First idea set Monique Hendriks

Extending behavior theory (please respond to one question in this category)
- Assume our goal is to develop behavior change models that support building an appropriate prevention/intervention framework. How can such models capture the temporal and dynamic nature of real-life behavior and the dynamic influence of relationships, information and environments? How could models that acknowledge complex temporal influences on behavior that span weeks, months, or even years be used to design systems that support change in the moment?

When we design systems that *support* change, we should keep in mind that it is more important for the user of the system to become aware of the dynamics of his behavior than it is for the system to find out these dynamics. As with student-teacher relations, it should be the case that the teacher is helping the student to become independent. So the system does not necessarily need to capture all of the complex temporal influences on the user's behavior. All it needs to do is to inspire the user to look for these influences for himself, to point him in the right direction. In this manner, the user himself, and not necessarily the system, will become aware of the complex temporal influences on his behavior; what is stopping him from changing his behavior, under which circumstances does he succeed in changing his behavior, what can he do to remove his own barriers and increase his success? So under the assumption that we develop behavior change models that support building an appropriate prevention/intervention framework, the complex dynamics of behavior are not as important as the understanding of what causes these dynamics. It is important here to separate the symptoms from the causes. Measuring the exact time and circumstances under which a person lights a cigarette even though he really wants to quit is useless if you don't know why this person decides to light a cigarette anyway. On the other hand, if you know why he sometimes decides to light a cigarette, e.g. because he is cued by his environment, you do not necessarily need to know the exact time and circumstances under which this happens, you can ask the user; "please think about typical situations when you find yourself craving for a cigarette, in these situations [...intervention..].

Measurement of behavior (please respond to one question in this category)
- What type of behaviors, emotions, cognitions, context, environments and systems need to be measured to enable modeling behavior change? At what level of detail must the measurement take place?

I'd like to remark here that in my view, the advantage of having a model of behavior (change) is that we do not need to measure everything. The model can be applied to extend the system's knowledge of the user by inferring higher level semantic information such as emotions, cognitions and certain parts of context information from simple measures such as GPS-coordinates, heart rate and movement of certain body parts.

- How might high-frequency human-computer interaction be used to support longitudinal engagement with a wellness system?

Human-computer interaction is a behavior that has become habitual. By running on the same systems people are already using on a daily basis (e.g. laptop, smart phone, tablet), a wellness system can hook onto this habitual behavior. If for example, a user extends his morning routine of starting up his laptop, opening his e-mail and reading the news with opening the wellness application/website to check the feedback of the system on his behavior of yesterday, there is a solid basis for longitudinal engagement.

However, this method also inherently runs the risk of the user becoming less and less aware of the feedback the system is giving him, thereby actually lowering the level of engagement over time. So the challenge is to design a system which is dynamic in the way in which it communicates feedback to the user so as to keep things interesting, but at the same time, interaction with the system should be to some extent aimed at a low cognitive burden for the user, so as to support the interaction becoming a habit.

Evaluation (please respond to one question in this category)
- How should systems designed to work for years be evaluated if they depend on technology that may change at a much more rapid pace?

Again, I would like to stress that the way in which behaviors are measured, the technological possibilities, are not the most important part of a wellness system. We should realize that, while better measurement and greater calculation power and storage capacity will become available, we should not design our systems to depend on this. Because in the end, the goal of the system, whether it should be functioning now or in the future, is to support behavior change. And the successfulness of behavior change does not depend on how much information we can present to the user, or how fast, but on the type of support we offer to the user to provide him with the necessary insight into his behavior. To do that, we need to help the user to become aware of his behavior and not to keep depending on a system to tell him what is good and what is bad. The focus should not be on having good measurements, precise and fast calculations and as much data at our disposal as possible, the focus should be on guiding the user through the stages of behavior change by supporting him with a limited amount of information, only that which is useful to him to be able to make the next step. For this, it is more important to understand how human behavior change works, and to design systems in such a way that they support this process of behavior change independent of the technology which is used to do the measurements and to interact with the user.

General question *(please respond to this question)*

- What could participants in the meeting collectively do before, during, and after the meeting to significantly impact the field of health behavior change and maintenance? Be as concrete as you can, and think boldly.

We could try to construct a complete model of behavior change, incorporating all of the findings of the participants. Most probably, we would fail, but my experience with these kinds of exercises is that they do provide a lot of insight and at the very least they will result in an extensive inventory of the facets involved in behavior change and their possible interrelations. An inventory of the answers to the first question ("What do you think are the 'necessary ingredients' to develop models of health-related behavior that can account for momentary, short-term and long-term behavior change?") in this set will already provide a good starting point for this discussion.