A Design Framework for Community-Engaged System Dynamics Practice

2023 International System Dynamics Conference in Chicago

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Agenda

What do we mean by design?

- Decisions made about an approach to modeling for some purpose

- Why those decisions matter

- Ways to understand the impact of those decisions

Design for Practice

Ongoing efforts to document and support participation processes

Scripts: captures established techniques for group model building

- Specifies team roles
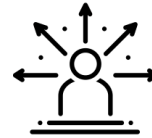- Clarify decisions around how facilitators engage in process

Andersen et al., 1997; Luna-Reyes et al., 2006; Andersen & Richardson, 1997; Hovmand, 2013

Scriptapedia: Scripts compiled a creative commons licensed database

- Enables sharing of best and emerging practices
- Planning tool for process design &adaptation

Hovmand et al., 2015, Hovmand et al., 2012

Supporting Design: Other tools and techniques continue to emerge

- ScriptsMaps for script sequence
- Facilitation manuals to document scripts
- Core modeling teams lead the design and facilitation

Ackermann et al., 2011, Hovmand, 2013; Hovmand et al., 2015

Design for Research on Participatory Modeling

Design tools help create common language to enable research into effectiveness of participatory modeling

Evaluating Participatory Modeling

- **Effectiveness** of group model building workshops.[1]
- **Process:** Understanding the role of boundary objects in group participation.[2]
- **Impact:** Case study research for exploring the impact of participatory modeling in applied contexts.[3]

1. Rouwette, 2012; Rouwette et al., 2002, 2010; Scholz et al., 2015; Scott et al., 2013, 2016; Valcourt et al., 2020
2. Black, 2013; Black & Andersen, 2012; Rose et al., 2015
3. Scott et al., 2016

Limitations

Evaluating effectiveness of participatory modeling necessitates:
- Standards for describing the context
- Consistent and comparable methods
- Documentation of participatory modeling process
- Common measurement tools

Scott et al., 2016

The Gap

Without a cohesive cohesive framework for describing design components and how they relate to one another:

- Practice limitations
- Barriers to entering the field
- Inconsistent reporting
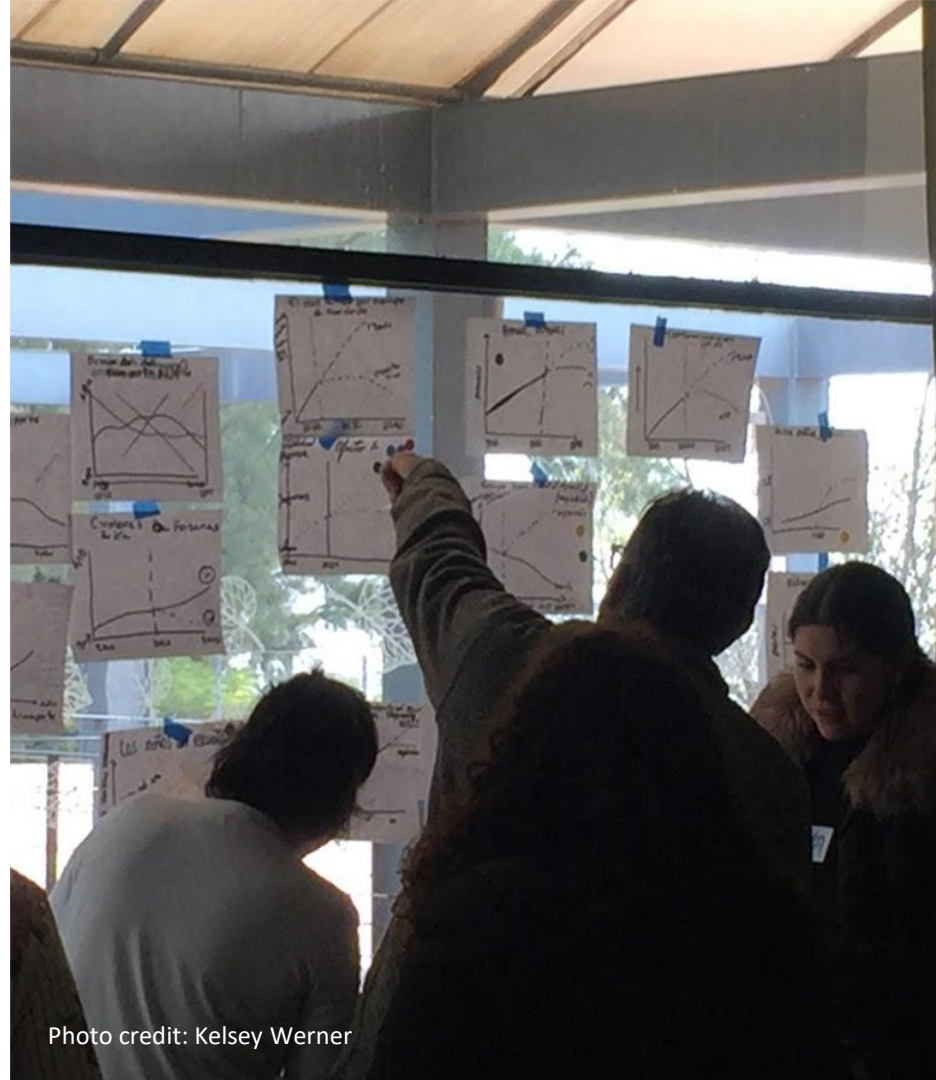- Challenges to evaluation in research

Photo credit: Kelsey Werner

Community-engaged system dynamics practice needs more thorough ways to **document and inform the design of stakeholder participation**

Design Framework

Photo credit: Kelsey Werner

Draft Design Framework

Project: A finite process to convene a stakeholder group to explore a specific problem, which may consist of multiple sessions.

Design Decisions:	Significance:	Assessment Approaches:
- Identifying reference modes - Considering problem types - Type/depth of insight required - Proposed value-add of modeling - Stakeholder identification - Modeling objectives - Core modeling team formation - How outputs will be documented, used, and shared - How the project will be evaluated	*Project level design decisions affect overall project impact such as:* - whether the right problem is being modeled - Whether the relevant stakeholders are engaged - Fit of approach to community - Fit of approach to problem - Fit of approach to scope - Potential benefits of the approach	- Impact evaluation - Comparative experiments - Participant surveys - Qualitative interviews

Session: A fixed period of time to engage stakeholders using scripts.

Design Decisions:	Significance:	Assessment approaches:
- Number, length, and frequency of sessions - Format of engagement (virtual or in-person) - Stakeholder participation & combinations (All stakeholders vs subset of stakeholders) - Selection and sequencing of scripts	*Session level design decisions affect:* - Dynamics of participant engagement - The modeling team's ability to process outputs during and across sessions - Participant learning	- Structured debriefs - Process evaluations - Artifact reviews

Script: A documented, structured small group exercise to engage stakeholders in modeling.

Design Decisions:	Significance:	Assessment approaches:
- Adapting the structure of scripts - Determining facilitation roles - Deciding structure of participation	*Script level design decisions affect:* - Outputs of scripts - Stakeholder engagement in activities - Dynamics between participants and facilitators	- Comparative script testing - Fidelity checklists - Video process recordings

Sub-Script: Components (or units) within scripts that are not explicitly stated in scripts but can be further tailored or adapted to enhance facilitation

Design Decisions:	Significance:	Assessment approaches:
- Phrasing activity prompts - Structure of stakeholder participation - Choice of illustrative examples - Use of resources to help guide activities	*Sub-script level design decisions affect:* - Content of activity outputs - Stakeholder engagement with one another and activity outputs - Stakeholder understanding of activity structure and underlying foundations of system dynamics	- Sub-script testing - Post-workshop debrief

Levels: The framework is organized into 4 nested levels: project, session, script, and sub-script

Design Decisions: Decisions made at each level

Significance: Potential impact of decisions on project delivery & outcomes

Assessment Approaches: Tools and approaches to assess the impact of decisions at each level

Draft Design Framework: Project Level

Project: A finite process to convene a stakeholder group to explore a specific problem, which may consist of multiple sessions.

Design Decisions:	Significance:	Assessment Approaches:
- Identifying reference modes - Considering problem types - Type/depth of insight required - Proposed value-add of modeling - Stakeholder identification - Modeling objectives - Core modeling team formation - How outputs will be documented, used, and shared - How the project will be evaluated	*Project level design decisions affect overall project impact such as:* - whether the right problem is being modeled - Whether the relevant stakeholders are engaged - Fit of approach to community - Fit of approach to problem - Fit of approach to scope - Potential benefits of the approach	- Impact evaluation - Comparative experiments - Participant surveys - Qualitative interviews

Draft Design Framework: Session Level

Session: A fixed period of time to engage stakeholders using scripts.		
Design Decisions: - Number, length, and frequency of sessions - Format of engagement (virtual or in-person) - Stakeholder participation & combinations (All stakeholders vs subset of stakeholders) - Selection and sequencing of scripts	**Significance**: *Session level design decisions affect:* - Dynamics of participant engagement - The modeling team's ability to process outputs during and across sessions - Participant learning	**Assessment approaches:** - Structured debriefs - Process evaluations - Artifact reviews

Draft Design Framework:: Script Level

Script: A documented, structured small group exercise to engage stakeholders in modeling.		
Design Decisions: - Adapting the structure of scripts - Determining facilitation roles - Deciding structure of participation	**Significance:** *Script level design decisions affect:* - Outputs of scripts - Stakeholder engagement in activities - Dynamics between participants and facilitators	**Assessment approaches:** - Comparative script testing - Fidelity checklists - Video process recordings

Draft Design Framework:: Sub-Script Level

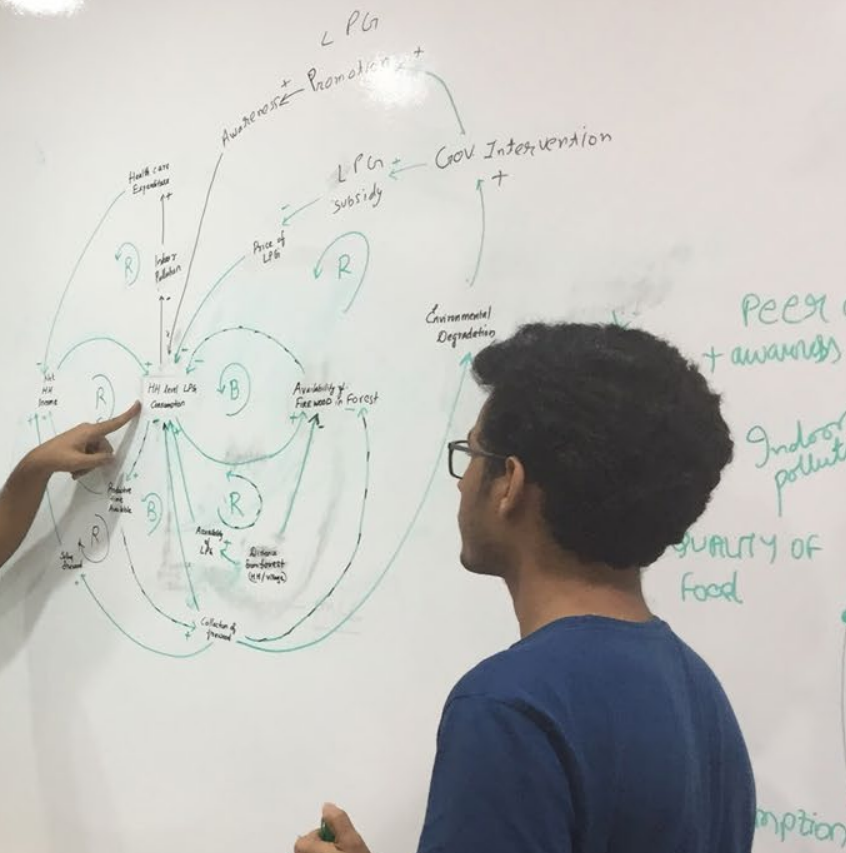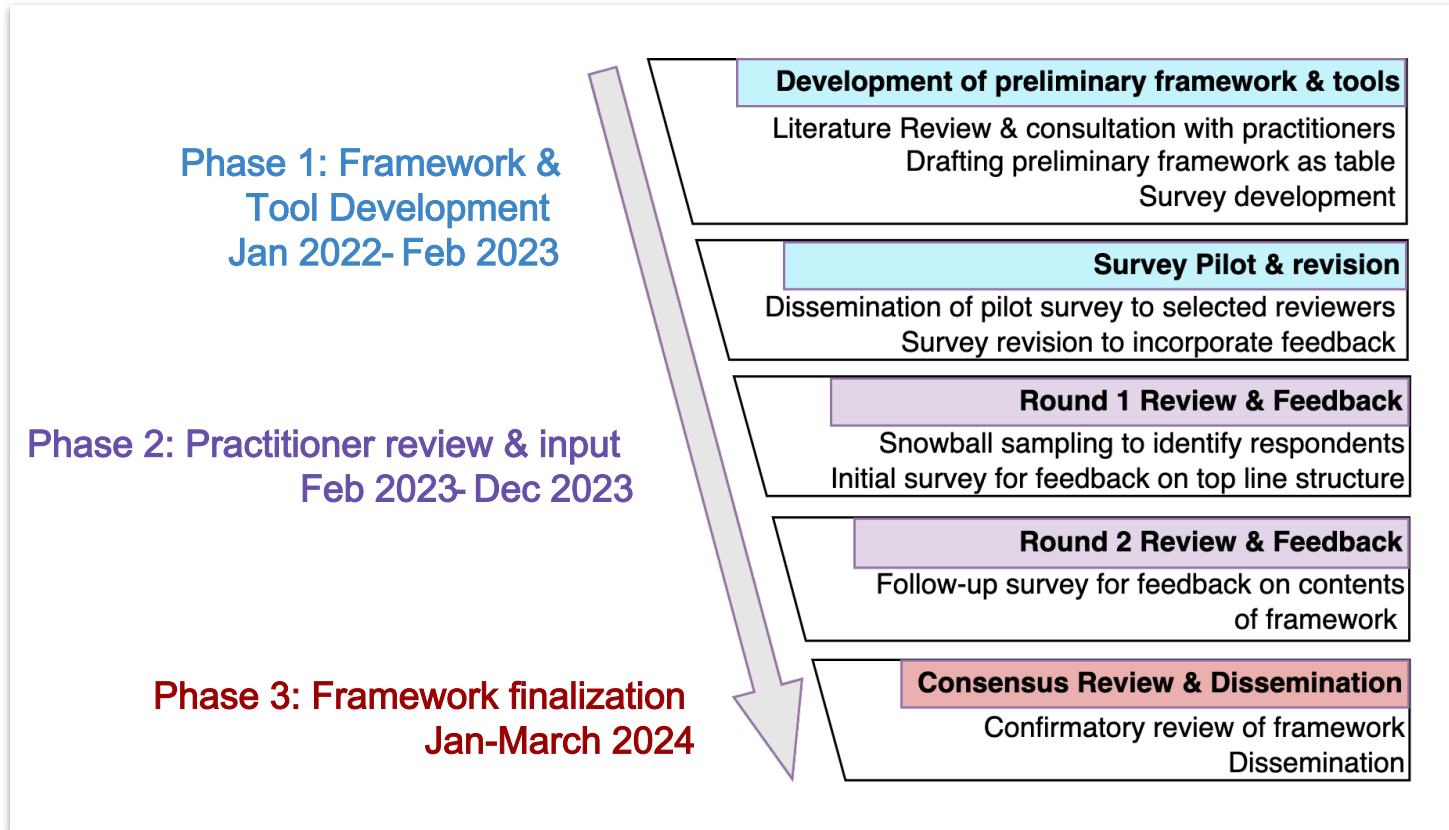| **Sub-Script**: Components (or units) within scripts that are not explicitly stated in scripts but can be further tailored or adapted to enhance facilitation		
Design Decisions: - Phrasing activity prompts; - Structure of stakeholder participation; - Use of illustrative examples	**Significance:** Sub-script level design decisions affect the content of activity outputs; stakeholder engagement with one another and activity outputs; and stakeholder understanding of activity structure and underlying foundations of system dynamics	**Assessment approaches:** - Sub-script testing

Delphi Approach

Photo credit: Kelsey Werner

Delphi Approach

**Phase 1: Framework &
Tool Development
Jan 2022- Feb 2023**

Development of preliminary framework & tools

Literature Review & consultation with practitioners
Drafting preliminary framework as table
Survey development

Survey Pilot & revision

Dissemination of pilot survey to selected reviewers
Survey revision to incorporate feedback

**Phase 2: Practitioner review & input
Feb 2023- Dec 2023**

Round 1 Review & Feedback

Snowball sampling to identify respondents
Initial survey for feedback on top line structure

Round 2 Review & Feedback

Follow-up survey for feedback on contents
of framework

**Phase 3: Framework finalization
Jan-March 2024**

Consensus Review & Dissemination

Confirmatory review of framework
Dissemination

Brady, 2015; Dalkey, 1969; Dalkey & Helmer, 1962

Status to Date

Phase 1 Survey Pilot (Winter 2023): 4 respondents

Phase 2 Round 1 (May 22 - June 30, 2023): 25 respondents

Round 1 Delphi Results

Key Insights from Phase 1: Survey Pilot

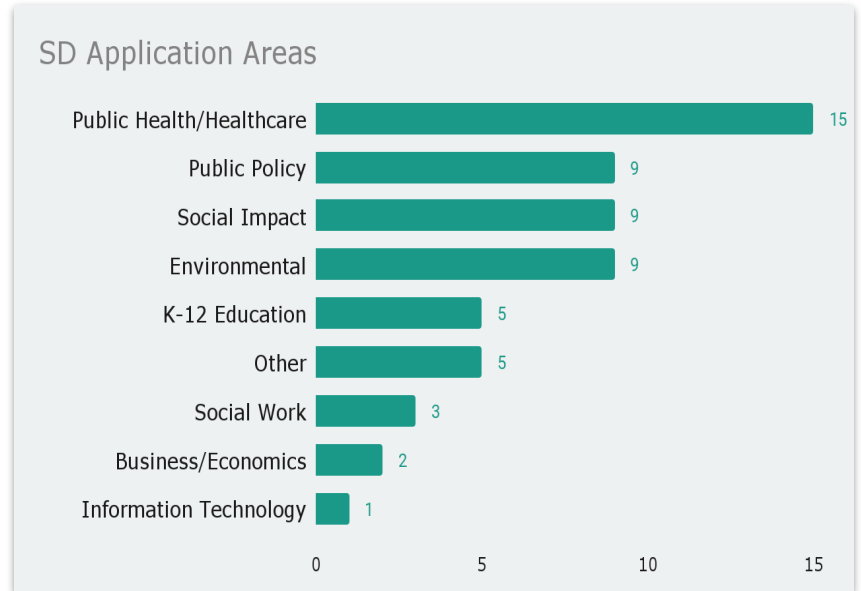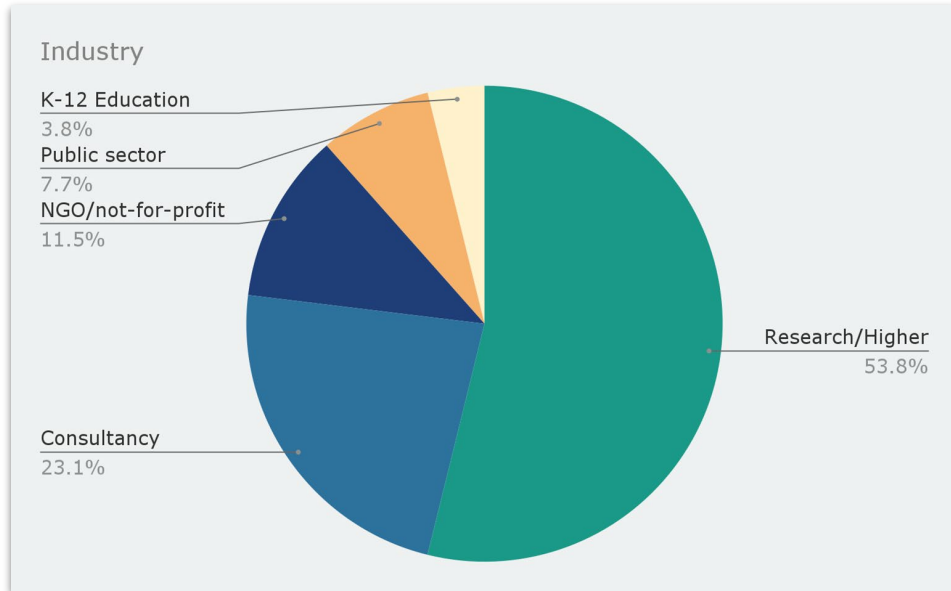## System dynamics and clarifying overlap with other fields

Added focus on products: Models and other outputs are a key feature of workshops, and so further references to products were added throughout to highlight this element of SD

Language: System dynamics generally, and participatory system dynamics in particular, uses a range of jargon, including commonly used terms like "reference mode" or "dynamic hypothesis" and terms used in more specific contexts such as "subscript." The survey was edited to minimise confusion around jargon hindering responses to the survey.

Boundary: The lines between participatory system dynamics, other systems thinking methods such as soft systems methodology, and other facilitation methods such as design thinking can be blurry. The survey was designed to explicitly consider system dynamics, while acknowledging that some of the insights from the survey could be extended to facilitating group processes in general and are therefore likely to apply more broadly.
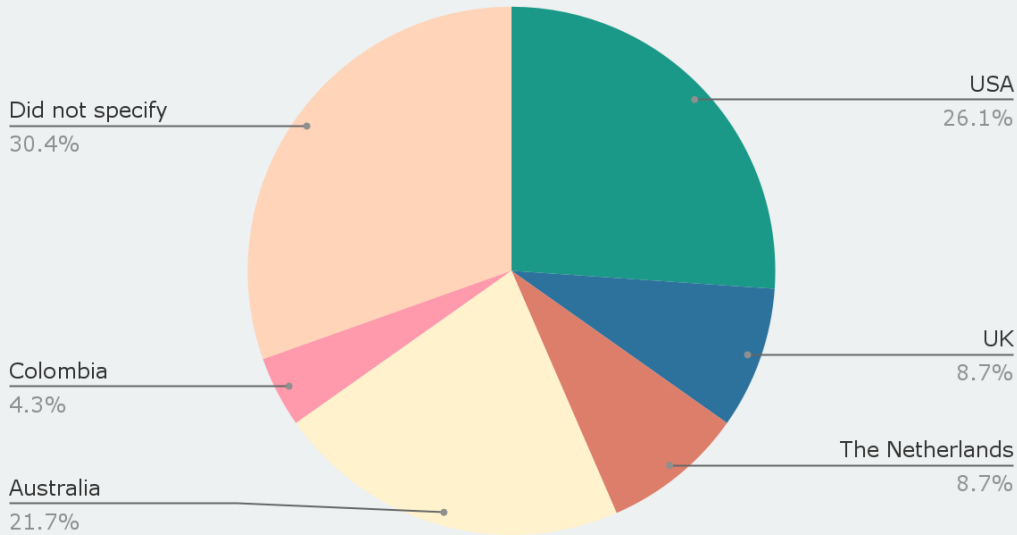
System Dynamics Experience

System dynamics and clarifying overlap with other fields

Industry

- K-12 Education — 3.8%
- Public sector — 7.7%
- NGO/not-for-profit — 11.5%
- Research/Higher — 53.8%
- Consultancy — 23.1%

SD Application Areas

Application Area	Value
Public Health/Healthcare	15
Public Policy	9
Social Impact	9
Environmental	9
K-12 Education	5
Other	5
Social Work	3
Business/Economics	2
Information Technology	1

Demographics

Respondent Locations

- USA — 26.1%
- UK — 8.7%
- The Netherlands — 8.7%
- Australia — 21.7%
- Colombia — 4.3%
- Did not specify — 30.4%

Gender & Race/Ethnicity

11 Woman or Female

7 Man or Male

7 Did not specify

Race/ethnicity (captured qualitatively) indicates majority white respondents. Presenting results may compromise anonymity of the results.

Framework as a Planning Tool

What levels do you plan out in advance?

To what extent does the framework reflect your planning at various levels?

Scale from 1-5: from "not at all" to "to a great extent"

Level	Mean	Std Dev.
Project	4.11	0.57
Session(s)	4.11	0.66
Script(s)	3.72	0.73
Subscript	3.56	1.26

Select Qualitative Responses Across Levels

Adaptations for Participants' Inclusion/Access

- Adapting the language

- Modifying format, time and delivery mode

- Accommodating previous experiences and exposure to systems

- Planning and incorporating activities to improve readiness

- Creating opportunities for inexperienced people to take active roles

Challenges/Constraints Influencing Decisions

- Time

- Budget or funding

- Not getting engagement from the 'right' people

- Limited capacity of team and participants
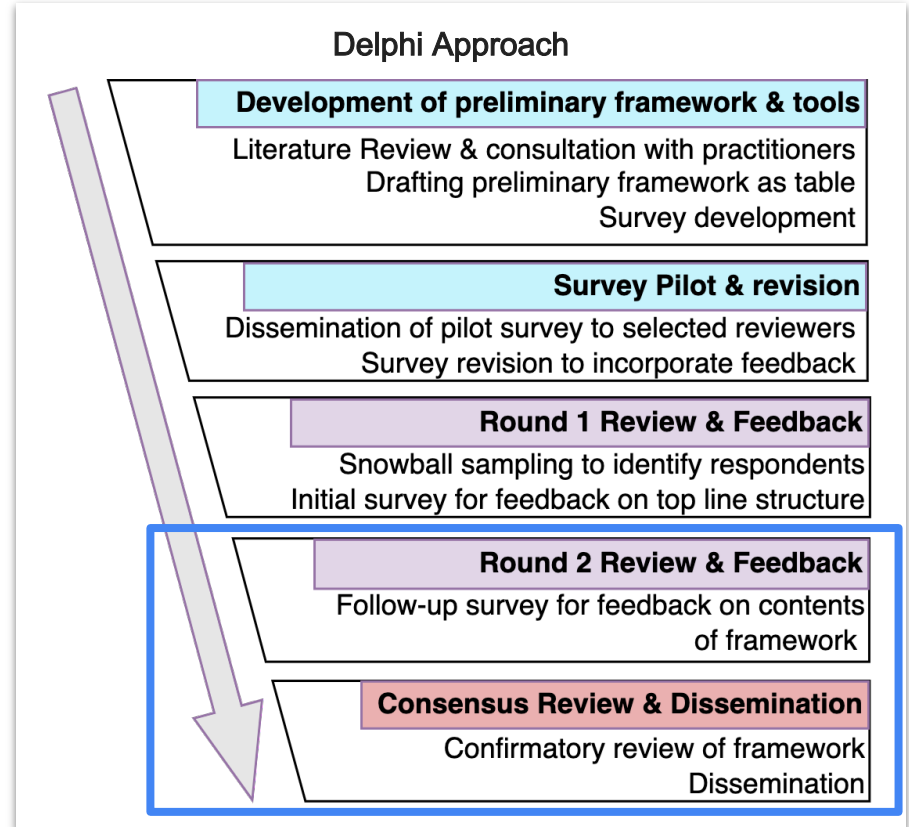
- Progressing beyond CLD development

Next Steps &
Implications

Photo Credit: Ellis Ballard

Next Steps

Analysis

- Analysis of round 1 results to gain understanding of utility of framework for design of community-engaged modeling

- Refine framework components based on findings of round 1

- Round two will aim to further refine framework components and obtain agreement on the final framework overall, with consensus defined prior to the start of round two

- Finalize framework and disseminate

- Explore opportunities for development of additional tools &resources

Delphi Approach

Development of preliminary framework & tools
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Round 1 Review & Feedback
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Confirmatory review of framework
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Potential for Contribution to the Field

Design in Practice:

Use the framework for early stage project and proposal development
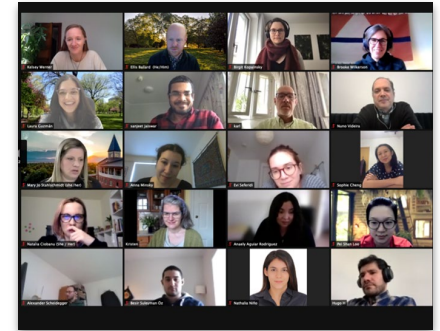

Developing Evaluation:

Develop new approaches to measuring impact of design decisions

Supporting Research:

Standardize reporting to enable comparison across diverse projects

Toward Practice Guidance:

Develop new guidance for the design and implementation of participatory projects

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Appendix

Approach: Delphi Process Inclusion Criteria

Criteria

1. Involvement in a minimum of 2 community-engaged system dynamics projects

2. Involved in a project since 2016

3. Played a role as a main facilitator, project lead, or supporting facilitator

Rationale

Ensure respondents have minimal diversity of practice experience

Ensure practice feedback is relatively current and active

Ensure that respondents have played a role in design considerations

The purpose of community participation in community-engaged system dynamics practice

- Create, co-generate and co-design knowledge and a shared vision of the problem/system by people in the system, increasing commitment and the probability that the knowledge will be acted on

- Engaging expertise and designing a model that centres the voices of people with lived experience, who are often the focus of research/projects

- Bring a variety of stakeholders together in one space to shift mental models and develop shared goals, involving community invites recognition of themselves as part of the problem and solution

- Elicit perspectives of different actors in a problem or system

- For community members to participate as highly valued members with important perspectives and insights, to have their voices elevated to decision makers and those seeking to better understand the system, then create community co-designed and led actions to tackle drivers from various points of influence

- Ensuring community leadership in decision making

- To build a CLD, identify leverage points and develop action ideas

- Help a community understand a complex issue

- Build common understanding, sharing & learning, engagement and empowerment, with equity considerations

- Empower local communities in decision making

- To use community-generated evidence that leads to actionable, sustainable outcomes

- It varies by practice, approach, and project - involving community to contribute to research, needs assessment, quality improvement, to developing a community of practice/community of systems scientists

When planning a project that engages the community in system dynamics

- Most respondents plan at the overall project level (19/29), sessions (17/29) and scripts (16/29)

- Other elements planned for include:

- Logistics/meals

- Format, hybrid or online

- Background materials and information for context

- Common understanding to adapt as needed.

- The process of engagement itself - who are we engaging with, why and how

- Have done these on different and during specific projects

- Incentives for participation and time

- Activities to build readiness

- Sometimes gathering and considering background information / evidence, and building readiness for the group / community first

- Who has the power to support or hinder any of the outcomes from the project

- Slides for intro to SD/artifact sharing

- How we can follow up or keep conversations going