
Integrated model for multifaceted behavior change

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Abstract

In this paper we describe an integrated model for supporting multifaceted behavior change. We propose to combine information used to inform a current behavior with information to motivate a relevant new behavior. Towards this goal, we propose a model composed of the transtheoretical model, the theory of planned behavior and the stage-based model of personal informatics to design multifaceted systems.

Keywords

Personal informatics, behavior change model

Introduction

Motivating behavior change in HCI has been looked at in terms of explicitly aiming to correct behaviors through persuasive systems [2], in supporting reflections on past behavior with a goal of reaching personal conclusions to change future actions [5], and in encouraging exploration of personal information [4].

We propose another dimension to this research: combining information about *what people are already doing* with information about *what else they could be doing*. More specifically, we aim to augment personal informatics tools to present feedback about behaviors that a user currently performs with information about

other positive behaviors that the user doesn't yet perform. We hope to harness the fact that individuals pay attention to feedback presented to them while they are reflecting on personal data to raise their awareness about another behavior. We call this multifaceted behavior change.

For example, if we want to encourage young people to eat healthier food, and we know that these people highly value physical exercise, then we could augment their training data with healthy food information. This multifaceted aspect to daily activities is highlighted in Li et al [4]. Here we propose an integrated model for designing these systems. In this example, both behaviors are in the area of improving health. We expect that our model would hold for behaviors with a weaker relationship such as leveraging health data for displaying information about sustainability.

In order to design such a system, we need to understand how designing for multifaceted behavior change can be incorporated in the user experience of personal informatics tools. Our integrated model combines the transtheoretical model, which describes a scale of motivation towards a behavior, the theory of planned behavior, which describes the process of behavior change within one stage of the transtheoretical model, and the stage-based model of personal informatics, which describes the adoption process of personal informatics. Through the workshop we hope to get feedback about this model.

Models

The Transtheoretical Model

The transtheoretical model (TTM), also called the model of stages of change, is widely used in the health

domain and has been used in HCI to guide design decisions [3]. This model describes behavior change as a series of demarked stages [6]. These stages are:

Precontemplation: the individual is unaware that their behavior is bad or is unwilling to change.

Contemplation: the individual starts to become aware that something needs to change.

Preparation: the individual creates a plan to change.

Action: the individual performs a first step towards changing behavior.

Maintenance: the individual tried to maintain the positive behavior over a period of time.

At each stage, individuals respond more or less to behavioral processes (encouraging action) and cognitive process (presenting information), which are important to consider in the design of a system [3].

An important point for our integrated model is that the individuals are at different stages in the transtheoretical model for different behaviors. For example, an individual can be in the maintenance stage of exercising regularly and in the contemplation phase for eating more vegetables.

The Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is also a model of behavior change, but, in contrast to the TTM, it is a continuous model rather than a stage-based model. In the TPB, three things determine behavior outcomes: attitude, social norm and perceived control [1]. Attitudes, which are central to the model, are based on beliefs about the behavior associated with costs/benefits. The more beliefs, the stronger they are, and the more positive they are, the more likely the behavior will occur.

Our integrated model accounts for attitude, which we reinforce through presentation of relevant information, and perceived control, which we reinforce through the presentation of actionable information. While the TPB model also includes social norm as an important influencer, we leave it out of our model since we are not directly designing for social persuasion.

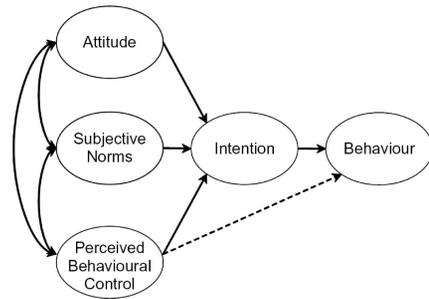


Figure 1. Diagram representing the Theory of Planned Behavior (Azjen)

The Stage-based Model of Personal Informatics

In Li et al [4], the authors describe a model to understand how people use personal informatics tools. This model contains five stages:

Preparation: users decide what tools to use and what information to collect.

Collection: input of personal data into the system.

Integration: preparing data for reflection.

Reflection: exploration of information collected.

Action: action taken as a consequence of the insights gained from reflection.

For the purposes of our integrated model, we modify the stage-based model of personal informatics by 1) disregarding the preparation step and 2) by adding a cycle by which, once a behavior has been performed

(action stage), the model cycles through again: the data about that action is collected, integrated and reflected on.

Proposed Integrated Model

The TPB provides a valuable model to understand how attitudes influence behavior. The TTM provides a stage-based model with design principles that have already been explored in HCI [3]. The stage-based model of personal informatics provides us with a model to understand how the psychology models could fit in to system design. Figure 2 illustrates our integrated model.

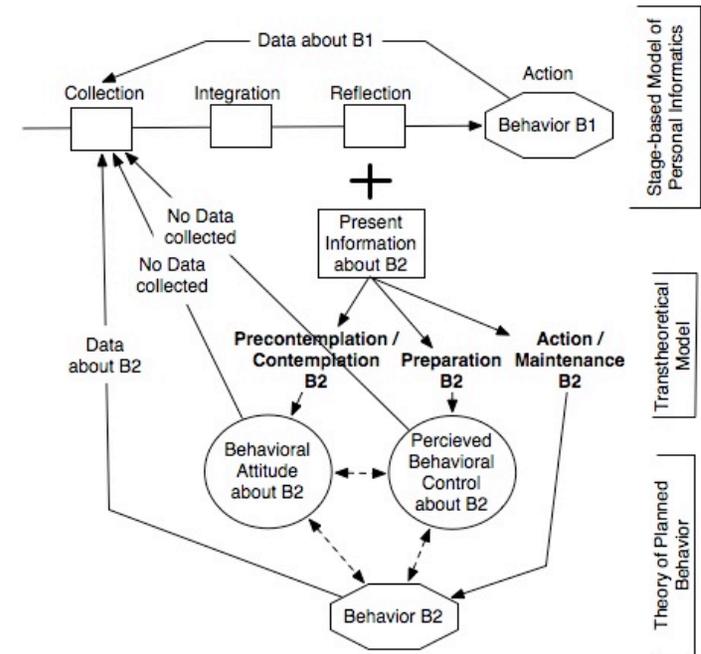


Figure 2. The integrated model of multifaceted behavior change

Since our goal is to combine information about *what people are already doing* with information about *what else they could be doing*, our integrated model concerns personal informatics tools that people already use. Thus we disregard the preparation stage in the stage-based model of personal informatics. The user must be in the action/maintenance stage for the behavior B1 they currently track since their usage of the personal informatics tool cycles through the modified stage-based model of personal informatics. Our goal is to piggyback on information presented about B1 to present information about B2, a behavior for which the user is in the precontemplation / contemplation phase.

Introducing new attitudes

When the user cycles through to the reflection stage, they are in the process of looking at their information and reflecting on it [4]. We suppose that at this point, they would be receptive to information about B2. For example, when a user is reflecting on their physical exercise during the last week they could be presented with healthy eating information. This presentation of information will make them in the precontemplation / contemplation phase for B2 and will have an effect on their attitudes towards that behavior.

Moving from pre-contemplation to preparation

As the user cycles through the stage-based model of personal informatics, the presentation of information of B2 can switch from presenting cognitive information (such as information about the benefits of B2 [3]) to behavioral information (such as providing encouragement to perform a step towards B2 [3]). This will make the user develop a higher perceived behavioral control over B2.

Moving from preparation to action/maintenance

In the TPB model, behavior is influenced by attitudes and perceived behavioral control. As the user cycles through the integrated model of multifaceted behavior change, they will eventually reach a point when the effects of attitudes and perceived behavioral control are strong enough to motivate action. The user will then transition to the action stage, and a few other cycles will theoretically lead the user to the maintenance stage.

Future Work

This paper is a proposal for an integrated model that should be validated through a series of user evaluations. From this workshop, we hope to contribute our model to theoretical discussions about designing personal informatics and we hope to gain feedback about practical applications of our model.

Citations

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