificatory knowledge is not sufficient to design efficient and effective RIHISS. The latter concepts must be seen as rather complementary to justificatory knowledge from the IS, health and organizational disciplines that all together must inform design principles for RIHISS. IS-related theories such as the IS success model [6, 7], the model of IS continuance [4] or positive design theory [39], explain why IS services are used, a precondition for effect measurement and utility evaluation of HISS. By contrast, health-related theories such as the revised health promotion model [26] or the information-motivation-strategy model

[8], explain why health promoting behavior happens on the individual level and organizational level. Finally, organizational research on health interventions such as the organizational health development model [3, 14] are required to account for the organizational characteristics during the design of RIHISS such that successful implementation and managerial support is achieved [21].

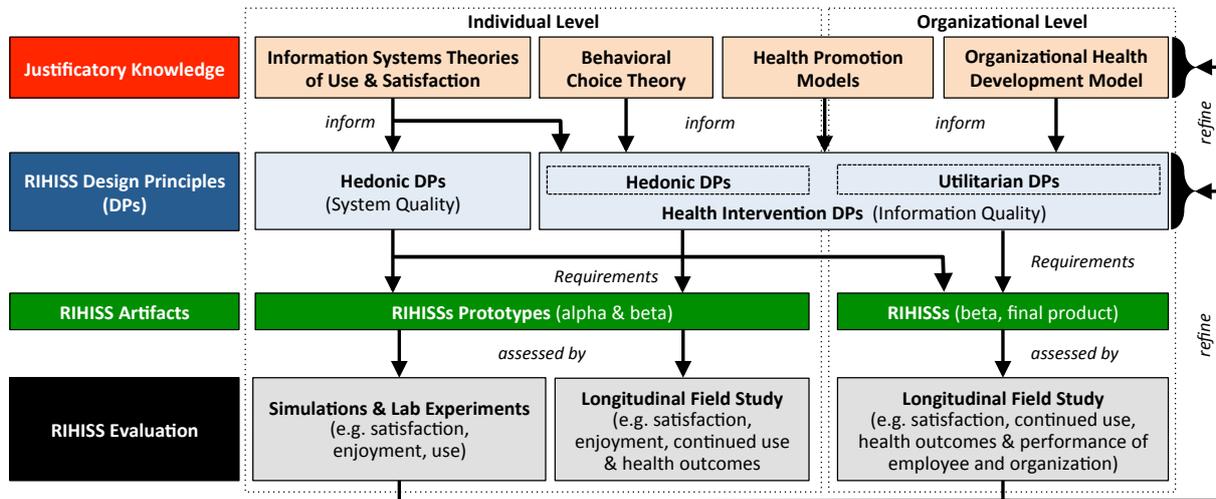


Figure 1: Design theory for HISS that enable organizations to implement results-based incentives for health promotion (RIHISS)

The justificatory knowledge described above informs design principles for RIHISS. Design principles are technological rules which can take the form of “If you want to achieve Y in situation Z, then something like action X will help.” [33, p. 227] In this work, Y is healthy behavior, Z is an everyday situation in the private or organizational context and X is a particular health promoting action that is supported by RIHISS. In line with prior work on hedonic IS [19, 34] and positive design theory [39], it is argued that design principles for RIHISS must address not only utilitarian aspects (e.g. ability to activate health promoting behavior of employees in organizations) but particularly also hedonic aspects (e.g. user satisfaction with the service or enjoyment during service usage) due to the fact that it was shown that hedonic characteristics significantly influence utilitarian characteristics and (intended) system use [10, 16, 19, 34]. We hereby adopt the notion of Wixom and Todd [38] and argue that system quality of RIHISS is defined by hedonic design principles from IS theories of use and satisfaction, whereas information quality is defined by hedonic and utilitarian design principles from behavioral choice theory, health promotion models and the organizational health development model. Because of their goal-oriented health promotion focus, the latter design principles are also summarized as health intervention design principles. An initial set of design principles based on IS research [e.g. 2, 17, 27, 36] was first identified and then matched to the two concepts from behavioral choice theory, i.e. relative reinforcing value and delay discounting [9] and health promotion models [8, 23, 26]. The following (abbreviated) design principles (DP) resulted from the matching task and, consistent with prior work [11], refer to the fundamental rules or clear statements that support X, i.e. health promotion actions (key literature by which the DPs are informed is provided in brackets):

DP1. Individual program goals should be made explicit and communicated [17].

DP2. Information about the progress of the health promotion plan should be provided [8, 17].

DP3. Reminders should be provided in everyday situations to increase awareness and adherence [8, 20, 22, 26].

DP4. Information and training on effective strategies on delaying gratification should be provided [8, 9, 17, 22].

DP5. Long-term incentives should be chosen adequately and communicated in a motivating way, i.e. either framed as gains for healthy behavior and/or framed as loss for behavior harmful to health [16, 19, 34, 38, 39].

In order to develop useful RIHISS the aforementioned set of design principles for RIHISS¹ must be selected (and revised) according to the individual needs of the planned health promotion program of a particular organization. The selected and revised design principles then represent the requirements for the technical implementation of RIHISS prototypes and market-ready products. These artifacts will be then evaluated in several simulations, lab experiments and longitudinal field studies. Key constructs to be evaluated must be hedonic and utilitarian characteristics of the RIHISS such that the design principles of the proposed design theory can be tested and such that both components of RIHISS are addressed, i.e. system quality and information quality.

Testable propositions of the proposed design theory for RIHISS can be divided into (1) predictor propositions to answer the question why a RIHISS is used and (2) effect propositions to answer the question which effects a RIHISS has on health behavior. Both propositions are therefore linked to continued use of RIHISS as the central construct of evaluation. First, predictor propositions delineate relevant relationships of predicting constructs and continuance usage, a precondition to understand and measure any effects. From prior work in the IS field it should be evaluated whether characteristics of RIHISS such as user satisfaction, hedonic motivation, facilitating conditions (in particular in the organizational context), social support, performance expectancy and effort expectancy are perceived high and positively related to continued RIHISS use [e.g. 4, 35]. Second, effect propositions start with the degree of usage over a certain period of time and assess its relationship with health-related outcome parameters such as perceived well-being, sickness absence, individual job performance and organizational performance [e.g. 3, 14, 18, 31]. In addition to the quantitative results that are gathered by testing the predictor constructs and effect constructs of RIHISS continued use, qualitative data must be collected in parallel to each of the quantitative constructs to investigate their rationale. As a result and part of each build-and-evaluate loop [13], empirical data is used to revise and assess not only the hedonic and utilitarian design principles but also their underlying kernel theories and justificatory knowledge.

The overall process explained above is also a first description of the principles of implementations of RIHISS according to Gregor and Jones [12]. As described in the last section, future work will revise and detail this initial design theory according to several build-and-evaluate loops. Accordingly, we next present first results of an assessment of one particular RIHISS.

3 Preliminary Evaluation of the Design Theory

In order to test selected aspects of the design theory for RIHISS and to reveal relevant insights for further design principles and refinements, an online survey was conducted with an insurance company in 2013. Due to the fact that tobacco use is one of the primary causes of cardiovascular disease and pulmonary conditions [24], an impairment also relevant to the company, the RIHISS was tailored to a quit smoking program by a textual description. That is, employees would bet their own money and would (lose or) win their stakes plus an additional bonus if they were (not) successful in quit smoking

¹ The initial set of design principles does not consider justificatory knowledge from the organizational health development model but this will be part of future work as outlined in the last section.

after a pre-defined period of time. The described HIS would guide and support them in pursuing their individual health-related goals.

Overall, 249 employees have participated in the survey. Results indicate that employees who smoke (26.5%) would participate in the RIHISS-based program. That is, a one-sample t-test of willingness to participate shows a significant and positive mean of 4.79 (SD: 1.69, $p < .001$, test value: 4) anchored on a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7).

Furthermore, smokers willing to quit (24.9% of all or 93.9% of smoking participants) indicated that both monetary incentives (Mean: 4.66, SD: 1.87, $p < .001$) and perceived risks to lose money (Mean: 4.16, SD: 1.78, $p > .05$) would increase their commitment and perseverance not to smoke. However, regression analysis showed that only monetary incentives ($\beta = .67$, $p < .001$), and not perceived risks ($\beta = .07$, $p < .001$), were positively related with the willingness to participate in the RIHISS-based program (DP5, $R^2: .509$, $F: 30.6$, $p < .001$). On average, participants would expect a bonus in the order of 38% of their monetary stakes while, at the same time, they would only set in approximately 5% of their monthly income.

With regard to the initial set of design principles, smokers perceived information on program progress, i.e. time remaining to achieve the health-related goal (DP2, Mean: 4.85, SD: 1.87, $p < .001$), behavioral action plans, i.e. individual tips to pursue health-related goals (DP4, Mean: 4.68, SD: 1.87, $p < .001$) and reminders with clearly defined and communicated goals and program conditions (DP1, DP3, DP5, Mean: 4.60, SD: 1.82, $p < .001$) significantly positive in terms of useful IT services that support them to quit smoking. And finally, with 71.2%, the smartphone was chosen as the preferred form factor to interact with the services compared to tablet PCs (24.2%) or desktop PCs (19.7%).

4 Summary and Future Work

The current work-in-progress underlines the importance to motivate employees to participate in health promotion programs of organizations due to their desired effects such as decrease in sickness absence and organizational performance. Motivated by two concepts from behavioral choice theory (namely relative reinforcing value and delay discounting) [9], the use of RIHISS that enable organizations to employ health promotion programs with results-based incentives seems to be promising in this regard [24]. Due to the lack of research, an initial version of a design theory for RIHISS was then presented and preliminary described with regard to purpose and scope, justificatory knowledge, constructs, principles of implementation and testable propositions. An initial set of five design principles was also provided. The concept of RIHISS and their underlying design principles were then evaluated in a first exploratory online study with 249 employees in the context of a smoking cessation program. Results indicate that RIHISS are accepted and that monetary incentives should be communicated rather than perceived risks to lose money in order to motivate employees to participate in RIHISS-based programs. These results set the scene for future work.

Accordingly, we will improve and detail the design theory for RIHISS during the next design cycles with at least two organizations. In particular, the organizational health development model will be incorporated as justificatory knowledge and the initial set of design principles will be revised, extended and described in much more detail. Furthermore, three remaining components of IS design theories will be described which are (1) principle of form an function, (2) artifact mutability and (3) expository instantiation [12]. In addition, first prototypes will be implemented and assessed with the help of simulations (to assess the ideal time range of health promotion programs, and amount of monetary incentives) and lab experiments with individual employees. The resulting insights of the

evaluations will lead to further improvements and refinements of the design principles and their underlying justificatory knowledge that, in turn, will allow us to test the revised prototypes in longitudinal field studies in the organizational context.

5 References

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