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Community and programmatic factors influencing effective use of system dynamic models

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COMMUNITY AND PROGRAMMATIC FACTORS INFLUENCING EFFECTIVE USE OF SYSTEM DYNAMIC MODELS

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ABOUT THE RETHINK HEALTH SYSTEM DYNAMICS MODEL

The RTH model is a realistic, but simplified, portrait of a regional health system. Representing a U.S. city, county, state, or region, the model simulates changes in population health, health care delivery, health equity, workforce productivity, and health care costs by quarter-year increments from 2010 to 2040. The model contains more than twenty options for simulating strategies either individually or in combinations. RTH's year-one pilot phase (2011-2012) provided a multi-site laboratory for exploring important practice-based questions.

STUDY DESIGN

To advance future application of dynamic simulation modeling in the health arena, we evaluated the first five sites that piloted the RTH model to determine contextual characteristics and pre-conditions that promote or undermine effective use of the model.

The realist method uses a 'configurational' approach to causality, in which outcomes follow from the alignment of a specific combination of attributes, namely the context within which the intervention is introduced and the mechanism, or characteristics of the intervention itself. Through a realist evaluation lens, we analyzed the five communities' modeling experience to better understand how the presence or absence of a range of contextual and intervention characteristics, alone or in combination, promote or undermine effective community use of the system dynamics model.

The realist evaluation approach allowed the original data categories to be systematically applied and tested within and across sites. The evaluation design allowed for the emergence of factors not included in the initial framework, Elements Affecting Model Use, and domains were revised for future practice based upon these learnings.

RESULTS

Collaborative characteristics emerged as a very important context domain across sites (Table 1). Cross-site observations indicate that sites with certain pre-existing collaborative characteristics, leadership capacities, and internal motivation for the project were better able to use the model and harness its potential to catalyze change.

TABLE 1: Summary of Key Context-Mechanism-Outcome Observations Across Sites

	Community 1	Community 2	Community 3	Community 4	Community 5
CONTEXT DOMAIN ELEMENTS					
Community Collaborative Characteristics					
Composition and Size	✔				✔
Influence of Members	✔				✔
Relationships	✔				✔
Leadership Capacities					
convening stakeholders	✔	✔	✔	✔	✔
managing data	✔	✔			✔
use of the model	✔				✔
championing the process	✔				✔
Clearly Identified Problem for Model Use	✔				✔
MECHANISM DOMAIN ELEMENTS					
Sponsorship (internal)	✔	✔			✔
Clearly Defined Geography for Model	✔			✔	✔
OUTCOME DOMAIN ELEMENTS					
Observed Effects of Modeling Use					
Individual	✔	✔	✔	✔	✔
Group	✔	✔	✔		✔
Organization/System	✔				
Further Use of Modeling	✔				✔

Key: ✔ indicates distinctive strengths or attributes relative to the other sites, judged by consensus among all three evaluators.

DISCUSSION

By applying a practice framework, such as the described Elements Affecting Model Use (Table 2), system dynamics practitioners will be better able to assess the extent to which communities are positioned to effectively use modeling tools, design effective community engagements, and evaluate modeling implementation, ultimately enhancing the implementation of their modeling tools and expanding their impact in transforming health systems and improving health outcomes.

IMPLICATIONS FOR PRACTICE

It is our intent that the findings of this realist-informed evaluation, summarized in the Elements Affecting Model Use framework, can serve as a framework for system dynamics practitioners in the field to answer common practice-based questions, including "How do I identify communities with whom to work? What level of facilitation and support might a given community need for model use to have an impact? and How will I know if model use made a difference?"

TABLE 2: Final Elements Affecting Model Use

CONTEXT
Independent of the model activities

Community Collaborative
- Composition and size – decided how?
- ◊ Influence of members
- ◊ Organizational diversity
- Affiliation
- Culture (i.e., conflict, learning, collective action)
- Formality
- ◊ Leadership capacity
  - ◊ Convening stakeholders
  - ◊ Managing data
  - ◊ Use of the model
  - ◊ Championing the process
- Geography
- Resources
- ◊ Relationships
  - ◊ Quality of interactions
  - ◊ History of working together (time together, evolution of partnerships, other projects and accomplishments)

Health System
- *Provider viability*
- *Local ACA activity (including ACOs)*
- *System integration and financing*

History with Rippel
- Participation in other ReThink interventions

Problem Identification/Selection
- Extent to which the stakeholders have information regarding the problem (analytical dimensions)
- Stakeholders in dispute regarding problem (social dimensions)
- ◊ Clearly identified problem (plan for the use of the model)

MECHANISM
Process of the modeling intervention

Pre-project Activities
- Who initiated contact
- ◊ Contracting
  - ◊ Sponsorship
    - ◊ Role of Sponsor
    - ◊ Capacity of Sponsor
    - ◊ Receptivity of the individual sites
  - ◊ Direct
- Initial reactions and deliberations
- Motivation for initiating the intervention – training, implementation of solutions, etc.
- Initial expectations and goals (implementation of results, etc.)
- Modeling/facilitation team and relative roles

Model
- Process for developing model
- Sources of information
- Process for eliciting knowledge
- Size and dynamic complexity
- Level of community engagement in model development (model development vs. customization/calibration)
- Role of modelers
- ◊ Clearly defined geography the model will cover

Facilitation/Support
- Self-directed vs. facilitated
- Extent of support (modeling assistance vs. continued facilitation, guidance, and interpretation)
- Meetings – content, process,
- Time investment
- Modelers
- Facilitator
- Community participants
- Duration of intervention
- Facilitator role and participant perceptions (e.g., neutrality, credibility)
- Follow-up activities

OUTCOMES
Effects of modeling use

Individual
- Reaction to the model – value added, ownership, trust
- Learning and Insights – broader perspective of the system in which they work, understanding of the problem, trade-offs, consequences of inaction, leverage points (high-low)
- Commitment to implement the results of the model
- Changed behavior

Group
- Exchange of viewpoints; focus constructive conversation
- Alignment – "shared view"
- Shared language
- Engagement of key stakeholders
- Capacity for collective stewardship

Organization/System
- Actions taken change the system (slighted modified from literature)
- Results of system changes
- Effective uses for simulated scenarios (align resources, create partnership, advance policy, a deal, a program, a contract)

Methods
- Further use of modeling, systems thinking
- ◊ Ability to use the model independently run simulations
- Modeling seen as a more efficient means than tackling similar problems with more conventional methods
- ◊ Identifies other models that could be used to support decision making

Key
- • Domains identified pre-study based on literature and veteran practitioner insights
- ◊ Additional domains added based upon observed patterns during the evaluation

For more information, please contact the Georgia Health Policy Center at 404.413.0314 or visit us online at www.gsu.edu/ghpc.

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