Modelling social learning during participatory modeling processes

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Modelling social learning during participatory modeling processes

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“Modelling the modelling process”

- What?
  - Attempting to develop a theory of mechanism occurring during participatory (multi-)modelling
- Why?
  - to purposefully design (more) effective participatory modelling processes
- How?
  - Developing a ABM based on a transdisciplinary theoretical synthesis and case studies
- Where?
  - First theoretical framework, model implementation and initial results

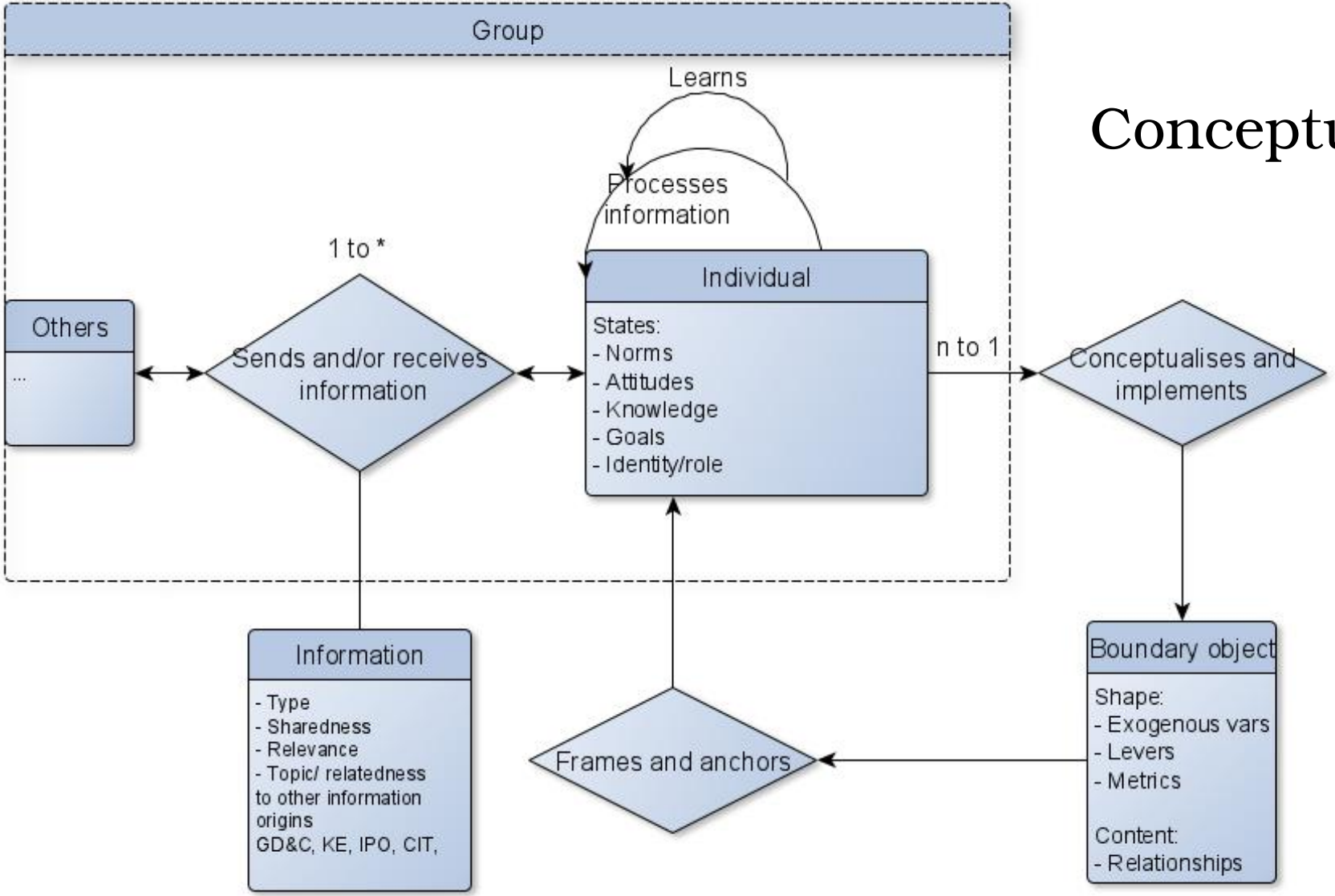
Theoretical framework : Theory synthesis

- Drawing from :
  - Social psychology
  - (science) communication theory
  - Broad participatory modeling literature

- Core concepts :
  - Information / knowledge
  - Boundary object
  - Individual / group interactions
  - Social learning

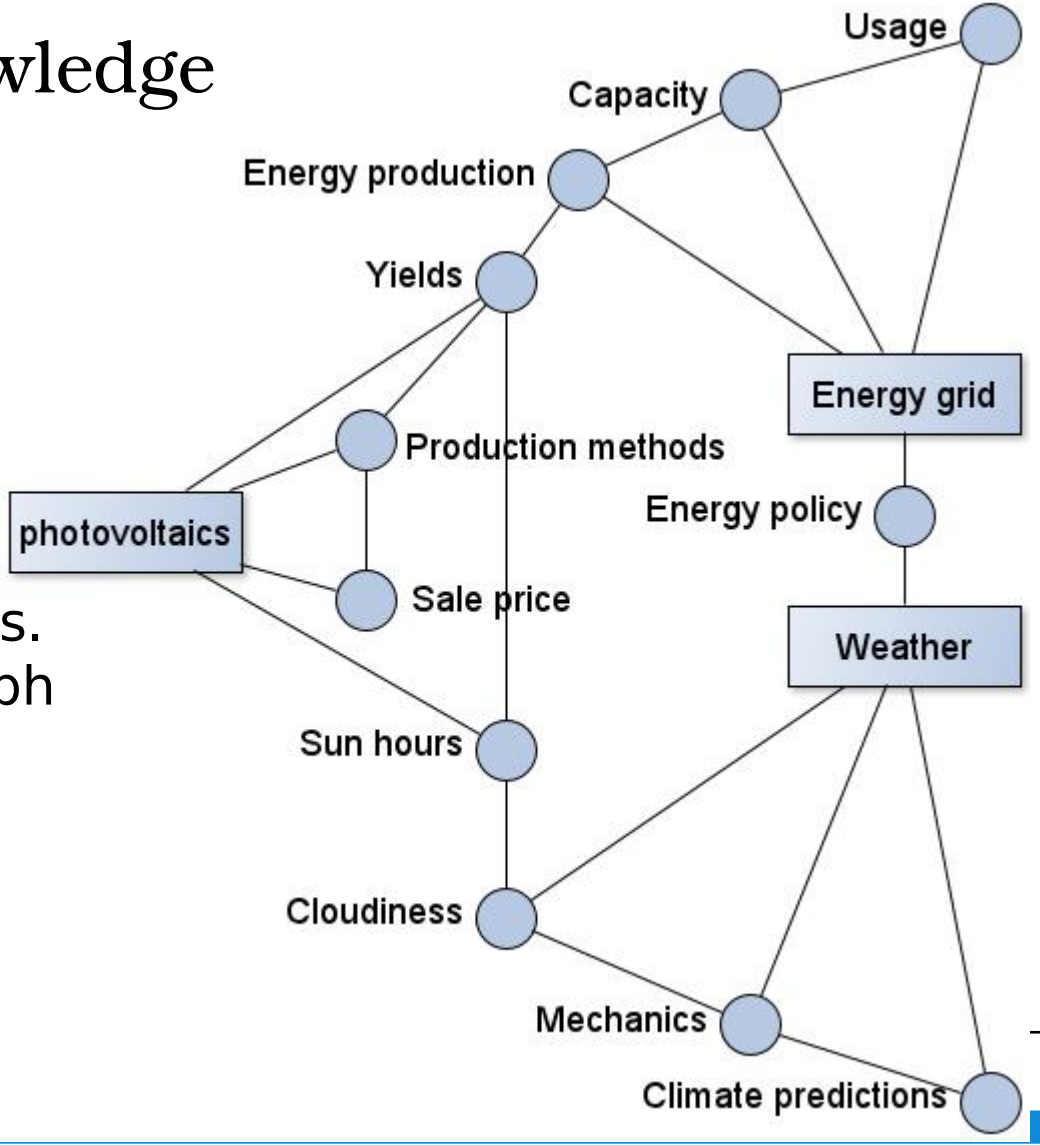
Theory	Origin	Main source - Selection based on modelability, perceived usefulness and (inter)compatibility
Group diversity and conflict theories	Social psychology	•Jehn, K. A., Northcraft, G. B., & Neale, M. A. (1999). Why differences make a difference: A field study of diversity, conflict and performance in workgroups. Administrative science quarterly, *44*(4), 741–763. •Greer, L. L., Jehn, K. A., & Mannix, E. A. (2008). Conflict transformation: A longitudinal investigation of the relationships between different types of intragroup conflict and the moderating role of conflict resolution. Small group research, *39*(3), 278–302.
Social categorisation theory	Social psychology	•Hogg, M. A., & Reid, S. A. (2006). Social identity, self-categorization, and the •communication of group norms. Communication theory, *16*(1), 7–30. •Hogg, M. A., & Tindale, S. (2008). Blackwell handbook of social psychology: Group processes. John Wiley & Sons.
Faceworks	Communication science	Littlejohn, S. W., & Foss, K. A. (2010). Theories of human communication. Waveland press.
Input-process-Output model	Communication science	Littlejohn, S. W., & Foss, K. A. (2010). Theories of human communication. Waveland press.
Common Knowledge effects	Social psychology	Stasser, G., & Titus, W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. Journal of personality and social psychology, *48*(6), 1467.
Cognition and information processing theories	Communication science & Social psychology	Littlejohn, S. W., & Foss, K. A. (2010). Theories of human communication. Waveland press.
Information integration theory	Communication science	Littlejohn, S. W., & Foss, K. A. (2010). Theories of human communication. Waveland press.

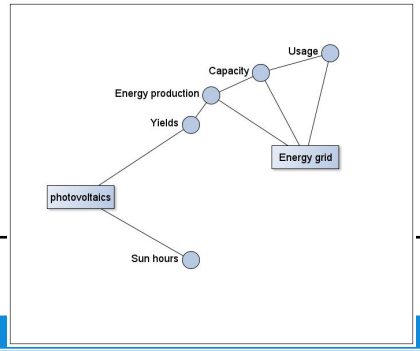
Conceptual model



Conceptualization of knowledge

- Multidimensional network
- complete knowledge set exists
- topics
- information items
- Relations (links) between these items.
- Individual knows a subset of the graph

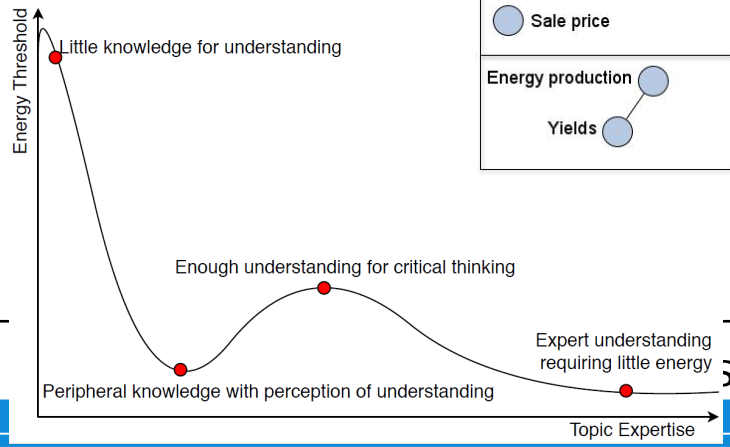




Sharing and learning of knowledge

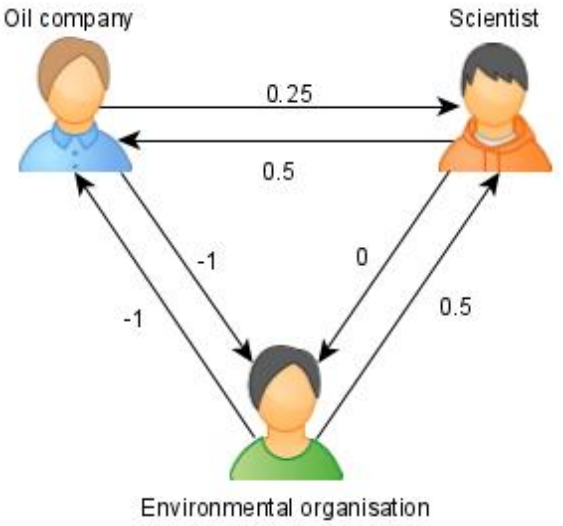
- Individuals may share known items, links and topics.
- Sharing influenced by perceived relevance of that information.
- Individuals receive information : process or reject it based on
  - expertise / familiarity with the topic.
  - energy needed to process information.
  - available energy : relevance and attitude towards the sender .
- Required energy related to expertise

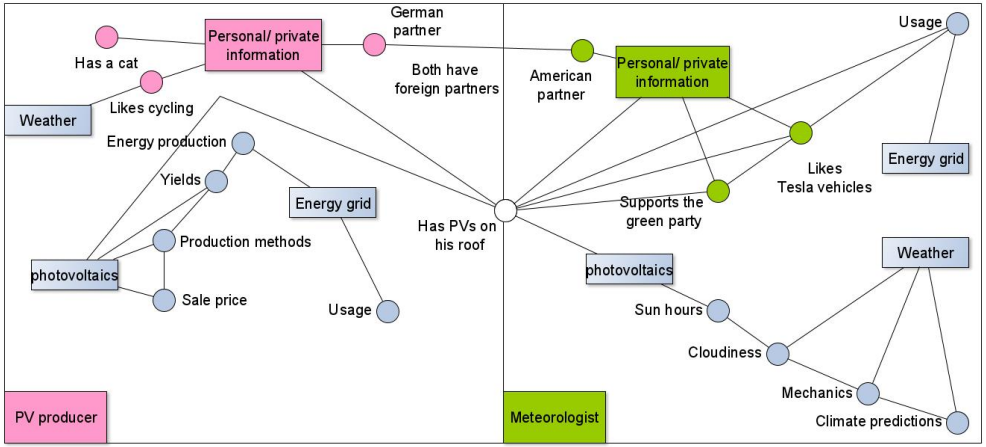
Visualisation	Description	Information weight	Required relative energy
photovoltaics	Topic	No real information requires elaboration	0
photovoltaics Energy grid	Relation between topics	Useful if many information items are known requires elaboration otherwise	1
Energy production Yields	Relation without information item(s)	Relation without information item(s)	2
Production methods Sale price	Information item(s)	Building blocks of knowledge. Required for knowledge creation	3
Energy production Yields	Relation and information item(s)	Relation and information item(s)	4



Attitude and energy

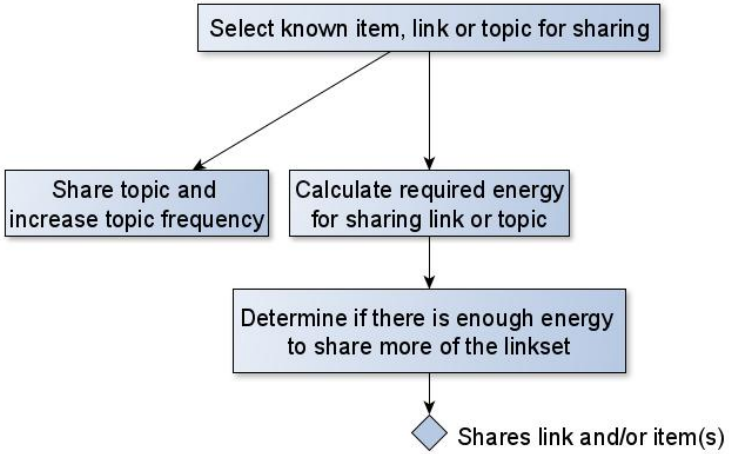
- Attitudes are asymmetrical and modify energy required for communication
- affected by
  - sharing and processing of (personal) info
  - Information already known : lower effect on attitudes.
  - preference for specific information

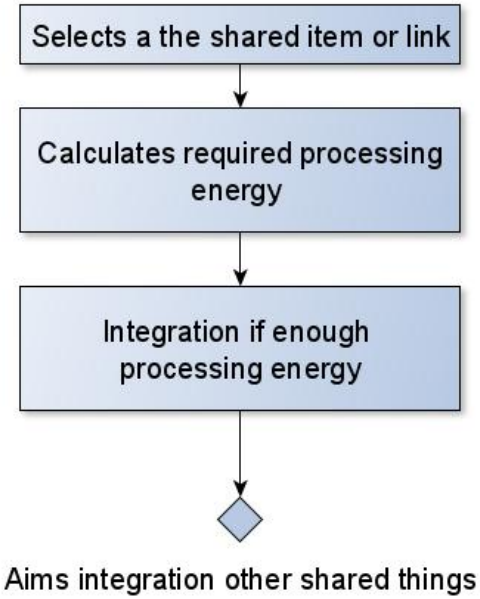




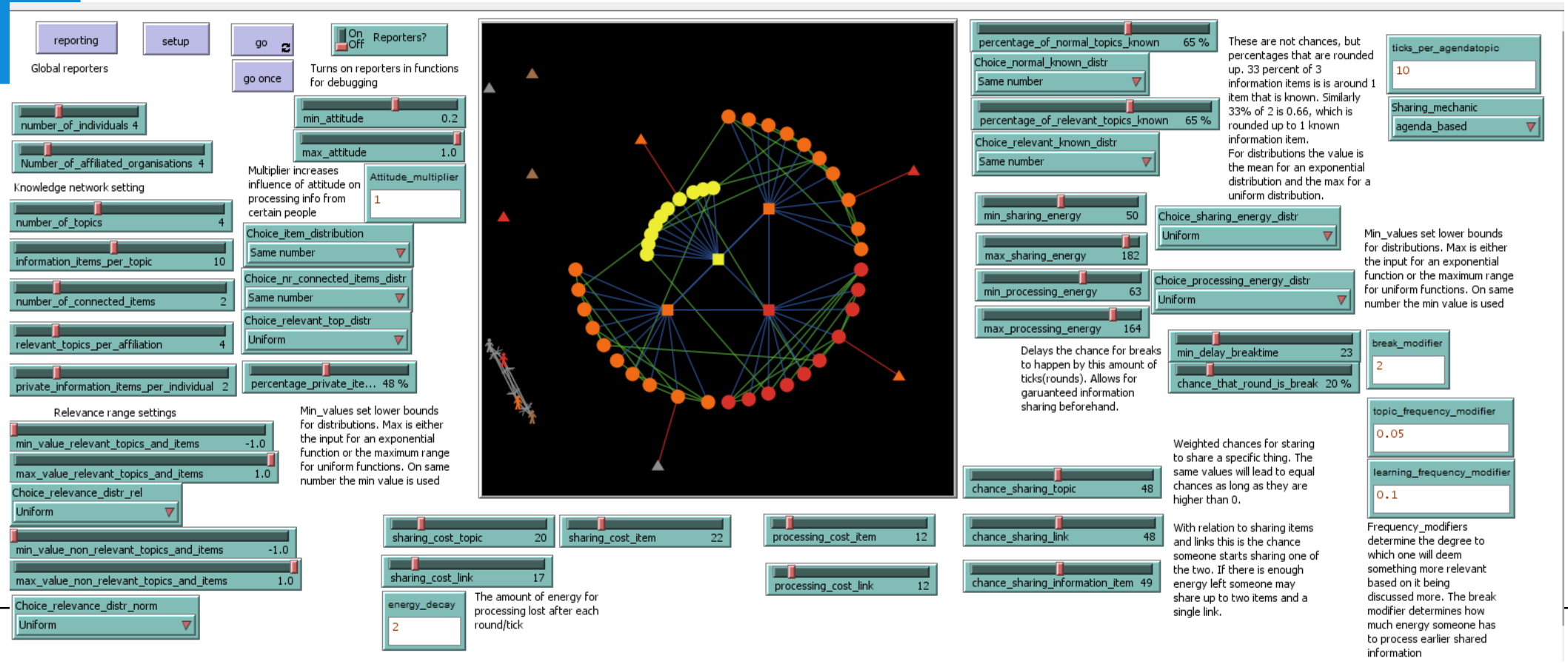
Model narrative

1) Collaborative session (content related interaction)
2) Integration of knowledge
3) Break (personal information related interaction)
4) Integration of knowledge





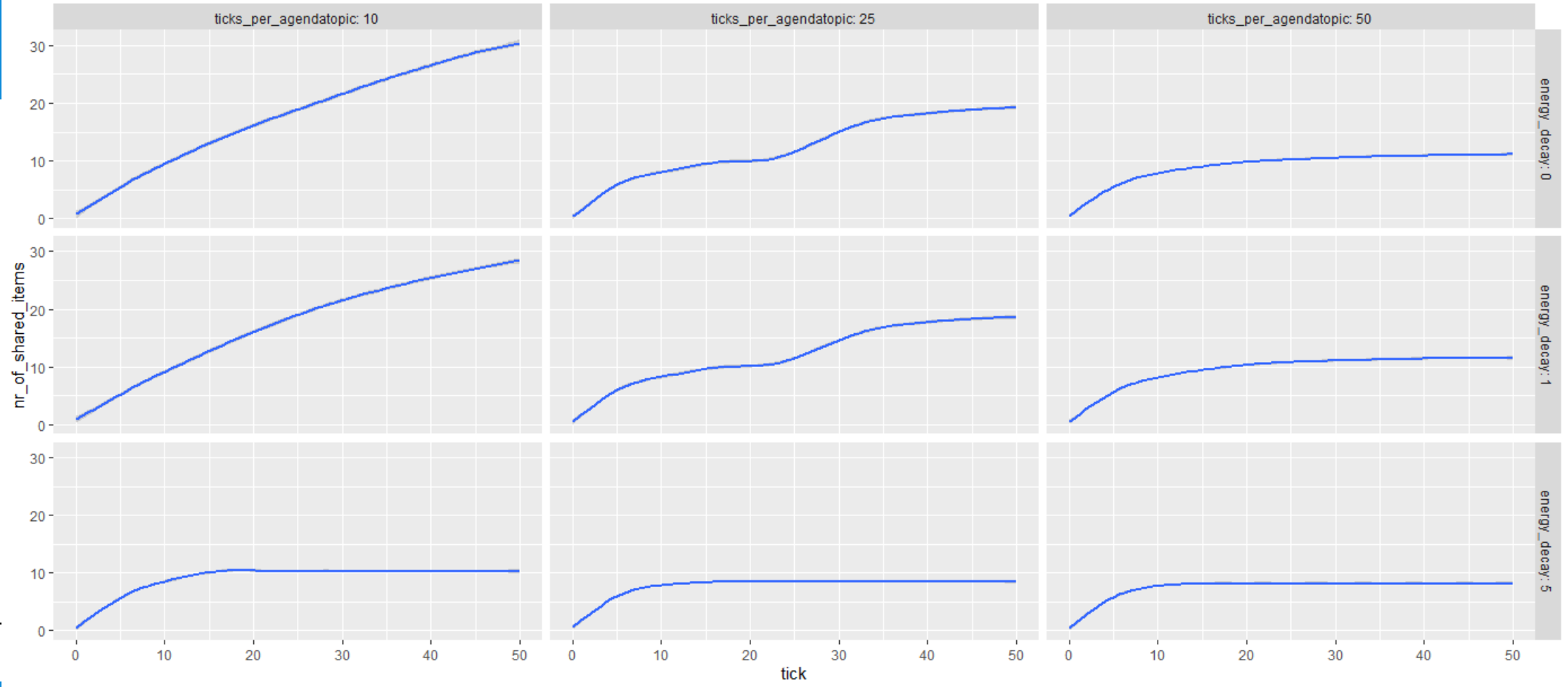
Model implementation : NetLogo + nw extension



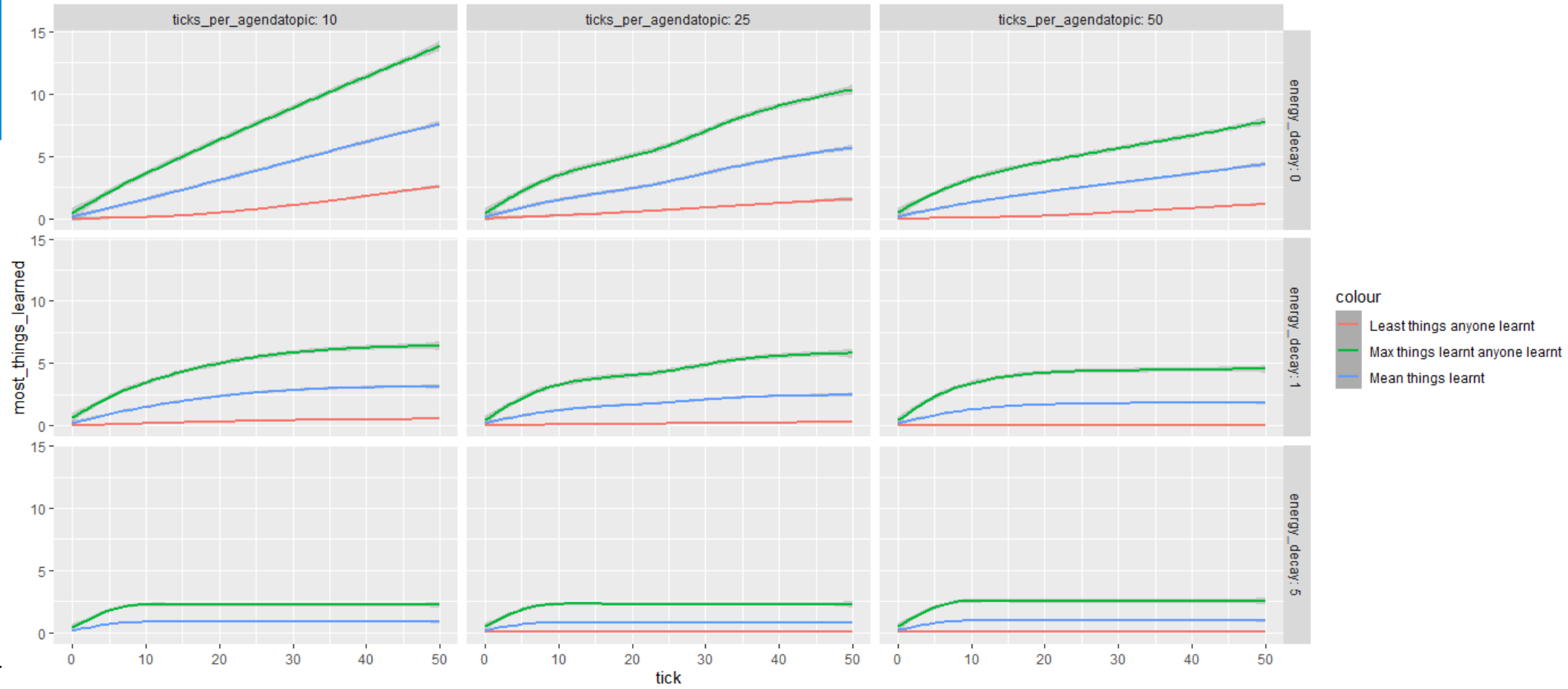
Example experiment :
influence the process agenda

- Experiment Setup
  - 4 people , 5 topics, 15 information items,
    - 2 items of each topic have a link to another topic
  - Agenda determined which topic is discussed during round
  - Preference for sharing items and links
    - rather then discussing a whole topic
  - 50 rounds , no breaks
  - Only positive attitudes towards others
  - People are specialized in 1 topic
- We vary :
  - 5, 2 and 0 agenda changes during process
  - How tiring is the process (not, average, very)

Example outcome : Things shared at least once



Example outcome : Number of things learned



(very) Preliminary findings

- Specific:
  - Model seems to be “sane” and provide broadly intuitive outcomes
  - Agenda has clear effect on how much is shared, available energy behaves as expected
  - Systematic exploration of model behavior has just started

- General
  - Model concept is promising, and already allows fairly elaborate participatory process description
  - Sensible parametrisation will be “interesting”

Future plans

- Continue refining the theoretical framework
  - (much) more explicit modeling mechanism, loss of information due to abstraction / simplification, effect of modeling paradigm, etc
  - Diversify interaction to be dependent on form of session
- Develop sensible parametrisation
  - Case data for behavioral elements
  - Quantitative data for parametrisation
- Start thinking about a process design tool
- Expected publication of code and detailed model description ~ 2 months from now

Thank you !

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Also on
pmcop-workspace.slack.com
and
participatorymodeling.org