Science Meets Policy Practice[1]

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Abstract

Recent discussions in system dynamics have raised questions about the scientific acceptability of system dynamics and impact of system dynamics on social problems. This paper describes two different projects in the area of mental health services research—a research study recognized for its science and a consulting project making an impact on the policy process—and the institutional structures forming the university-agency-state partnerships. Together, the two projects helped create a community with greater awareness of system dynamics, interest in asking new questions from a system dynamics perspective, and motivation to pursue additional system dynamics projects related to research and policy. Key features of the individual projects, Center for Mental Health Services Research, Alliance for Building Capacity, and the community are discussed. The paper concludes with implications for future work in mental health services research and system dynamics in the nonprofit sector.

Keywords: social science, public policy, health, mental health, group model building

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In the wake of the 50th anniversary of system dynamics, questions were raised about why system dynamics has not had more of an impact with government or played a major role in addressing major problems. Forrester (2007) raised some of these questions himself and identified a number of causes including the careerism in academia, the lack of courage in political leaders, the absence of popular works and movements that created political pressure for change, the mistaken belief that having technical answers presented to political elites is enough, and the misguided efforts to substitute systems thinking for simulation and elevate the role of historical fit at the expense of deeper insights. It therefore seems important to present examples of work that highlight the interchange between science and policy practice when it does happen.

In this paper, we set out to describe two projects that have created a bridge between social science and policy practice and the institutional supports creating them. The first project involves a research grant funded by the National Science Foundation. The second is a series of contracts with the Missouri Department of Mental Health to support policy work on transformation of mental health services. The projects were initiated by previous work and collaborations facilitated by the Center for Mental Health Services Research and Alliance for Building Capacity, both situated within the George Warren Brown School of Social Work at Washington University in St. Louis. While each project has its weaknesses, together they created a community that is both engaged in basic science *and* interested in developing simulation models for policy design. The two projects now coexist within a reinforcing feedback loop, providing a useful example of institutional supports can play a critical role in forming research partnerships with nonprofits and state agencies that can advance science, impact the policy process, and motivate more rigorous work in system dynamics and policy analysis.

The paper is organized as follows. After first describing each of the two projects separately, we describe how the two projects reinforce each other through an overlapping community of participants engaged in both projects. A variety of factors are discussed as critical to the development of excitement within this community, along with some reflections on what helped us along the way, and implications for future directions in mental health and health services research and policy using system dynamics.

Institutional Supports

Two units within the George Warren Brown School of Social Work played instrumental roles in facilitating university-state agency and university-nonprofit partnerships, supporting pilot work developing those partnerships, and facilitating the ongoing collaborations. The Center for Mental Health Services Center (CMHSR) is a National Institute of Mental Health research center. The focus of the CMHSR has been on promoting mental health services research on topics such as advancing research methods for services research, developing practice based research partnerships, and advancing evidence based practices (EBP) and implementation science in mental health services. Federally funded research centers provide invaluable institutional supports that bring together national experts through a series of scientific meetings and collaborations on research projects, helping to simultaneously set the research agenda and build the capacity of researchers around the country to pursue that agenda through externally funded research. As such, they bring together local and regional policy makers and practitioners together with university based researchers, and opportunities for forming new research partnerships on well focused substantive issues amenable to scientific research and evaluations.

In addition to the CMHSR, the Alliance for Building Capacity (ABC), an endowed program at the George Warren Brown School of Social Work, seeks to work with small nonprofit organizations in the St. Louis area. ABC has provided a variety of technical assistance services and professional development for human service professionals working in nonprofits. These include workshops and assistance on board development, strategic planning, budgets, social entrepreneurship, developing business plans, and supervising students through field practicum experiences with an interest in nonprofit management. ABC provides a unique entry point for nonprofit organizations seeking to access the university and develop university-nonprofit partnerships.

Science

The first project is a research grant to investigate the impact of innovation implementation on organizational performance in the field of mental health, funded through the National Science Foundation (NSF). An overarching aim of the study is to understand something basic about organizational behavior using system dynamics simulation research. The inspiration for this grant began in 2004 with the Diffusion of Innovative Practices study (Hovmand and Proctor, Co-PI) funded through the Center for Mental Health Services Research as a pilot. The aims of the pilot were to 1) identify the barriers and facilitators that administrators and clinical directors faced with implementing evidence based practices, and 2) develop collaborative relationships for a subsequent implementation study.

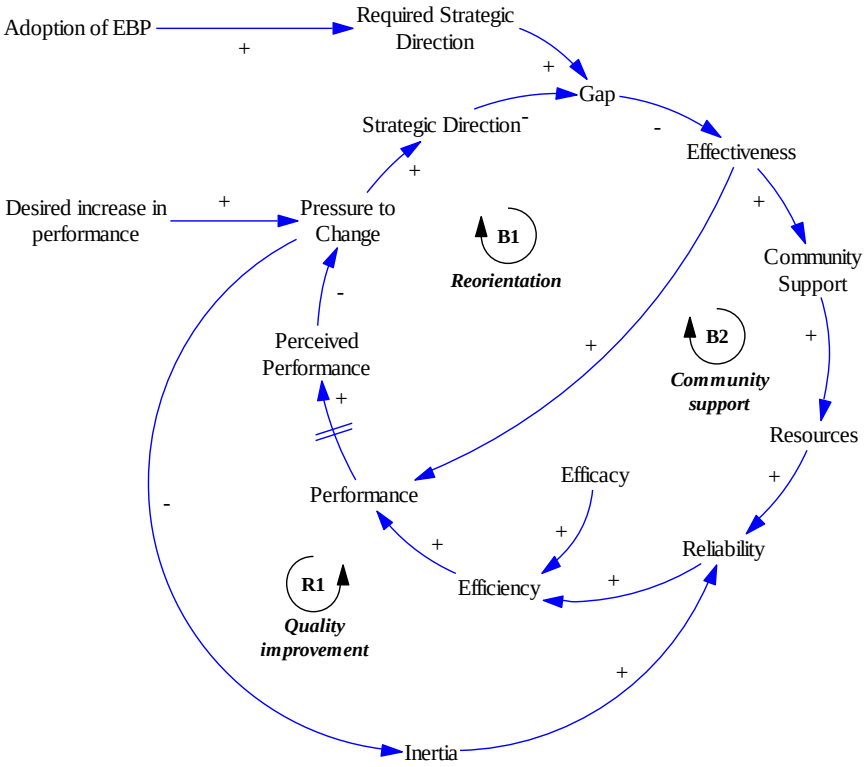
While the study team identified a number of facilitators and barriers, we also found that administrators and clinical directors had expectations of evidence based practice that went beyond the client. Specifically, managers wanted strategic outcomes for the organization as well. For example, informants described how they expected implementation of EBP to legitimate their services to stakeholders, anticipated that as consumers had more control over the resources to pay for services they would be demanding EBP, or wanted to be known as regional center of excellence. What struck us and our colleagues about this was how few people were looking at the organizational outcomes from implementing EBP. So we (Hovmand and Gillespie) decided to design and submit a grant application to the National Science Foundation to study this.

Our initial work involved reviewing system dynamics models related to innovation implementation and organizational change. For example, we drew on the early work by Levin and Roberts (1976) and their dynamic theory of human service organizations, Samuel and Jacobson's (1997) work on planned organizational change, Sastry's (1997) model of Tushman and Romanelli's (1985) theory of punctuated change, and Repenning's (2002) work on managerial commitment in implementation of Total Quality Management. We invested nearly a year building, testing, integrating, and then retesting these models. Ambiguities arose between different uses of organizational constructs that had to be ironed out, but as a consequence our theory developed. We compared our constructs and mechanisms with the initial key informant interviews and presented our results to colleagues for feedback (Hovmand and Gillespie 2006), and then tested and refined our study questions pre-submission, validating via simulation the logical consistency between our theory and the questions we were posing (Hovmand and Gillespie 2007).

We submitted a grant proposal for a multiple case study design of 40 nonprofit organizations providing mental health services to the National Science Foundation (Hovmand,

PI; Gillespie, Co-PI; SES 724577). Data sources would include key informant interviews, longitudinal financial data from IRS 990 returns, organizational surveys, agency documents, and group model building sessions. The three-year study would seek to build a system dynamics simulation model of implementation and its effects on organizational performance. During the preparation for this grant, we sought letters of commitment from the Department of Mental Health to help us identify organizations. While they were supportive, they were not quite sure what system dynamics was about or how this would work. We were asking questions about the long term consequences of implementation, whereas most policy makers and researchers were focused on simply getting the practices implemented. So our study seemed distant from the immediate problems of implementation.

Figure 1 Overview of main feedback mechanisms
in the model of the implementation and organizational performance



We wrote up the preliminary work and presented a talk about system dynamics later that spring at the Missouri Institute of Mental Health. The paper and presentation focused on a brief introduction to the problem, system dynamics as a research strategy, and discussion of the preliminary simulation results. The story of implementation and its effects could be told in terms of three feedback mechanisms: strategic reorientation, community support, and quality improvement (see Figure 1). In showing this simple diagram and the simulation results, we were able to convey in a relatively brief time some of the key issues organizations faced as they sought to adapt to their environment and improve outcomes. The take-home point was that implementation of innovations that produce better clinical outcomes do not always benefit the organization in the long run, and that the outcomes depend on how the initial performance was achieved.

What struck us, however, was how important a simulation was in illustrating the results and made what seemed like a far-fetched idea three months ago become part of the practical discussion for implementing policy. People were now referring to this simulation result in conversations, not as a prediction of what would happen, but as a possibility that needed to be considered as leaders planned various kinds of changes within their organization. By summer of 2007 we had received favorable scientific reviews from NSF that emphasized the argument for using simulation, the focus on developing heuristics, use of triangulation, and using empirical data to parameterize the model.

Missouri Transformation Project

In 2003, the President's New Freedom Commission on Mental Health called for an overhaul of the system of mental health services in the United States. The report urged states to transform the mental health service system from one driven by bureaucratic and financial incentives to one driven by the needs of consumers and families that focuses on facilitating recovery and building resilience (DHHS 2006). In response to this challenge, the Substance Abuse and Mental Health Services Administration (SAMHSA) proposed to invest $173 million in the form of five-year state incentive grants to help transform mental health services. Nine states have been awarded these grants, which provide support for strategic planning and capacity building to transform mental health care to a system that 1) recognizes that mental health is essential to overall health, 2) is driven by consumers and family members, 3) eliminates disparities, 4) facilitates early mental health screening, assessment, and referrals to services, 5) accelerates research, and 6) uses technology to access mental health care and information (New Freedom Commission on Mental Health 2003). In 2006, Missouri was awarded one of the state incentive grants from SAMHSA (McFarland, Chair; Goon, Co-Chair; SM57474-01).

The emphasis on eliminating disparities and making services consumer and family driven meant that for changes to be sustainable, a broad based of participation was needed in the planning process, from consumers and family members to providers and policy makers. This is especially important given that quality of mental health care often depends on local support, and that statewide solutions that ignore local needs are likely to exacerbate disparities. Consequently, the leadership team developed a statewide planning process that would eventually include approximately 240 individuals working in six groups, each group focused on developing recommendations for one of the six areas identified by the New Freedom Commission Report. The coordinators of the project designed the planning process in collaboration with a private consulting group specializing in managing change in state agencies.[3]

Each workgroup consisted of approximately 40 members with a chair and co-chair selected from the workgroup. Members were invited by the planning group to participate in the process to ensure adequate geographic and stakeholder representation and include key individuals who would later be important for implementing the recommendations. Participants included consumers and family members of persons with mental illness, substance abuse disorders, or developmental disabilities; advocates for persons with mental illness, substance abuse disorders, or development disabilities; providers; representatives of hospital associations; administrators from various state agencies including corrections, youth services, mental health,

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and protective services; and researchers and academics. Each workgroup was expected to meet every two weeks for three hours over a period of approximately three months.

One of the issues the planning group was facing was how to start the groups and motivate a holistic view of the mental health transformation effort. Although participants in each workgroup were familiar with some aspect of mental health, most had only a limited view of the whole system. This was seen as both a consequence of system fragmentation and a barrier to change. If participants were unable to move from their local views of the problem of transforming mental health care to a global perspective, then the effort was likely to fail. In particular, opportunities were sought to illustrate how efforts that might seem locally rational were in fact contributing to a systems problem. The planners also wanted some way to distinguish this transformation effort from earlier efforts to reengineer or change mental health care.

Policy Practice

The planners were familiar with and drew on Peter Senge's (2005) recent book *Presence* with Otto Scharmer, Joseph Jaworksi and Betty Sue Flowers. They wanted a way to help people suspend individual agendas and see the whole. The challenge was that while people refer to "the mental health system" it was often experienced as a highly fragmented set of services spanning multiple sectors.[4] Initially, it was unclear if system dynamics could be of much use for this project. However, the planners saw the potential after the first author shared some examples of earlier simulation work and group model building from a technical assistance project with Save the Children UK in Ulaanbaatar, Mongolia.[5]

The initial contract called for group model building exercises with each of the five working groups in their respective areas: mental health is essential to health, evidence based practice, reducing disparities, easy and early access, and consumer and family driven services. Each session was to be conducted with approximately 40 people during the second half of their first meeting. A four person modeling team was convened including a modeler/facilitator, facilitator, and two recorders. Several scripts (Andersen and Richardson 1997) were piloted and then a final set of scripts selected based on the practice sessions. All five sessions were conducted in the same week with approximately 200 participants across the five groups. Figure 1 shows an example of the type of causal loop diagrams created. Word got out about the sessions and toward the end of the week some participants were eager to know more about the exercise. Follow-up work included identifying major themes that cut across all five sessions and identifying possible next steps for a second phase of work and contract.

A second contract was drawn up to integrate the five diagrams into a single model, begin development of a basic population model, and map and trace the approximately 180 policy recommendations from the five working groups. This mainly involved the core working groups consisting of the chairs and co-chairs from each of the five working groups. While not a simulation model, mapping the policies and tracing their causes to the population flows proved insightful and of great value to the core working group.

The core working group was faced with the problem of synthesizing the recommendations whether they had the benefit of a system dynamics model or not. Identifying the policies that were proximate to each population flow helped them see some of the challenges

[4] This is similar to the point that Shaffer (1976) makes about the criminal justice system.
[5] With Dr. Gautam Yadama, George Warren Brown School of Social Work, Washington University in St. Louis.

and more realistically consider the benefits of some ideas. They were also able to more clearly see how a large set of policies were concentrated on specific areas such as coordination and collaboration that had proved resistant to change in previous efforts. These results were presented to the core working group in June 2007. One participate exclaimed that this was "total value added" and the group decided that it would be beneficial for attendees at the July Leadership Meeting see a similar presentation. The Leadership Meeting was the main decision making body that would take the recommendations, develop the specific plan, and turn the recommendations into legislative action.

Figure 2: Example of Causal Loop Diagram from Consumer and Family Driven Services Workshop

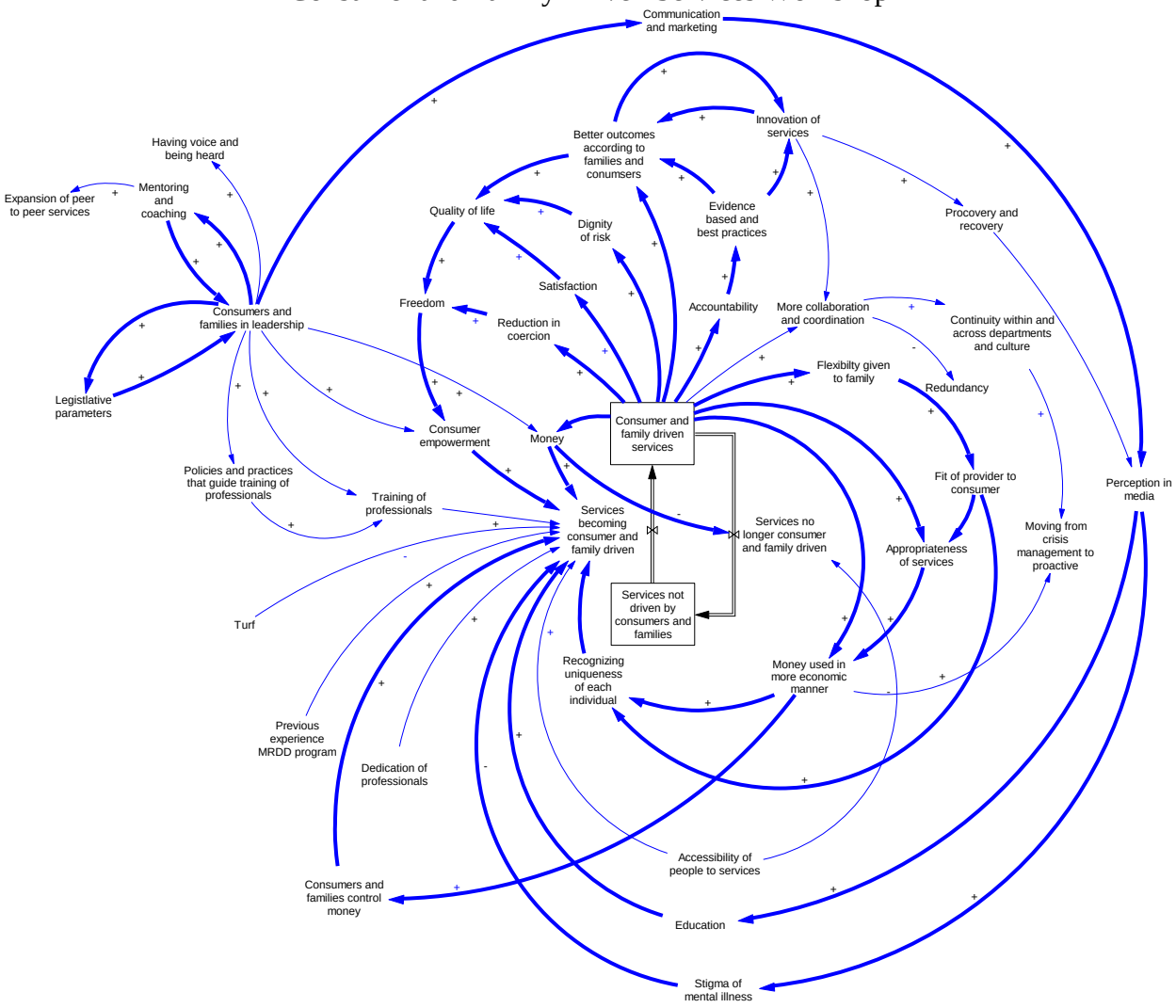


Figure 3 Community Preparation (R3) and Stigma (R4)

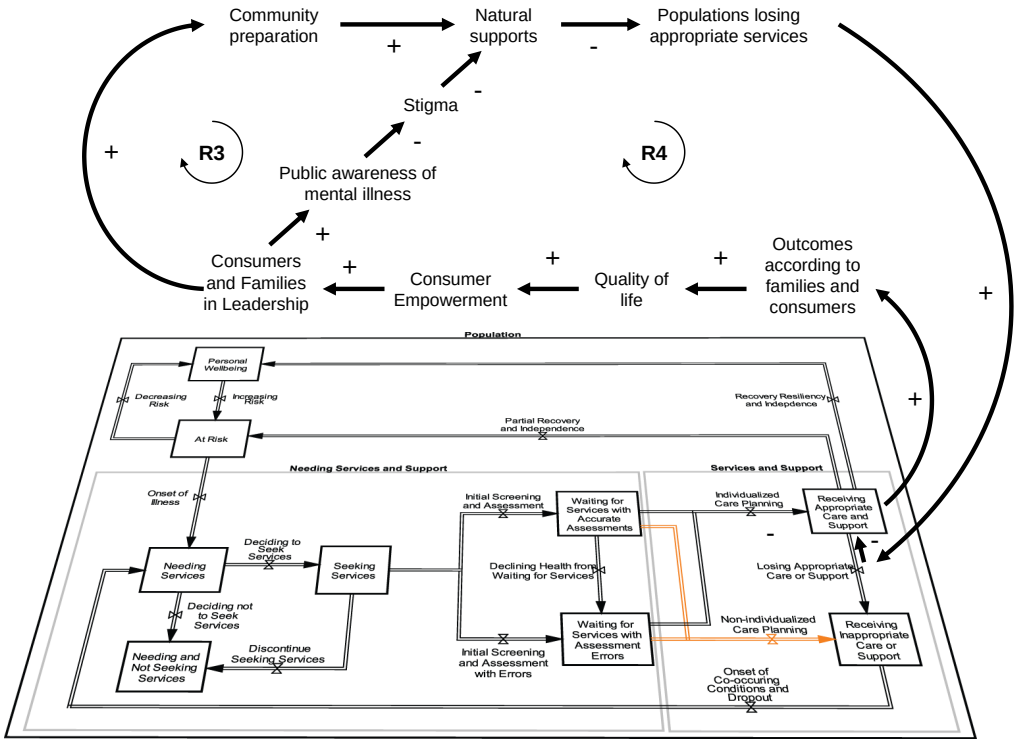
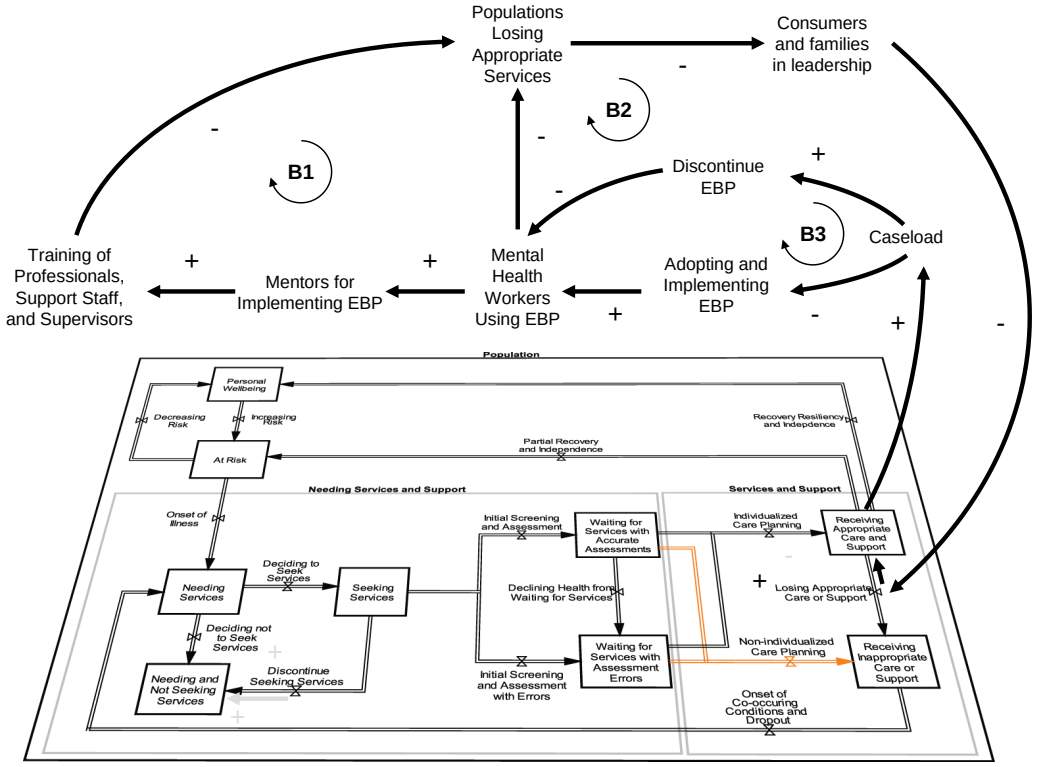


Figure 4 Shortage of Mentors (B1), Losing Fidelity (B2), and Slowing Adoption and Implementation of EBP (B3)



After the Leadership Meeting, a summary report based on the conversation during the meeting was prepared. This report included a review of the overall process and description of some of the key feedback mechanisms that participants had identified and discussed during the previous 7 months and documents, and eventually included as an appendix into the actual plan. Figures 3 and 4 below are two examples of the types of diagrams used to describe these feedback mechanisms. These were based on a single integrated model of mental health transformation that included a stock-flow population model with aging chains. Each of the population stocks shown in Figures 3 and 4 were arrayed to include children, adults, and older adults. This turned out to raise some important issues as people noted, for example, that the greatest risks for children are not necessarily the parents who have mental illness, but the parents who are at risk of mental illness since these tend to occur earlier and there are more parents in this stock. As a consequence, this led to a more nuanced view of risk and prevention across the life-span since adults at risk come from not just the adverse events they experience as adults, but also children who are at risk and age into the stock of at-risk adults. The results were included as an appendix to the state-federal cooperative agreement to transform mental health services in Missouri (Hovmand 2008).

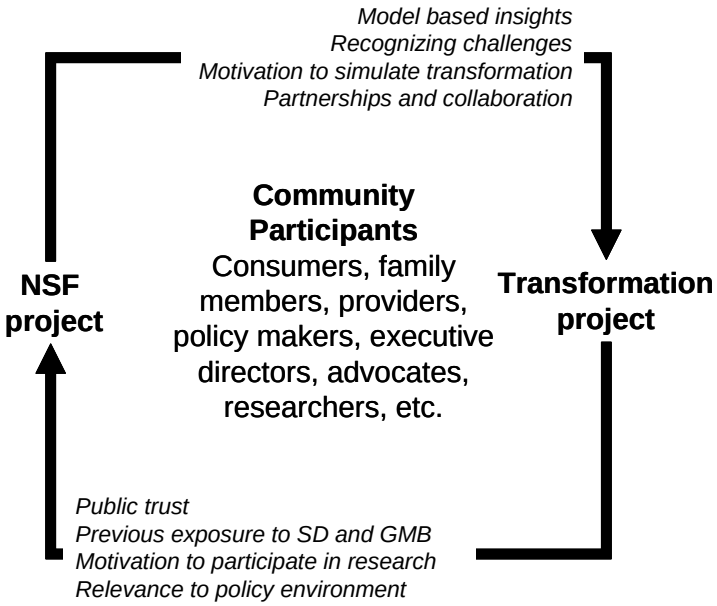
Science Meets Policy Practice

While each of these two projects is interesting in its own right and both continue, the focus in this paper is on how the overlap in the community participants between the two projects created unexpected opportunities and motivation to both participate in the NSF project and pursue the development of a more rigorous system dynamics model of mental health transformation for policy analysis. Figure 5 summarizes this relationship with the community of participants coupling the two projects.

We first noticed this effect when we began our recruitment of nonprofit organizations in the NSF study. Many of the people we met had attended one of the transformation workgroup meetings and remembered the exercise or had a member of their executive team who had participated. Most expressed enthusiasm for participating in more research based on this experience and were eager to get more involved with the development of a simulation model and learn more about system dynamics. And while they had been exposed to system dynamics, we had also developed a better understanding of the relevant mental issues at the state and community level. Importantly, our view was grounded in their collective experience as opposed to a particular agenda. As a consequence, we had a much broader view of what might constitute mental health services and supports, had a better idea of how services and supports were organized, and understood some the barriers that they faced in their day to day operations.

Organizations also expressed a sense of trust that was reinforced when we discussed the importance of the results being “open source” that could be used by them for a variety of purposes without restriction. It was not that we had arrived at some significant insight, but that we were able to effectively link questions about the dynamics of the problem we were studying into their immediate context. When we did this, they not only saw the question, but its immediate practical relevance to the questions they were facing. Some reasoned out loud that they were already thinking about these questions, and so why not do it with the benefits and insights that might come from working on a research project.

Figure 5



The work on the NSF project and related smaller models also helped participants in the transformation project put the qualitative models into context as well as motivate interest in developing a simulation model of transformation. The ability to construct a simulation model of mental health transformation depends greatly not only the skill of the modelers or motivation of client, but also depends on the community of people who are interested in participating and can effectively utilize the results and evaluate their impact. The NSF project has over 40 organizations and 60 people enrolled in the study. Some will be mainly involved as key informants, but many have expressed interest in participating in group model building sessions and subsequent research projects. In fact, we now have a nice problem of there being more interest for more research projects than we could ever have imagined, and this has reshaped our research agenda as organizations and state policy makers are now eager to use system dynamics to address a variety of problems that they are facing.

Through this pair of projects, we have managed to simultaneously field a study looking at basic questions of organizational behavior and impact the policy process. The critical feature of driving the acceptance of both projects has been on developing a *community* that is motivated to use system dynamics and simulation research as important tools for answering difficult questions about how to improve the quality of services and supports in mental health. This community was in effect able to create a new language for thinking about change made possible through the large number of people exposed to system dynamics in both projects.

Equally important is the fact that as this community of participants developed, they began to ask frame questions different and consider new projects. For example, people started to explore how system dynamics might be used to think about the problem of implementing school based mental health, or how the approach could be used to reduce disparities in mental health, or how one could use the approach to support local communities in their planning of mental health services.

Lastly, the two projects together were able to help people begin to question their cherished policies and beliefs about how to deliver services. We helped create a different kind of

conversation—a framework—where someone could say "We know someone's ox is going to get gored" and begin to deal with an incredibly complex problem more honestly.

Conclusion

We attribute some of our success to always remembering a basic point about system dynamics that it is fundamentally about improving the mental models of decision makers over what they might have used otherwise. Seeing the whole might not seem impressive in comparison to a running simulation model, but it is an essential step in the modeling process if one is going to develop a model that will be supported by community leaders, consumers, and their family members. Throughout all this work, we have continually returned to the question of what would decision makers have used otherwise.

Equally important to building this community has been a commitment to capacity building. For example, being situated within a university, we have sought to create opportunities for social workers to pursue internships and take our system dynamics courses. We have presented workshops to the community on system dynamics and talks to local institutes. In our field work with the organizations, we have emphasized the multiple opportunities for them and their staffs to learn more about system dynamics whether they want to participate or not in our study. We have talked with schools and programs with at-risk teens to explore ways that system dynamics could play a role. We have helped connect their causes and participated in their movements to address some of the critical barriers, such as supporting petition drives for a local children's mental health tax levy. In short, we have not only sought them out as participants in research, but been actively engaged in the community. They have in turn had higher expectations of us, and impressed upon us the responsibilities we have to bring these conversations forward to impact local communities.

This has created whole new sets of opportunities that we could not have imagined 18 months ago. Recruiting and partnering with organizations to work on implementation issues in mental health has been recognized as one of the most formidable barriers to advancing implementation research. We now work with a community of diverse organizations with interests in pursuing more system dynamics. The first two projects with the Department of Mental Health have created a desire to develop a third project. These are now in the process of coming together in plans for new studies that aim to use system dynamics simulation modeling for understanding and planning implementation strategies to reduce disparities and improve the quality of mental health services. We are in a position to imagine that 10 years from now if not sooner, community mental health planners may be drawing on a set of canonical simulation models to design programs and organizations to address gaps in mental health services, or use simulation models to design and conduct evaluations of changes to mental health services, or draw on system insights derived from experience with these models to work with communities to design and support key policy initiatives such as a school based mental health. We envision a time when researchers proposing a grant to test a new implementation intervention in a community would have conducted a simulation study prior to submission in much the same way that we conduct a statistical power analysis today. Ultimately though, we foresee a fundamental shift in how mental health services and supports are provided in the United States and globally, and a welcomed role for system dynamics as a tool to facilitate that transformation and developing research partnerships.

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