An evaluation framework for participatory modelling

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Evaluation framing: bounding, focus, timing, purpose (Burgess & Chilvers, 2006; Blackstock et al., 2007; Jones et al., 2009).

- Geographical setting
- Political setting
- Actors
- Interests
- Conflicts
- Participants
- Funding
- Process objectives

Participatory modelling

Context

Process

Outputs

Outcomes

When

How

Models as vehicles for learning: the Squires & Renn (2011) evaluative potential of models

Learning

Borrowing criteria from the theories of social, transformative and experiential learning (Webler et al., 1995; Petts, 2007; Armitage et al., 2008; Reed et al., 2010), which overlap considerably. The even broader Squires & Renn (2011) definition of social learning provides the link to "participatory modelling proper" as an act of co-generating knowledge.

Type

Instrumental learning

Broadly cognitive enhancement

Communicative learning

Change in interpreting meanings, intentions and values associated with actions and activities; group dynamics

Who

Scientists/ facilitators

Stakeholders

Instrumental learning

- Emerging knowledge

Communicative learning

- Ownership of the model: acceptance, support, use
- Conflict resolution: did conflicts and solutions emerge as outcomes, not focussed on the process of conflict management
- Relationships: social capital, trust, reciprocity, collaboration
- Skills
- Recognised impacts: changes as a result of the process

Model

- Salience
- Credibility
- Legitimacy

White et al. (2010) use these criteria more narrowly for models as boundary objects. They map onto the competence and fairness criteria of Webler et al. (1995), which are originally process criteria. The proposition is that participatory modelling leads to better and more acceptable/accepted models (elaborated in Squires & Renn, 2011).

- Emerging knowledge as captured formally by the model

Evaluation methods, data sources, evaluators

- Analysis of model by participating scientists, cross-checked with other participants
- Questionnaire survey of participants before and after three key stages of model development: perceptual model, formal model, procedural model
- Reflective diary of participating scientists
- Scientist/facilitator team reflection led by an outsider to the process

Question pool

(inspired by Blackstock et al., 2007; Jones et al., 2009, Schmid, 2011)

(1) What has the model "learned" (gained) in the process?

Salience/competence

- Is the model meeting a real demand?
- Did participants' views during the process influence model design so as to meet the demand? (**more relevance through participatory modelling**)
- How else could the demand have been met?

Credibility/competence

- Is the model true to peer-reviewed science?
- Are the input data of adequate quality?
- How could they have been improved?
- Are the calculations sound?
- How could they have been improved?
- Are model interface and outputs useful, user-friendly and understandable?
- How could they have been improved?
- Are the model predictions accurate (though not necessarily precise)? (**stakeholder validation**)
- Are model uncertainties treated adequately?
- How could they have been treated better? What is missing?
- Are you happy with the assumptions made and the limitations of the model?
- Does the model incorporate knowledge and data that came out of the process? Which? (**stakeholder knowledge/data provision**)
- Does this influence the credibility of the model? (**improved credibility through participatory modelling**)
- How else could these knowledge and data have been incorporated?

Legitimacy/fairness

- Does the model respond to the diversity of concerns people have?
- Which are missing?
- Did participants voice concerns during the process which subsequently were addressed by the model? (**more legitimacy through participatory modelling**)
- Is the model biased? In what way?
- Is the model transparent?
- Is the model a legitimate basis for making decisions?
- How else could a legitimate model have been achieved?

Is the model being used outside the process for decision making?

(2) What have participants learned?

Cognitive enhancement/instrumental learning

- Through participating in the process, did you gain an increased understanding of how the system works and various factors interlink?
- Did you gain an increased understanding of integrated resource management issues?
- If so, please explain what you learned.
- Who brought knowledge to the table that you benefited from? (**knowledge exchange through participatory modelling**)
- How could this have been achieved without getting involved in the process?
- Have you learned anything new about modelling?
- Are you confident you know the important assumptions and limitations of the model?
- Have you learned anything new about model uncertainties and how they can be accounted for?
- Can you interpret the model output?
- Has this ability changed in the process?
- Do you understand the reason for model calibration?
- Do you understand how this links to the model uncertainty?
- Has this understanding changed in the process?

Cognitive enhancement/communicative learning/moral development

- Do you feel you contributed knowledge and perspectives to the process? (**reflection**)
- Did you reached a better understanding of the interests of other people/groups?
- Did you discover and now value any shared interests?
- Have your thoughts/views of other people/groups changed as a result of your involvement?
- Has conflict arisen? What kind?
- Was it resolved? How?
- Was there negotiation over the knowledge that went into the model?
- Are you aware of any trade-offs that were decided jointly?
- Has a shared understanding of the problem emerged in the group?
- Has a shared identity emerged?
- What has changed in your sense/value of the natural environment as a result of your involvement?
- What has changed in your behaviours?
- Did trust develop between the participants?
- Which skills have you developed/practiced through your involvement (e.g. communication/engagement skills, integrative thinking)?
- Is there anything else you learned through your involvement?

Has the model been an aid for knowledge exchange outside the process?
Has the model helped build consensus on decisions?
Social learning outside the process?
Has the model gained salience, credibility and legitimacy in the eyes of outsiders to the process through the work of the group?

(3) What has the scientist/facilitator team learned?

Cognitive enhancement/instrumental learning

- Increased understanding of how the system works and various factors interlink?
- Increased understanding of integrated resource management issues?
- Did participants bring new knowledge to the table that you benefited from?
- How could this have been achieved without the process?
- Change in practice of modelling?
- Change in practice of facilitation?

Cognitive enhancement/communicative learning/moral development

- Reflection on own knowledge/values?
- Better understanding of the interests of participants?
- Discover and now value any shared interests?
- Thoughts/views of other people/groups changed through the process?
- Conflict and conflict resolution?
- Negotiation over knowledge that went into the model?
- Trade-offs decided jointly?
- Do you feel part of the group?
- Shared understanding of the problem in the group?
- Shared identity?
- Trust?
- Change in sense/value of the natural environment as a result of process?
- Behaviour change?
- Skills developed/practiced through process (e.g. communication/engagement skills, integrative thinking)?
- Any other leaning outcomes?

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