Re: International Workshop on New Computationally-Enabled Theoretical Models to Support Health Behavior Change and Maintenance, Ocotber 16-17, 2012, Brussels, Belgium. ***First Idea Set***

Dear workshop participants,

We are looking forward to seeing you in October in Brussels!

As we mentioned in our original letter of invitation, the development of the workshop will take place in conversation with all of you. We thought that a good way to get the conversation started would be to ask you all to respond to a few questions, and then post your answers to our shared website where everyone could read and respond. The questions we thought might be useful are listed below. Please respond to <u>one question from each of the three groups below</u>, and then to the <u>general question</u> at the bottom. We think that about ½ page answer for each question would be great for starters. Thus, we are asking you for short responses to four questions in total, which amounts to about two pages of typed text. We hope you will find the questions thought provoking.

Please upload your answers (Word doc. or PDF file) to the workshop website **no later than Monday, June 25th**. To upload your responses, please go to http://www.behaviorchange.be/ and log in. Once you log in you will see a 'Documents' tab. Go to the documents page, and you will see a folder titled: 'First Idea Set'. Open the folder, and you will find a link to upload your responses. Once responses are uploaded, the entire group will be able to read them, so please check back in every so often to see what other members of the workshop are writing about. Under the document tab, the original workshop proposal is also available for you to download and read. If you have any trouble with the website, please don't hesitate to contact Javier Diaz at javierad@usc.edu.

Thanks in advance! Here are the questions:

Extending behavior theory (please respond to one question in this category)
• 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?

Development of such models is likely to require new forms of data, as well as advances in measurement technology to support collection of these new data streams. In particular, developing and testing richer models of behavior is likely to require large longitudinal datasets that include extended, repeated, observation and measurement of both outcomes (behaviors) and inputs (social and environmental context, emotional or physiological state). Repeated and frequent measures of the *same participants* through time and across spatial contexts will produce data that can then be used to develop and test models containing path dependencies, context dependencies, and different timescales of decision-making. Sufficient coverage of different potential time sequences, context-individual state pairings, etc will be necessary to provide large enough sample sizes for effectively evaluating models of this type. Collecting repeated, multi-dimensional data of this type, with large enough groups of individuals, high enough accuracy, and small enough attrition rates, is likely to require two kinds of technical innovations. First, the development and refinement of strategies to attain high adherence and low attrition over prolonged periods of study will be needed. Second, increasingly sophisticated automated algorithms for translating information from passive sensors into sufficiently accurate behavioral or context information will be needed.

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?

Generally, I would expect coverage of the following to be potentially important (before, during, and after the moment of action): social context, physical context, physiological state, and emotional state. Timing of behavior and the sequence of previous behavior are also likely to be important. The specific variables that will be most important to measure and the level of detail required are likely specific to each health behavior domain of interest. For example, in the context of eating, important measurements are likely to include:

presence/characteristics of others (social context), food environment cues and option set (physical context), hunger state/sleep state/current BMI (physiological state), emotional state, and sequence of previous eating (both in the previous hours and previous weeks). There will be some overlap between contexts—tobacco use will share some of these variables but not others. Detailed measurement of many of these variables, along with detailed characterization of food intake, is extremely challenging--but would be invaluable for developing richer models of behavior in this space. See ideas above regarding technical advances that may be necessary for improving information collection of this kind.

Evaluation (please respond to one question in this category)
- How should behavioral, social, and computer scientists and engineers structure their scientific inquiries to support development of sound theories that use technology but without too much dependence on any particular implementation of the technology?

Central to development of better theories will be both the collection of richer data and the use of modeling approaches that permit temporally and spatially complex treatment of decision-making. In both cases, multi-method approaches and methodological diversity may help provide robustness in the theories that emerge, and iterative relationships between empirical inquiry and modeling will be invaluable. On the data collection side, two key necessities will be improved techniques for minimizing attrition over long periods of time and improved techniques for translation of multi-dimensional passive sensor data into conceptually meaningful data about behavior, context, or state. Multiple approaches are likely to be proposed for addressing each of these hurdles, and each approach will have advantages and drawbacks whose full significance may not be clear at the outset (and indeed may only be realized after the data is used for modeling). Therefore, both methodological diversity and frequent bi-directional interaction between data streams and models (with subsequent mutual refinement) may be especially effective strategies. Modeling approaches capable of capturing sufficient dynamic complexity are few in number, but do have important differences between them, with respective strengths and weaknesses. Again, anticipating in advance the full implications of these strengths and weaknesses for the type of theories each can develop will be difficult—multiple approaches are likely to be needed, and methods will likely need to be tailored to the specific health behavior domain under consideration.

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.

A primary need for progress in this field will be interdisciplinary collaboration. With workshop participants drawn from diverse backgrounds, effort both before and during the meeting to become familiar with others work and to begin to collectively develop suitable language and terminology to bridge disciplinary boundaries will be critical to allow for effective communication and collaboration. During and after the meeting, the forging of new interdisciplinary collaborations and teams can be an important product of the workshop, and is likely necessary to move the field forward. In order to generate momentum, identification of concrete topics and "low hanging fruit" for jump starting collaborations will be important. Finally, in addition to developing language to allow effective communication within the workshop group, we will need to begin to develop ways to communicate the new approaches and concepts we develop to a much broader audience—including both disciplinary scientists, funders, and stakeholders.