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In this first issue of this journal, the National Institutes of Health (NIH) is pleased to highlight three areas of emphasis that are directly relevant to information technology and evidence implementation. First, the incorporation of mobile technologies, or mHealth, into health care delivery offers exciting possibilities for prevention and management of disease. Second, behavioral and social scientists are harnessing the power of systems science methodologies to explore complex and nonlinear phenomena, synthesize knowledge across disciplines and levels of analysis to gain a better understanding of the big picture, and conduct virtual experiments that are inefficient or impossible to conduct in the real world. Finally, there is a clear imperative for the results from efficacy trials to have greater reach, adoption, to sustainability. NIH has an ever growing role in supporting research that improves translation of research into real-world communities and settings. Some examples of this research emphasis are trans-NIH funding announcements and a yearly conference that highlights the advances and issues in dissemination and implementation science.

mHealth—The recent proliferation of wireless and mobile technologies—often called “mHealth”—(including cell phones, mobile monitors, and sensors) provides an opportunity to connect information in the real world to produce continuous streams of data on an individual’s biology, psychology (attitudes, cognitions, and emotions), behavior, and daily environment to improve health. Mobile phones, particularly smartphones and other mobile computing devices, are becoming increasingly ubiquitous, which enhances their potential utility to assess and improve health. There are over 285 million wireless subscribers in the USA alone and an estimated 67.6% of adults worldwide own cell phones [1]. In contrast to the internet, mobile phone use has been widely adopted across socioeconomic and demographic groups [2]. The access and data available from mobile technologies have the potential to yield new insights into the factors that lead to disease. Data collected using mHealth technologies has the potential to be analyzed and used in “real time” to prompt changes in behaviors or environmental exposures that can reduce health risks or optimize health outcomes. This new area of mobile health may revolutionize how we think about where and when health care is provided and how we

ensure that important social, behavioral, and environmental data are collected. Industry and behavioral medicine researchers are just beginning to understand and evaluate the critical questions in mHealth, such as determining optimal content, mode, and frequency of delivery, tailoring for population-specific needs, and linking with the health care system. The evidence base for what works for which specific groups and under what circumstances is in its infancy. The NIH is actively involved in creating venues to facilitate public–private partnerships, such as the mHealth Summit held in Washington D.C. in November, 2010 <http://www.mhealthsummit.org/>. This meeting brought together academic, industry, and policy mHealth experts to examine the intersection among research, technology, and policy. In addition, NIH funding is available for the full range of mHealth applications through investigator-initiated grants, as well as through targeted funding opportunities (e.g., <http://grants.nih.gov/grants/guide/pa-files/PAS-10-097.html>, *Technology-Based Adherence Interventions for Substance Abusing Populations with HIV (R01)*, issued by the National Institute on Drug Abuse).

Systems science methodologies: new tools for research in the behavioral and social sciences—“You think because you understand ‘one’, you must understand ‘two’ because one and one is two. But you must also understand ‘and’.”—Sufi saying.

Most major threats to the public’s health—including cardiovascular disease, pulmonary disease, cancer, diabetes, mental illnesses, HIV/AIDS, substance abuse, violence, emerging infectious diseases, obesity, sedentary lifestyle, poor diet, sleep disorders, and more—are complex in etiology and may require equally complex solutions. Many of these conditions are the result of an interaction among genetic, physiological, behavioral, economic, social, and environmental factors. Behavioral and social scientists have traditionally relied on reductionist approaches and correlation-based analytic methods (e.g., regression) to study these problems. Such methods are useful for understanding components of a problem and identifying linear relationships, but have a limited ability to explore complex interactions. Systems science methodologies, in contrast, are not good for some tasks (e.g., statistical hypothesis testing), but excel at facilitating the exploration of bidirectional and nonlinear relationships, emergent properties of a

system (e.g., system properties that cannot be explained by understanding the behavior of individual components of the system), and help reveal unintended consequences of intervening in the system. Systems science methodologies are a family of methodologies including various forms of computational modeling and simulation (e.g., Markov modeling, system dynamics modeling, microsimulation, and agent-based modeling) and network analysis.

Systems science methodologies should not displace, but rather should complement other analytic approaches. System science methodologies are inherently interdisciplinary and require collaborative efforts to optimize their potential. Although there are new and emerging computational methods, many system modeling methodologies are not new and have been used to good effect in other disciplines. The application of existing and emerging system science methods in the behavioral and social sciences offers the potential to better target future prevention and treatment research. For example, these methods make our mental models explicit, forcing assumptions to be specified. Simulations (scenarios played out over time using the model) can be used to explore what might happen to the outcome of interest under conditions where the assumptions about multiple interacting factors are varied systematically. As such, researchers can explore the potential result of various interventions, programs or policies in silico before actually putting them into practice.

NIH now has a variety of open funding opportunity announcements (FOAs) that encourage systems science methodologies. Below are two such solicitations. A more comprehensive list of such FOAs is available by contacting Dr. Patty Mabry (mabryp@od.nih.gov) of the Office of Behavioral and Social Sciences Research. Moreover, interested persons are encouraged to contact her in order to subscribe to the NIH BSSR-Systems Science Listserv.

R21: *Using Systems Science Methodologies to Protect and Improve Population Health*: <http://grants.nih.gov/grants/guide/pa-files/PA-R-08-224.html>

Social Network Analysis and Health

R01: <http://grants.nih.gov/grants/guide/pa-files/PA-R-10-145.html>

R21: <http://grants.nih.gov/grants/guide/pa-files/PA-R-10-146.html>

NIH staff has contributed to the planning and execution of the *International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction (SBP11)* in March 28–31, 2011: <http://www.umi.acs.umd.edu/conferences/sbp2011/>. The meeting will facilitate cross-disciplinary fertilization by introducing behavioral and social science researchers and systems scientists (i.e., colleagues from computer science, mathematics, physics, computational science to related disciplines). The meeting will also provide tutorials about modeling concepts

for behavioral and social scientists and introduce systems scientists to health and behavioral/social/cultural research concepts.

Dissemination and implementation science—Health scientists have successfully developed and tested a plethora of clinical and community interventions demonstrated to treat and prevent medical and behavioral illnesses. However, as leaders in research and clinical practice have noted, there is still an enormous gap between what we know can maximize the quality of health care and what is currently being delivered in practice and community settings. To optimize public health, we must not only understand how to create the best interventions, but how to best ensure that they are effectively delivered within real-world clinical and community practice. This is the focus of dissemination and implementation research, and building this knowledge base is imperative to get the best return on decades of investment in biomedical and behavioral research. Dissemination and implementation science is a rapidly growing area of emphasis for behavioral medicine at NIH. On March 21–22, 2011 the *4th Annual NIH Conference on the Science of Dissemination and Implementation: Policy and Practice* will occur: <http://conferences.thehillgroup.com/obsr/DI2011/index.html>. This year, the meeting will have an increased focus on transferring research to policy and on international projects. It will also feature advances in the field, discuss challenges and potential solutions, and facilitate networking in this vibrant and diverse research community. Registration is free but space is limited.

Interested researchers should also consider the following trans-NIH dissemination and implementation funding opportunities. This dissemination and implementation program announcement has a standing study section beginning in late 2010 and is also now accepting submissions at each of the usual NIH deadlines. Each of the 12 NIH institutes and offices participating in the FOA has a designated scientific contact person identified in the program announcements:

Dissemination and Implementation Research in Health

R01: <http://grants.nih.gov/grants/guide/pa-files/PA-R-10-038.html>

R21: <http://grants1.nih.gov/grants/guide/pa-files/PA-R-10-040.html>

R03: <http://grants1.nih.gov/grants/guide/pa-files/PA-R-10-039.html>

1. International Communications Union. http://www.itu.int/ITU-d/ict/publications/idi/2010/Material/MIS_2010_Summary_E.pdf
2. Pew Internet. (2010). http://www.pewinternet.org/~media/Files/Reports/2010/PIP_Adults_Cellphones_Report_2010.pdf