

Using community-based system dynamics modeling to understand the complex systems that influence health in cities

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Urban systems are complex

- **Policymakers generally recognize that cities are complex systems**
- **Aspects of complexity relevant for policy**
 - **Feedback loops – bi-directional relationships with two or more variables**
 - **Interdependence – outcomes of one person are often not independent of outcomes in others**
 - **Change over time – effect of a policy may depend on the state of a system**
- **Need common tools and terminology for describing complex systems and understanding their influence**

Policy stakeholder engagement – group model building

- Four workshops with 72 stakeholders
- Healthy eating and mobility/transport in Latin American cities
- Objectives:
 - Engage policy stakeholders in SALURBAL
 - Introduce systems thinking
 - Describe structure and function of complex systems
 - Explore multi-sector influences
 - Identify policy solutions

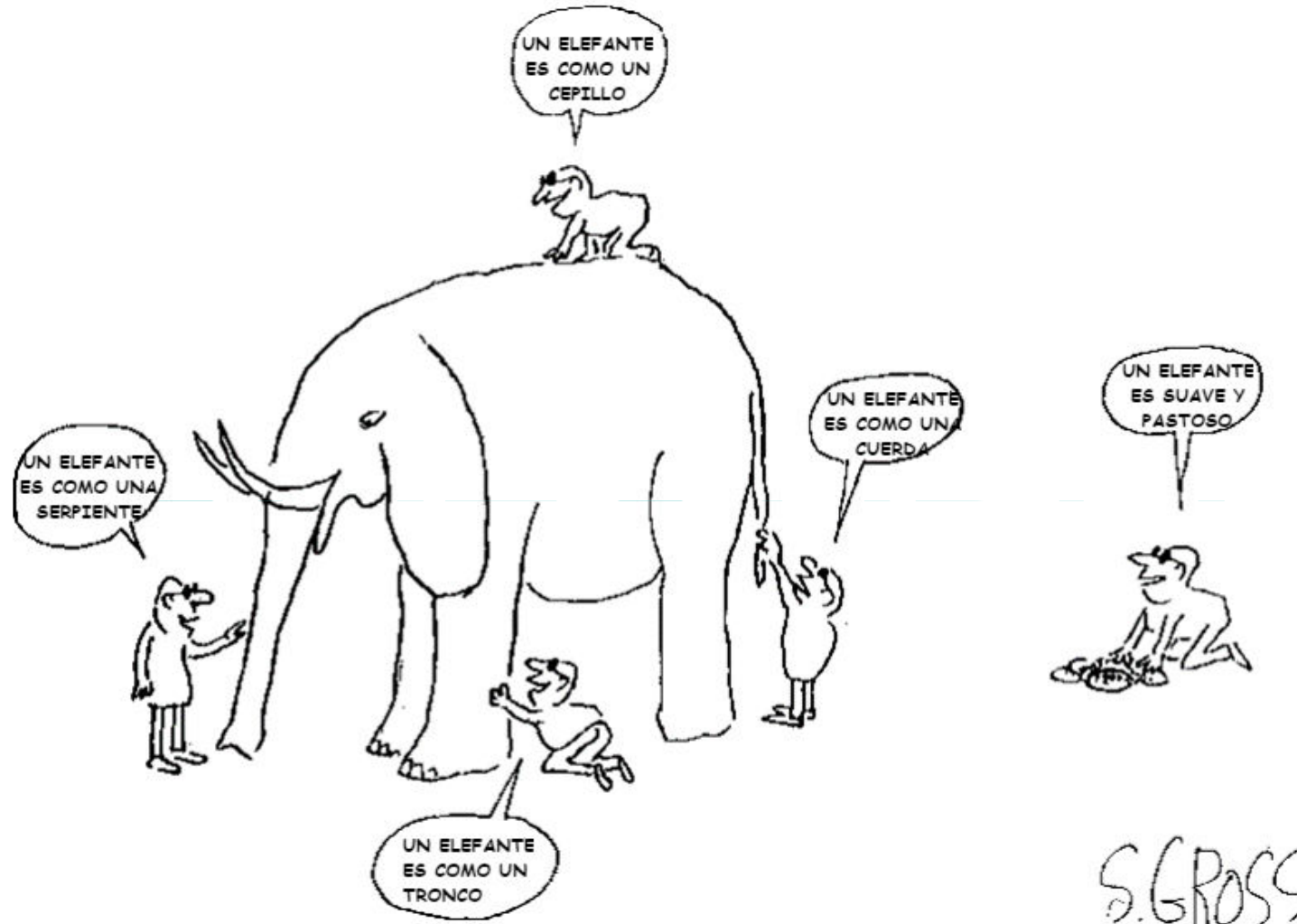
Sample Workshop Agenda

<u>Activity</u>
Hopes & Fears
Graphs Over Time
Dots
Causal Loop Diagramming
Presentations
Model synthesis
Action Ideas
Dots

Four workshops implemented: Lima, São Paulo, Antigua, Bogotá (case study)



We use community-based systems dynamics to co-create shared mental models of systems and represent them using causal loop diagrams

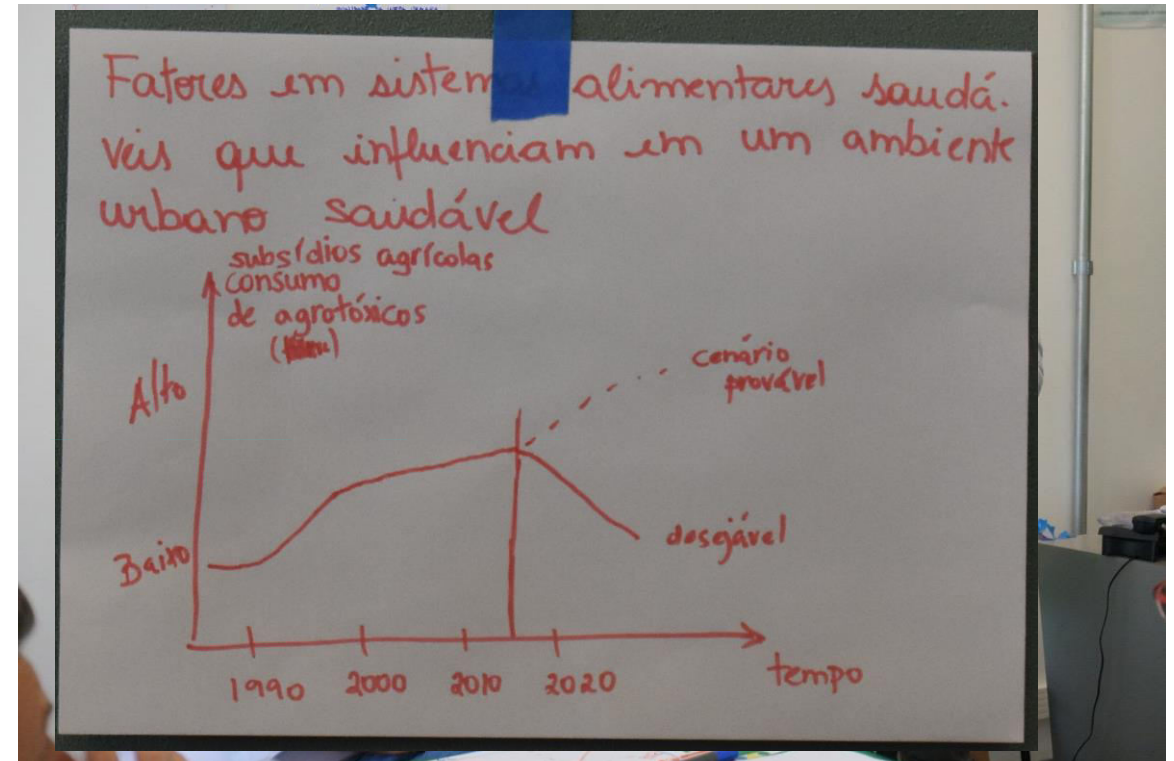


Steele, R. (2015). *Implementing an integrated and transformative agenda at the regional and national levels*. United Nations ESCAP Conference.

Scripted Activities – Graphs Over Time

Purpose: Engages participants in framing a problem, initiating mapping, generating variables, and ranking priority of variables as preparation for creating causal loop diagrams.

Sample prompt: Think of a factor that **influences healthy eating in cities**. Draw a trajectory that shows how you hope that factor changes over time and how you fear it will change over time.

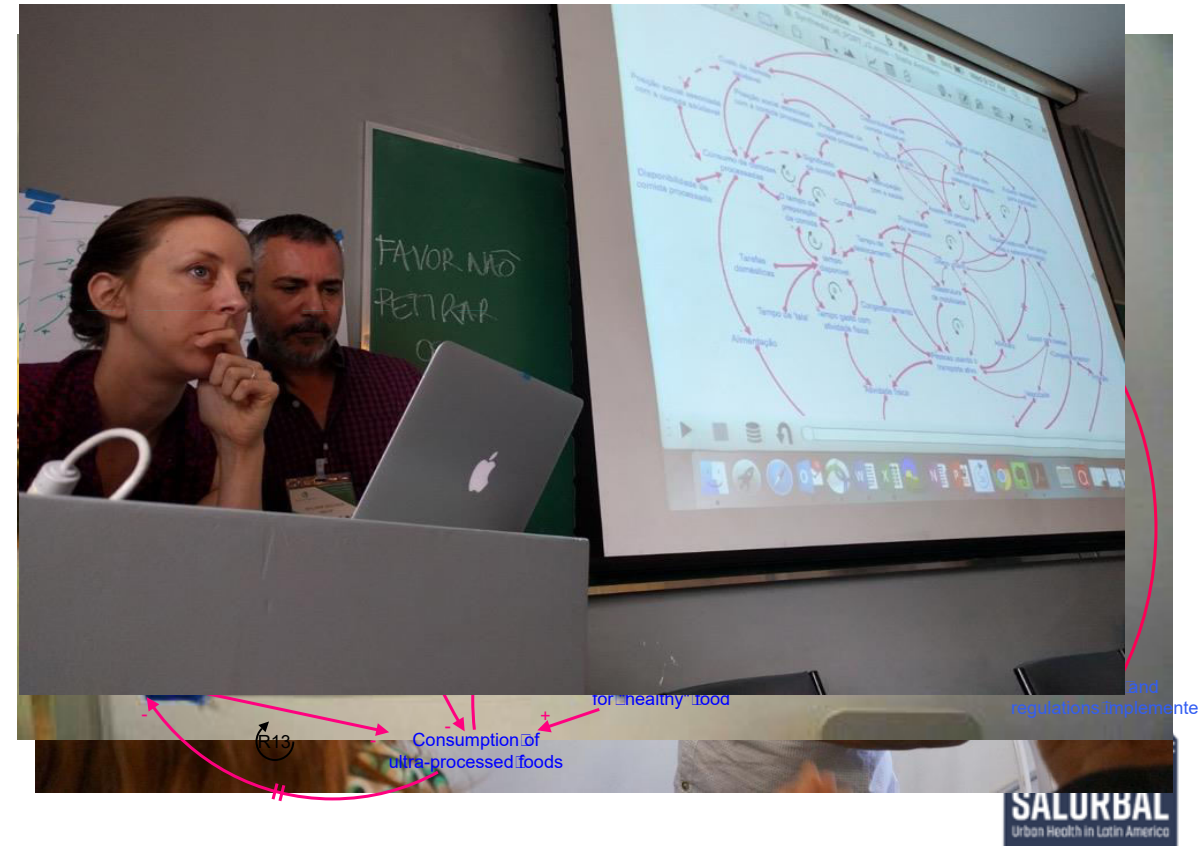


Scripted Activities – Causal Loop Diagrams

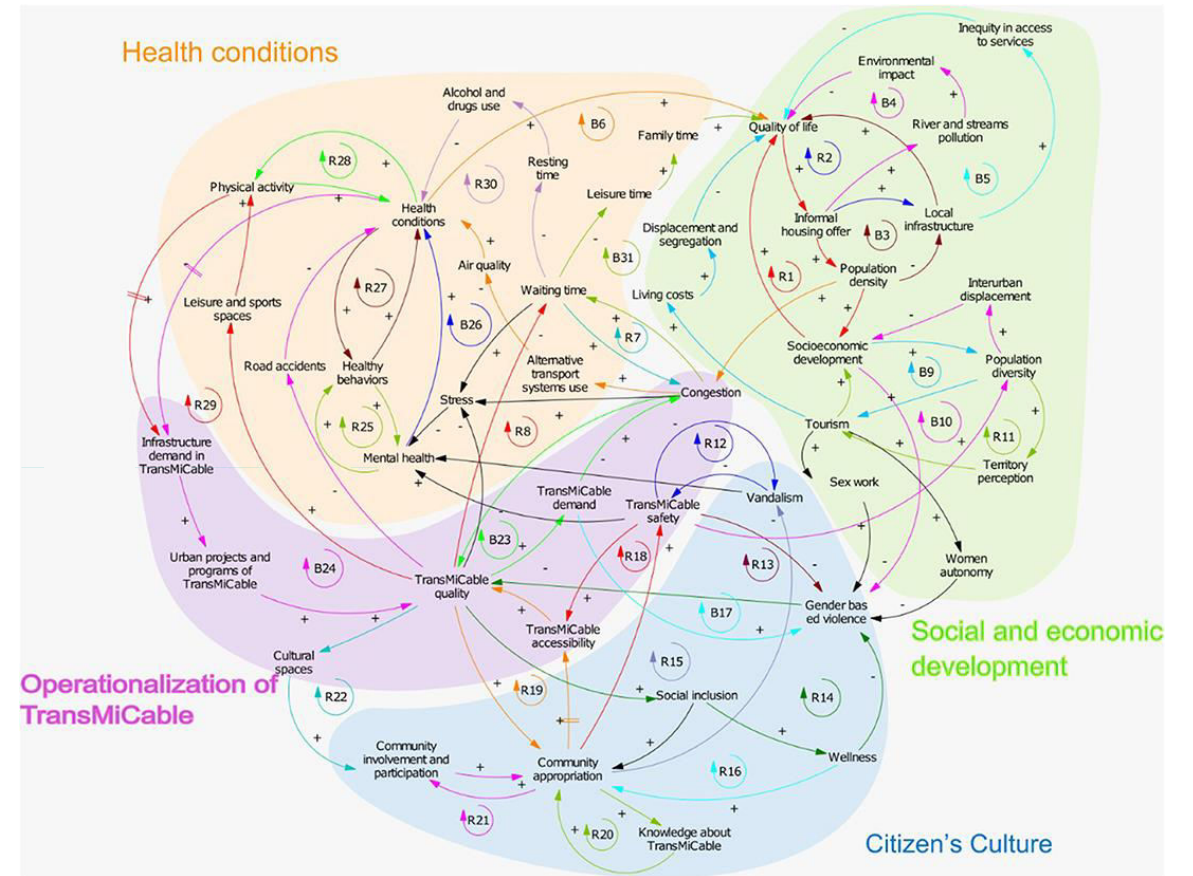
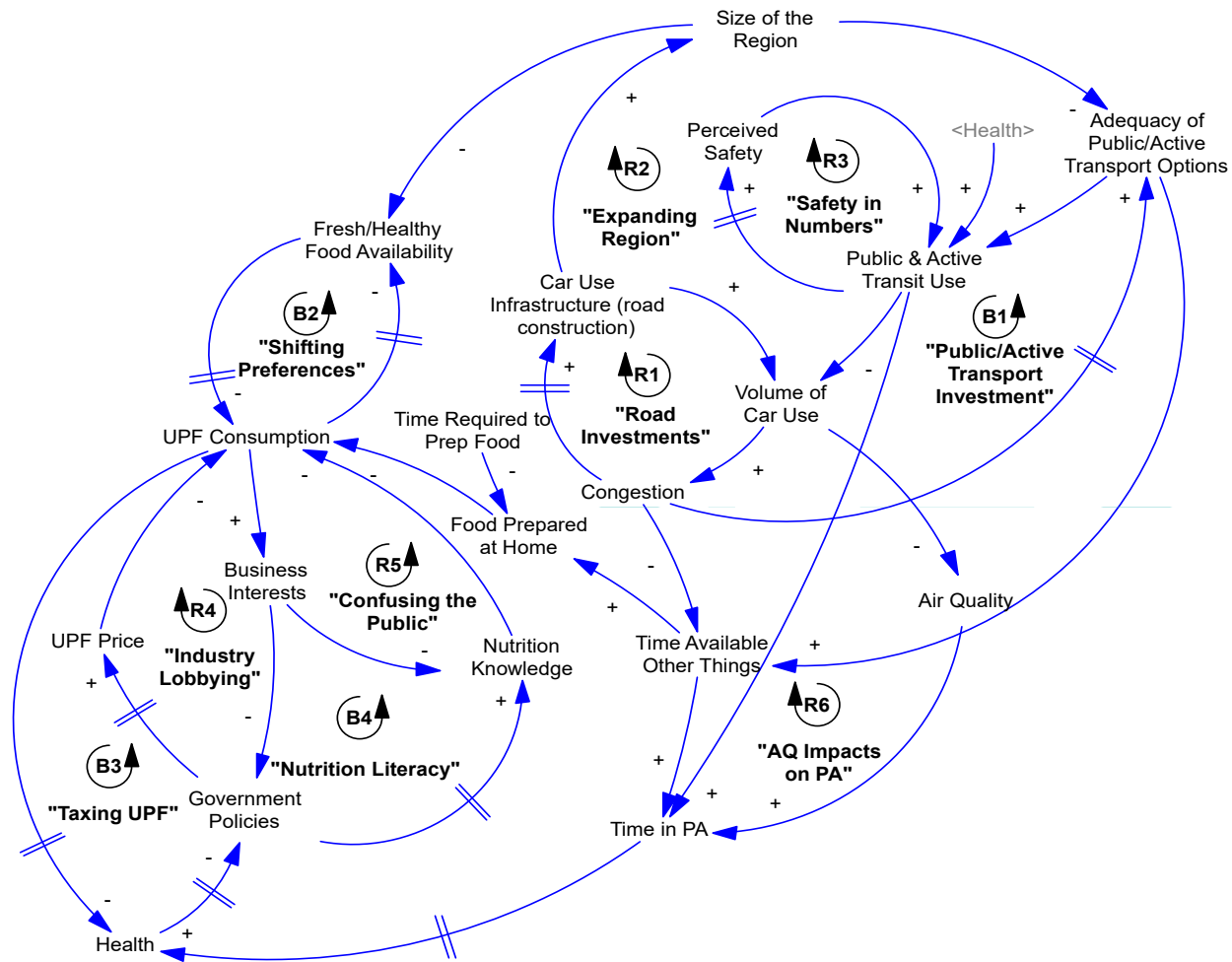
Purpose: Create and synthesize causal loop diagrams

1. Small groups
2. Present back to larger group
3. Synthesis & critique

Prompt: “Build a causal loop diagram that explains a hypothesis of the food system/transportation system factors that influence a healthy urban environment.”

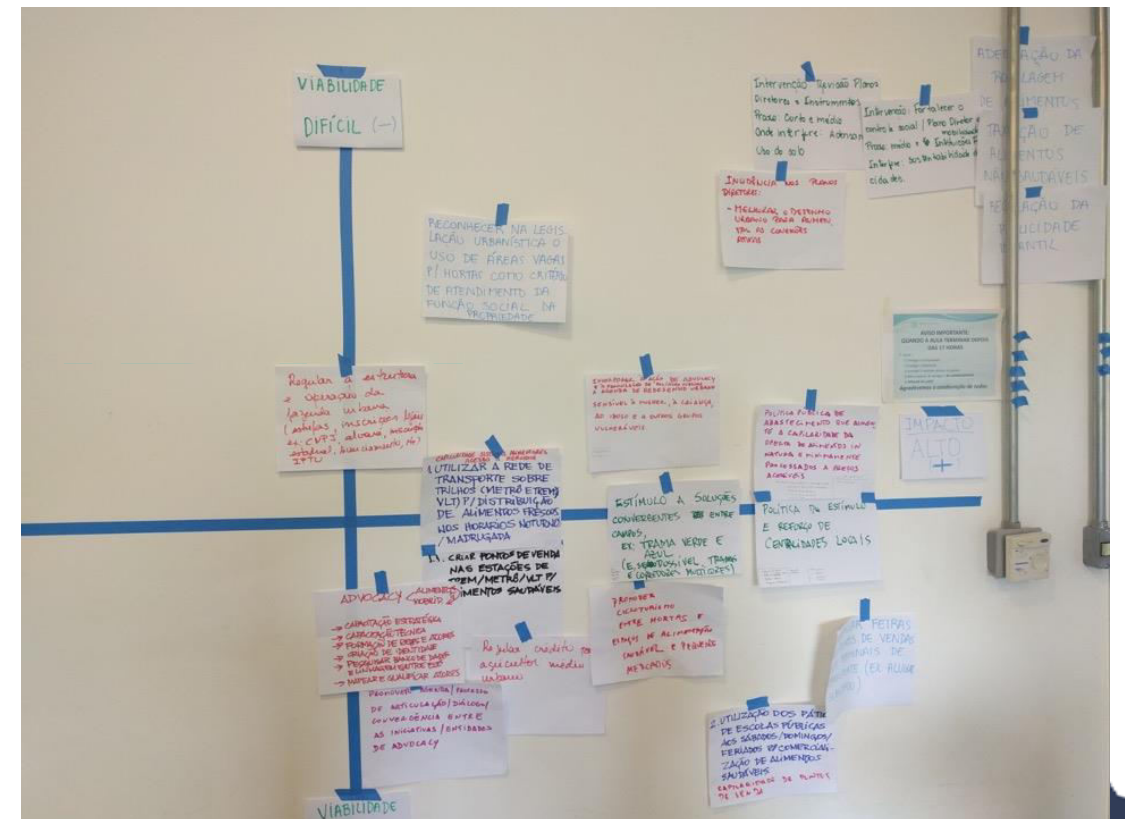


Synthesis model



Scripted Activities – Action Ideas

Purpose: To generate action ideas -- policies and other changes to the system -- to improve health outcomes, rank them by ease/impact, and prioritize them for action.



Action ideas

Hard to Do, Low Impact	Hard to Do, High Impact
<ul style="list-style-type: none"> • Creation of operation regulations for urban farms 	<ul style="list-style-type: none"> • Incorporating advocacy into public policy agendas for urban redesign • Revising city master plans and design instruments • Using integrated infrastructure to distribute fresh foods • Urban legislation recognizing use of vacant areas for urban gardens • Supply-side public policies to increase capillarity of healthy food distribution • Strengthen social control (revising master plans for sustainable cities) • Urban design incentives • Convergent solutions across fields
Easy to Do, Low Impact	Easy to Do, High Impact
<ul style="list-style-type: none"> • Ultra-processed food regulations 	<ul style="list-style-type: none"> • Promoting cycling tours between vegetable gardens, small markets, and healthy eating places • Microcredit and credit assistance for medium-sized farms • Organizing weekend markets at public schools to sell healthy foods • Markets and selling points on transportation lines • Advocacy for food and transport • Advocacy that articulates goals to bring together different initiatives and areas

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