

**Pre-conference Workshop #3
Society for Prevention Research
20th Annual Meeting
Tuesday, May 29, 2012
8:30 AM – 5:00 PM
Hyatt Regency Washington
Washington, DC**

Participatory System Dynamics Modeling: Applications for Prevention Research

Chairs and Presenters:

Elizabeth M. Ginexi, PhD, Program Director, Division of Cancer Control and Population Sciences, National Cancer Institute

Patricia L. Mabry, PhD, Senior Advisor, Office of Behavioral and Social Sciences Research, Office of the Director, National Institutes of Health

Presenters:

Kristen Hassmiller Lich, PhD, University of North Carolina, Chapel Hill

David Mendez, PhD, Associate Professor, Department of Health Management and Policy at the University of Michigan School of Public Health

Karen Minyard, PhD, Director, Georgia Health Policy Center at Georgia State University's Andrew Young School of Policy Studies

Imrana Umar, Powersim Solutions, Inc.

Background and Purpose

Our team introduced systems science methodologies as analytic tools for addressing complex problems, like those found in prevention science, at the past two SPR conferences. All of the methods presented were well received, and System Dynamics (SD) in particular, seemed to generate a great deal of enthusiasm among audience members. This year we propose to build on our previous efforts and deliver a workshop that will provide an introduction to System Dynamics (SD) modeling for prevention science researchers in greater depth than was possible in our previous forums. Following a general introduction to SD methods, and a brief review of the historical context and of role of SD in the larger space of systems science methods, we will illustrate with in-depth case examples in public health research. Specifically, we will present an SD model examining the potential impact of one or more tobacco control policies under consideration by FDA. We will also hear from a researcher who will describe how she has used SD to inform policymakers about the potential future impact of various health policies under consideration by a state legislature. We will next introduce software used in SD model building (Powersim), showcasing all of the basic features via public health examples. In this way, we will be both demonstrating the software, while at the same time, illustrating how the SD method works with relevant case examples. Next, we will engage the audience in a participatory model building exercise involving prevention science implementation research examples, so that

audience members will have an opportunity for experiential learning. We will conclude with a 45 minute interactive session in which SD experts outline steps for building and using a model for problems selected by the audience. This final session is intended to help participants understand how they can implement an SD approach to address prevention science research questions and also gain an appreciation for the types of problems this tool is best suited for as well as its limits (i.e., in situations where a problem nominated might not be well suited for the SD method, an explanation for why would be provided). Each session will include facilitated, interactive discussion among session participants and workshop speakers, regarding how the methods might be used in prevention science research.

Specific learning objectives

- Understand the unique capabilities of System Dynamics (SD) modeling for prevention science and how it can complement and extend traditional methods.
- Understand what types of prevention research questions might be appropriate for SD modeling.
- Become familiar with and understand the main capabilities of System Dynamics modeling.
- Become familiar with the basic features of one prominent and powerful SD software (Powersim) as well as with what early and more developed models look like “under the hood.”
- Become familiar with participatory modeling techniques, including the rationale for their use.
- Shape, with SD experts, an outline for next steps for 2-3 prevention science research projects selected by audience members

Target Audience

This workshop will be accessible to prevention investigators with and without exposure to systems science methodologies

Materials

Participants will receive a complete set of slides.

Outline of Workshop

8:30-8:35

Welcoming remarks – 5 mins

Elizabeth Ginexi, Ph.D., Behavioral Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute.

Dr. Ginexi will outline the planned schedule and format/logistics for the day.

8:35-8:55

What is systems science and why do we need it? - 20 mins

Patricia L. Mabry, Ph.D., Office of Behavioral and Social Sciences Research (OBSSR), National Institutes of Health.

Dr. Mabry will explain what systems science methods are and why interest and funding of such approaches is growing at NIH and will provide some funding opportunity announcement information for participants.

8:55-9:00 Q&A – 5 mins

9:00-9:30

***A Basic Primer on System Dynamics (SD) Modeling* - 30 mins**

Kristen Hassmiller Lich, Ph.D., MHSA, Assistant Professor, Department of Health Policy and Management at the University of North Carolina at Chapel Hill

Dr. Hassmiller Lich will explain how System Dynamics (SD) modeling fits in modeling space, including strengths and limitations. The audience will be introduced to all aspects of the SD modeling process: stakeholder engagement, identification of the problem, identifying model inputs and boundaries, parameterizing the model, model validation, model output and interpretation. Core SD concepts and terminology will be taught including stocks, flows, feedback/feedforward loops, delays, and threshold phenomena (aka “tipping points”).

9:30-9:35 Q&A – 5 mins

9:35-10:05

***An Applied Example: Dynamic Modeling of Smoking Cessation Policies in the United States* – 30 mins**

David Mendez, Ph.D., Associate Professor, Department of Health Management and Policy at the University of Michigan School of Public Health.

Dr. Mendez will describe his use of System Dynamics modeling to characterize the public health impacts of smoking cessation policies around the country.

10:05-10:20 Q&A – 15 mins

10:20-10:35 BREAK – 15 mins

10:35-11:05

***An Applied Example: Systems Thinking in the Legislative Health Policy Arena* – 30 mins**

Karen Minyard, Ph.D., Director, Georgia Health Policy Center at Georgia State University’s Andrew Young School of Policy Studies.

Dr. Minyard will describe the use of system dynamics models as a way to approach complex policy problems involving state and local public health programming.

11:05-11:20 Q&A – 15 mins

11:20-12:00

An Introduction to Systems Dynamics Software: Using Powersim – 40 mins

Imrana Umar, President, Powersim Solutions, Inc., Herndon, VA.

Mr. Umar will introduce the software Powersim, showcasing all of the basic features via relevant examples.

12:00-12:15 Q&A – 15 mins

12:15-1:15 BREAK – LUNCH ON YOUR OWN – 1 hour

1:15-2:45

Participatory Dynamic Modeling Exercise – 1 hour

Kristen Hassmiller Lich, Ph.D., University of North Carolina, Chapel Hill
Imrana Umar, Powersim Solutions, Inc.
Patricia L. Mabry, Ph.D., Office of Behavioral and Social Sciences Research (OBSSR), National Institutes of Health.

Dr. Hassmiller Lich, Mr. Umar, and Dr. Mabry will lead a group participatory modeling exercise with the workshop participants while utilizing the Powersim software in real time.

2:45-3:00 Q&A – 15 mins

3:00—3:15 BREAK

3:15-4:40

Solicitation of Prevention Research Questions from Audience – 1 hour 20 mins

Kristen Hassmiller Lich, Ph.D., University of North Carolina, Chapel Hill
Imrana Umar, Powersim Solutions, Inc.
Elizabeth Ginexi, Ph.D., Behavioral Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute.

In a highly interactive format with the workshop participants, the Panel will discuss a set of real world prevention research questions participants nominate as potentially well-suited for addressing with SD methods. The group will select examples to “delve into” – outlining next steps and beginning to build early (rough but insight-generating) models live using Powersim. Depending on the chosen examples, the panel should have time to work through 2-4 prevention questions to illustrate how to apply systems thinking and how to use SD modeling tools to approach and frame research questions.

4:40-4:45 Concluding remarks

4:45-5:00 Complete feedback survey and adjourn

Meeting Chairs

Elizabeth M. Ginexi, Ph.D. (Primary contact)

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Elizabeth M. Ginexi, Ph.D. is a Program Director in the Tobacco Control Research Branch, Behavioral Research Program, Division of Cancer Control and Population Sciences at the National Cancer Institute where she serves as the Project Coordinator for the State and Community Tobacco Control Policy and Media Research initiative. Dr. Ginexi is an Applied Social Psychologist with expertise in family- and community-based etiology and prevention research. From 2003-2010 she directed the Transdisciplinary Prevention Research program at the National Institute on Drug Abuse. Before that, as a Senior Study Director at Westat, Dr. Ginexi worked on community-based drug abuse treatment and prevention evaluations funded by the National Institute on Alcohol Abuse and Alcoholism and the Substance Abuse and Mental Health Services Administration. She served as Research Assistant, Postdoctoral Fellow and Research Scientist at the George Washington University Center for Family Research from 1994-2000.

Patricia L. Mabry, Ph.D.

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Dr. Mabry is a Senior Advisor in the Office of Behavioral and Social Sciences Research (OBSSR) at the National Institutes of Health (NIH) where she is facilitating the emergence of a new field that integrates systems science with health-related behavioral and social science research. Dr. Mabry's specific achievements include issuing funding opportunity announcements in systems science (e.g., [PAR-11-314 \(R01\)](#)/[PAR-11-315 \(R21\)](#), *Systems Science and Health in the Behavioral and Social Sciences*) and leading the development of an annual training course, the [Institute on Systems Science and Health \(ISSH\)](#). Dr. Mabry has authored a number of peer reviewed publications including articles in *The Lancet*, the *American Journal of Public Health*, and the *American Journal of Preventive Medicine*. She is a Guest Editor of the March 2010 supplement of the *American Journal of Preventive Medicine* entitled, *Increasing Tobacco Cessation in America: A Consumer Demand Perspective* and is also a

Guest Editor for the 2011 Special Issue of Research in Human Development entitled, *Embracing Systems Science: New Methodologies for Developmental Science*.

Dr. Mabry has been recognized for her leadership in systems science and health. She was a member of the team that received the inaugural Applied Systems Thinking Prize from the Applied Systems Thinking Institute in 2008, and received an individual Merit Award from NIH in 2008 for her leadership in systems science. In 2011, she received the NIH Director's Award for her contributions to NCCOR. Dr. Mabry runs the *Behavioral and Social Sciences Research-Systems Science Listserv* as a means of disseminating information to her constituency. To subscribe, please email your request to mabryp@od.nih.gov.

Kristen Hassmiller Lich, Ph.D., MHSA.

University of North Carolina at Chapel Hill

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Dr. Hassmiller Lich is an Assistant Professor in the Department of Health Policy and Management at the University of North Carolina at Chapel Hill. She received her Master in Health Services Administration (MHSA, 2000) and PhD in Health Services Organization and Policy (2007) from the University of Michigan School of Public Health. Dr. Lich specializes in the application of operations research and complex systems modeling techniques to health policy and management decision making. She has worked most extensively on tobacco control, including two key modeling projects. In the first, she built a dynamic simulation model to predict and compare the benefits of various tobacco-control policies in the US. In the second, a dynamic infectious disease model was built to advance understanding of the relationship between smoking and tuberculosis, and to estimate the effects of tobacco (and tobacco control) on population-level tuberculosis outcomes such as incidence and mortality rates. Other current research projects include: using decision support models to improve systems of mental health care in North Carolina and applying System Dynamics methods to improve stroke-related strategic planning in the Veterans' Health Administration. Dr. Lich's research passion is to advance the way we use models (both quantitative and qualitative) to improve policy-decision making, and to engage system stakeholders in the process. She has been invited to talk about the use of models to inform policy in a variety of settings, including the Centers for Disease Control and Prevention, the National Institutes of Health, and numerous meetings and workshops.

Presenters

David Mendez, Ph.D.

Associate Professor

Department of Health Management and Policy at the University of Michigan School of Public Health.

Email: dmendez@umich.edu

David Mendez is an Associate Professor in the Department of Health Management and Policy at the University of Michigan School of Public Health. His research involves developing mathematical/computer models to help policy makers explore solutions to public health problems in the areas of smoking control, residential radon, and HPV vaccination. He has written several papers on the role of systems science in public health policy research, and has

implemented systems science tools extensively in the area of tobacco control. He has brought this work to bear through serving on the CDC Healthy People 2020 Objectives Tobacco Use Workgroup and as a consultant with the Institute of Medicine.

Karen J. Minyard, Ph.D.

Karen Minyard, Executive Director, Georgia Health Policy Center
Associate Research Professor, Public Management and Policy
Ph.D., Georgia State University
M.S.N., Medical College of Georgia
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Karen Minyard, Ph.D. has directed the Georgia Health Policy Center (GHPC) at Georgia State University's Andrew Young School of Policy Studies since 2001. Minyard connects the research, policy, and programmatic work of the center across issue areas including: community and public health, end of life care, child health, health philanthropy, public and private health coverage, and the uninsured. Prior to assuming her current role, she directed the networks for rural health program at the GHPC. She has experience with the state Medicaid program, both with the design of a reformed Medicaid program and the external evaluation of the primary care case management program. She also has 13 years of experience in nursing and hospital administration.

She is an advocate for the importance of community in national, state, and local policy and the power of communities to improve health. Dr. Minyard maintains her connection with communities by working directly with local health collaboratives and serving on the boards of the National Network of Public Health Institutes, Physicians' Innovation Network, and Communities Joined in Action.

Minyard's research interests include: financing and evaluation of health-related social policy programs; strategic alignment of public and private health policy on all levels; the role of local health initiatives in access and health improvement; the role of targeted external facilitation and technical assistance in improving the sustainability, efficiency, and programmatic effectiveness of non-profit health collaboratives; and public health systems and financing.

Dr. Minyard frequently makes presentations and acts as a neutral convener and facilitator for groups and organizations. She often provides testimony for the state legislature and recently presented to congressional and executive agency staff on health reform and provisions related to the safety net. She is currently spearheading a team of faculty and staff at Georgia State University dedicated to translating national health care reform.

She received a bachelor's degree in nursing from the University of Virginia, a master's degree in nursing from the Medical College of Georgia, and a doctoral degree in business administration with a major in strategic management and minor in health care financing from Georgia State University.

Imrana A. Umar

President of Powersim Solutions, Inc.
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Imrana A. Umar is the President and Chief Executive Officer of Powersim Solutions, Inc., responsible for guiding the overall vision, strategy and operations of the company. Prior to co-

founding Powersim Solutions, Inc., Mr. Umar worked for Powersim Corporation for 11 years, where he held various senior management positions, as well as serving on the board directors of the company from 1999 to 2001. Mr. Umar has several years of experience developing and implementing advanced simulation-based technology solutions in a wide variety of industries and application areas for major organizations in both private and public sectors around the world.

Mr. Umar has consulted in many industries including Aviation, Energy, Oil & Gas, Financial Services, Health Care, High Technology, Hospitality, Manufacturing, Retail, Construction, ICT and Telecom. He has also consulted for private and public organizations globally including Microsoft, The World Bank, McKinsey & Co, Accenture, BP Amoco, Chevron, US National Energy Laboratories, Statoil of Norway, Nigerian National Petroleum Corporation (NNPC), Energy Commission of Nigeria, Energy Commission of Ghana, The American Red Cross, Qatar Petroleum, Cable & Wireless, Novellus Systems, AOL, NIPOST, Discover Business Services, FAA, Qatar Foundation for Science, Education, and Development, Ashghal (Public Works Authority of Qatar), among others.

Mr. Umar has also consulted in various application areas, including Organizational Transformation and Change Management, Analysis of Investment Options, Project Evaluation and Risk Assessment, Competitive Strategy, Policy Alignment and Coordination, Scenario-based Strategic Planning, Customer Acquisition, Development and Retention, Resource Planning, Technology and Product Innovation, Human Performance Management, Assessment of risks and options relating to marketing, sales, distribution channels, employee turnover, etc.

Prior to joining Powersim Corporation in 1992, Mr. Umar worked in the banking industry. After a brief break to study Information and Computer Science, he served as a faculty member and PhD research fellow at the University of Bergen between 1994 and 1997.

Mr. Umar is currently an adjunct professor of Performance Management Systems and Business Strategy Simulation in George Mason University's Executive Education program on Building Business Acumen and Corporate Ventures. He also teaches management courses on Strategic Visioning and Leadership Development. Mr. Umar sits on the System Dynamics Advisory Board, Department of Social Sciences and Policy Studies, Worcester Polytechnic Institute (WPI), Worcester, Massachusetts, he is a member of the System Dynamics Policy Council, and holds board membership on various other non-profit organizations.

Mr. Umar holds a B. Sc. (Honors) in Business Administration with a major in Banking and Finance; B.Sc. in Information and Computer Science; M. Phil. in Information and Computer Science, focusing on the System Dynamics Methodology and Model-based Policy Analyses, and has a 3 years of PhD studies in System Dynamics from the University of Bergen.