

A Collaborative Web-Based Modeling Platform for Causal Loop Diagramming

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Innovations in Collaborative Modeling 2016

Agenda

- Motivations
- Vision
- Demonstration
- Limitations
- Future Work

A Spectrum of Participation



Value of the Modeling Process

- Often the *modeling process* itself – rather than the models created – offers the greatest value
- Modeling as theory building: Refinement of mental models
- Reflecting on
 - Mental models
 - What is & is not known / data
 - Different perspectives

Models as Boundary Objects

- When characterized in a transparent fashion, models can serve as a common point of understanding by diverse stakeholders
- Having this common point of understanding permits easier communication and sharing of intervention ideas
- *The modeling approach & software used often has a major impact on capacity for use of models as boundary objects*

Causal Loop Diagrams as Boundary Objects

- Causal loop diagrams have long served as effective boundary objects
- Causal loop diagrams can typically be readily understood by participants
- Participants can very commonly contribute to causal loop diagrams

Challenges with current work: Process

- Limited to co-located individuals
- Hard to scale effectively to large participant pools
 - Privileged record keeper : power structure issues
 - Constrained access to physical representation
- Difficulty in communicating to audiences with multiple languages
- Stories & justifications for links and loops are lost
- Commonly reliance on hand-built diagrams

Challenges of hand-built diagrams

- Messy
- Changes burdensome
- Sometimes unreliable
- Limited confines of space

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Vision: Software to Support Collaborative Causal Loop Diagramming

- “Google docs/Office365” for causal loop diagramming
- Easy way for multiple distributed users to collaborative while building up diagram
- Simple sharing mechanism
- Accessible by multiple types of devices
- Small, simple feature set
- Performant

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Demonstration

Accessing the System

- To follow along viewing the presentation
 - Go to <http://tinyurl.com/ICM2016ViewCL>
 - Press “Authorize” button
 - Watch as the diagram is created

Recreate the Diagram

- To create a causal loop diagram
 - Go to <http://tinyurl.com/ICM2016CreateCL>
 - Press “Authenticate” button (if you didn’t above)
 - Add variables, etc.
- It may be helpful to coordinate by voice to one another when you want to “claim” a variable by adding or adjusting it

Tips

- To add a component
 - Click on the appropriate menu
 - **Establish the desired settings (e.g., variable name)**
 - Click on the diagram
- To modify an element
 - Click on it
 - Adjust the properties shown, or the size using the “handle”
- Delete using the delete (DEL) key
- Save the diagram via the “floppy disk” shaped button on upper left
- You can continue to draw connections one after the other. To exit this mode,
 - Press “Escape”
 - Click on the green image of the arrow
- “Undo” and “Redo” are very fine grained – may have to push several times
- Share via button on upper right

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Limitations: Informal Observations

- Failure to display “live” during dragging, resizing, etc.
- Failure to capture
 - Informal exchanges
 - Stories
 - Justifications
- Impaired usability
- Dependence on google accounts & docs to share
- No support yet for surface & touch devices
- Dependence on technology

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Features Seeking to Add

- Multilingual toggle/superposition
- Stock & flows for system structure diagrams
- “Live” tracing of dragging & other actions (facilitating social rules)
- Auditing to record & reporting to indicate who changed what/when
- Multiple object selections & manipulations (e.g., dragging, deletion)
- Option of recording explanatory metadata
 - Link creation: Justification/stories
 - Link browsing & modification: Recording of multi-way discussion
- Capturing delay indicators
- Pointing
- Hierarchical “hiding” mechanisms
- Ubiquitous commenting (e.g., via Disqus)
- Adaptation for surface computing?

Conclusions

- Traditional diagramming methods for participatory modeling offer significant limitations
- We have created an OSS collaborative modeling tool supporting simultaneous, interactive causal loop diagramming by physically distributed or co-located participants using multiple device categories
- Despite limitations, early experience suggests great potential for such collaborative software
- The tradeoffs associated with such technology-based causal loop diagram need to be closely studied

Acknowledgements

- Garrett Hansen
- Carl Gutwin

Intermediate Agent-Based Modeling

Bootcamp & Incubator 2016 (Aug. 22-27)

- Detailed “hands-on” coverage of building, calibrating & using agent-based health models
- Diverse health application case studies
- Instructor & TA assistance in building up models customized to participant’s interest
- Dozens of example health models, step-by-step exercises building health ABMs
- Discussion of modeling process best practices
- Coverage of sensitivity analysis, calibration, debugging
- Detailed tutorials on computational essentials
- modelingtutorials@cs.usask.ca