The *Centre for Policy Modelling*

UiT The Arctic University of Norway

How can we ensure our modelling is useful to Policy Actors?

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Part 1

Motivations and Misunderstandings

Analysts and Policy Actors live in different universes

They…

- Have different goals and motivations
- Use different terms or same terms with different meanings
- Act on different timescales
- Are under different pressures and constraints
- And, as a result, often do not understand each other or work at cross-purposes

Some example communication mismatches

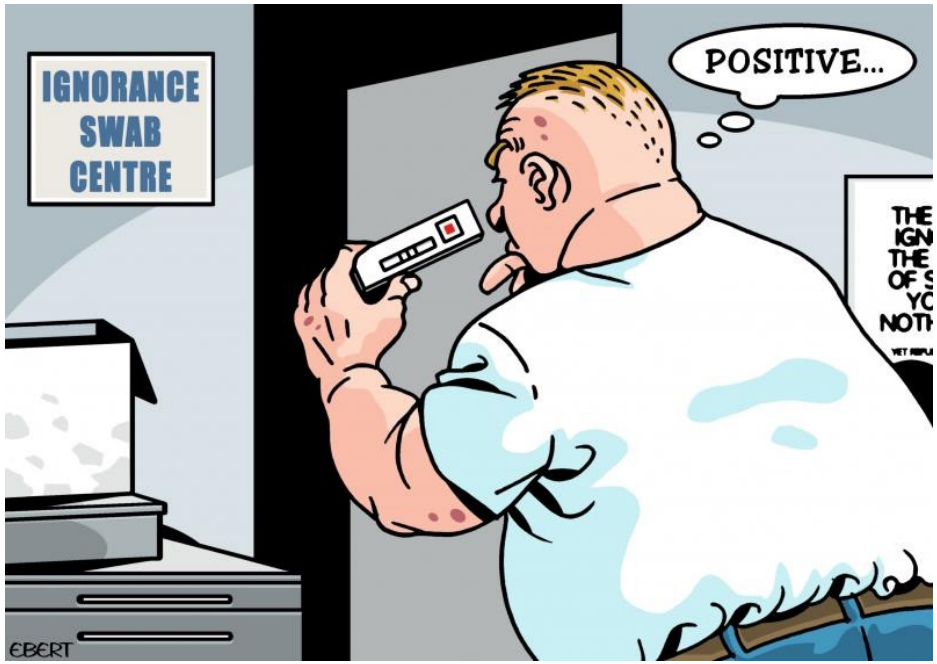
- Policy makers are appalled at the assumptions analysts make and reject their results out of hand
- Analysts have some research that they think should be utilised for the general good but are ignored
- Policy makers commission some research on some questions but the analyst's conclusions are too complex for them
- Analysts become over-cautious in stating conclusions due to removable of caveats in policy communication chain

Some example goal mismatches

- Analyst conclusions do not fit with policy actor's intuitions and are thus by-passed
- Stakeholders only care about a single aspect of commissioned research and thus are not engaged in the process
- Policy maker demands the impossible from an analyst who then does something that kind-of goes towards this, but in a half-baked manner
- Analyst produces results that provokes a backlash from the public which they policy actors that commissioned this now also attack

Underlying problem 1: Ignorance

- Each side are not only ignorant of the other's world, they can not even conceive how they must be thinking
- Researchers do not know how to present their work in a way policy actors can understand
- Policy actors do not know how to find the right analyst when they need them
- Results are unknown at the start



Underlying problem 2:
Power imbalance

- Target questions are entirely formulated by the policy actors
- Analysts can find it hard to push back against unrealistic expectations
- Researchers can end up being ‘used’ by policy actors
- Policy actors often control public reporting of outcomes
- Policy actors often specify project constraints
- Can the researchers trust the policy actors?

Underlying problem 3:
Knowledge imbalance

- Whilst researchers might be on top of the complications and limitations, this is a big problem for policy actors
- Policy actors can not assess the reliability of the techniques/results presented to them
- Policy actors do not know what questions to ask of the researchers
- Can policy actors trust the researchers?

Underlying problem 4:
Lack of time/resources

- Short time scales
- One-off projects
- Lack of research and/or policy actor continuity
- Exploratory research is presented as if it is mature work
- Researchers under pressure to publish quickly

Part 2

What could be useful to Policy Actors?

Different modelling purposes

- To an outsider, a model is a model, and should work like reality (albeit a bit approximately) – in this view, once built it can be used for all purposes
- But models need to be designed, implemented, checked, etc. in different ways depending on its purpose[7]
- Some misunderstanding can be avoided if this purpose (and its feasibility) is established at the start

Explanation

- Our bread-and-butter as researchers is to understand observed phenomena by establishing good explanations
- Policy Actors generally only want this if the explanation is sufficiently simple that it can be explained to others
- Can be useful after-the-fact as part of an enquiry as to the causes of an event but if this is too complex or specific to the case this has limited utility

Prediction

- Policy actors often want to know the effects of different policy options *before* doing them
- Being able to predict this reliably would be very useful to them
- *However*, this is rarely possible and requires a different methodology[3]
- The level of reliability needs establishing, *in practice*, with real unknown cases many times before this is useful (as long as this is widely known, this can be low as in economic forecasts)

Illustration

- Quite apart from an analytic model, a model to help communicate some policy complexity to the public might be helpful
- This might be based on an analytic model, but needs to be much more simple and more vivid
- E.g. it could be a data visualisation using an algorithm chosen upon an understanding of the underlying processes

Communication between stakeholders

- Whilst people can be good at negotiating trade-offs in familiar situations, they tend to over-simplify when dealing with more abstract, political issues
- In this case playing a ‘game’ based around a model of the situation can result in more nuanced agreements
- Need to be careful such simulations/games are not mistaken with predictive models

Possibilistic Risk Analysis

- Given a policy, what are the possible ways this could go surprisingly wrong (or right)?[6]
  - E.g. It may work well for many groups but have the opposite impact for others (allowing targetting)
  - E.g. It might work OK except when some particular combinations of circumstances occurs (allowing for early warning indicators of these to be implemented)
- Gives a rationale for introducing some of the complexity revealed by modelling

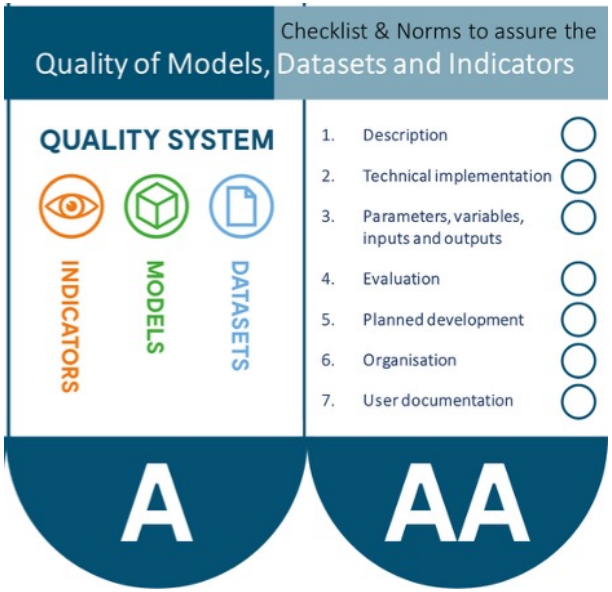
Part 3

How can we ensure our modelling is useful?

Standards: Wageningen's *Quality Assurance of Scientific Models*

- In place since 2004
- Risk-based standards with different levels (self, A, A+, AA)
- Model quality checklist with Self-assessment (A) or Product Audit (AA)

Impact class (see data classification)	Model quality	Quality check frequency	Level of safe storage & version control
Negligible	Optional	Optional	Low
Some	Self-assessment	Every 5 years	Low
Serious	Status A	Every 5 years	Medium
Disruptive	Status AA	Every 3 years	High



A little of the detail…

Norms for quality; status A and AA

Assuring and assessing the quality of a model, requires a definition of quality and norms that delineate specific quality levels. At WUR the quality of models is defined in 22 requirements, which are grouped according to 7 topics within 3 perspectives. For most of these requirements, norms are formulated at two levels: A and AA. Point-wise listing of the norms A and AA are provided in this folder, more elaborate descriptions are found on intranet.

Science & Technology

ST.1: description

1.1: General description

A: purpose * area of application * theoretical framework * paradigms

1.2: Conceptual and formal model

A: explicitly documented * assumptions * simplifications * embedded in literature

AA: *motivated complexity * peer-reviewed scientific publication*

ST.2:Technical implementation

2.1: Implementation

A: Basic structure * flow diagram

AA: *Code commenting * motivated (modular) design * code review*

2.2: Technical Environment

A: Language * IDE * settings * limitations

2.3: Tested

A: Tests documented * protocol * untested components named

AA: *Tests on schedule * periodic evaluation on completeness*

ST.3:Parameters, variables, inputs and output

3.1: Parameters and variables

A: Quantities * units * default values * default source * description

AA: *Range * Precision*

3.2: Calibration

A: Procedure * results discussed

3.3: Input & Output

A: Structure * format * quantities * units * precision * description * link variables & parameters * version echo

AA: *(Inter)national standards * input echo & timestamp*

3.4: Origin of data

A: Data preparation pipeline * source * scripts tested

AA: *Protocol for acquisition * periodically updated*

ST.4:Evaluation

4.1: Sensitivity analysis

A: Tailored to model/dataset type * documented * discussed

AA: *Protocol * evaluated*

4.2: Uncertainty analysis

A: Qualitative discussion

AA: *Quantitative analysis * evaluated*

4.3: Validation

A: Discussed * non-validated components named

AA: *Protocol * evaluated*

4.4: Use monitoring

A: Example studies listed

AA: *Use & use(r) experience tracked * evaluated * documented*

4.5: General assessment of quality

A: Relate goal to: test * sensitivity * uncertainty * validation * use

AA: *Include reliability * precision * data used * external review*

Development & Organisation:

DO.5:Planned development

5.1: Development plan

A: List of plans * progress reported * based on evaluation

AA: *Further evaluation * periodically updated*

5.2: Version control

A: Documented * acceptance criteria * (WUR) central archiving

AA: *Protocol for documenting & code-commenting*

DO.6:Organisation

6.1:The metadata

A: Domain appropriate format

AA: *FAIR*

6.2: Management plan

A: Responsibilities: content * technical * next-in-line * ownership * financial cover

AA: *Vision on future * periodically updated*

6.3: Dependencies

A: Datasources * (third-party) use

AA: *Tracked * Obligations * liabilities*

6.4: Formalised external use

A: Conditions for use * User support

AA: *User agreement * legally checked * financial paragraph*

Interpretation & Use:

IU.7:User documentation

7.1: Interpretation guidance

A: Goal * area of application * theoretic framework * summary of evaluations * general public

AA: *Reflection on goal, area of application, structure, complexity*

7.2: User manual

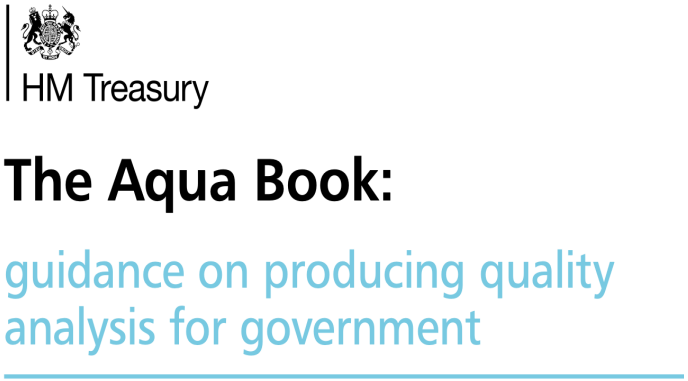
A: Operation instructions * installation guide * summary of technical documentation * minimal system requirement * format of input & output * contact information

…but this did not prevent farmer protests on the WUR campus in 2021!

Nieuws

Protest boeren op Wageningen Campus

Process Management: the UK Gov's *Aqua Book*[8]



- Specifies roles, processes, etc. required for policy modelling within the UK gov.
- Is top-down, so all the responsibility is on the analyst teams none on policy makers
- Is broadly sensible (in its rhetoric) but:
  - is a heavy on the duties and management
  - designed more to ensure blame allocation than to facilitate better analysis

A little of the detail… (part of 'analysis delivery')

Activity (to be tailored as appropriate to accommodate local practices)	Suggested ownership (to be tailored as appropriate to accommodate local practices)		
	Commissioner	Analyst	Analytical assurer
Ensure uncertainty, risk, limitations, and constraints are communicated clearly, along with the results, to the study commissioner.	Involved	Owner	Involved
Ensure uncertainty, risk, limitations, and constraints are communicated clearly, along with the results, to the decision-makers and stakeholders.	Owner	Involved	Involved
Ensure an analytical record is provided to i) facilitate access to the analysis by broader stakeholders, ii) make the analysis exploitable for wider decisions, and iii) inform continual improvement.	Involved	Owner	Involved
Ensure a suitable audit trail is in place that clarifies the level of validation, scope, and risks associated with the analysis. Best practice includes the production of validation log books.		Involved	Owner
Undertake reflective learning to capture successes and difficulties and ensure these lessons are available to improve future analysis.	Involved	Owner	Involved

Model Risk Analysis and Mitigation

- Based on model purpose
- Looks at all the things that might go wrong in achieving this purpose
- Then assesses what the consequences of these might be in the real world
- And so what needs to be done to mitigate these (bearing in mind their severity)
- Difficult to formalise if management wants to check this has been done well

Community-Based Quality

- Like peer-review but more thorough!
- Results from the checking/self-policing by the community of experts, e.g. by independent model replication
- More effective than standards, but only if sufficient time/people have engaged with a particular model
- It is often assumed by policy actors/the public that this has already happened for anything that is presented to them! (otherwise, why are we wasting their time?)

The long game

- Good modelling takes a long time to develop, check, validate etc.
- Critically it needs time to prove its worth in terms of being useful
- But also giving enough chance for critique and input from many people (e.g. replication of models)
- Maybe like the division between Theory and Models in traditional science – the development of theory is long terms and underlies the more applied models

Part 4

So what *might* help overall?

Education of policy actors and modellers about each other

- E.g. “The Academic – a user guide”[4] (one on policy actors is in preparation)
- More quality contact time between them over a longer time scale (e.g. joint Lorenz workshops and similar)
- “Living with dinosaurs” – \researchers and policy actors being embedded for a time within each other’s work environment (e.g. Alexander Melchior)

Set expectations about various goals

Goal	Feasibility
Refine Theory of Change - The processes of developing the ABM will allow the research to tease out more detail about the possible strands of causation that may be occurring with respect to the different contexts and situations the modelled events occur in	High
Identify key gaps in data - The processes of developing the ABM will allow the research to tease out more detail about the possible strands of causation that may be occurring with respect to the different contexts and situations the modelled events occur in	High
Additional robustness check - on any quantitative analyses, by relaxing assumptions, producing synthetic data and comparing those analyses to those on that data	High
Processual risk analysis - to identify some of the ways the implementation of the duty can be facilitated or frustrated that otherwise might be opaque.	Medium
Diagnostic tool - to identify hypotheses as to how DA Duty processes in LA cases are working and so inform subsequent evidence collection.	Medium
Aid cautious generalisation of lessons in implementing the DA - the ABM will lean on insights capture through other streams of the evaluation - specifically the QCA	Medium
Evaluate how a Local Authority is doing in different performance dimensions	Low
Evaluate changes in the DA Duty and how the government implements these	Low

Disciplinary self-checking/policing

- Beyond just peer-review…
- …to less of an individualistic approach
- …where it is the community that checks and improves each other's models

Imagine if Neil Fergusson had been forced to publicly share the code and documentation of his 2006 simulation on the spread of 'flu, allowing others to critique and improve it over the following decade!

Have a product that is desired by policy actors

- Need a robust and demonstratively working product/service (reliable for its purpose)
- They need to have heard of that kind of product and a case where it helped – thus some marketing is needed
- Then if the policy actors come to the analysts they can be clearer as to what is and is not possible

Guidelines/frameworks to structure policy ↔ analyst interaction

- Needs light framework to reduce misunderstandings on both side
- Paper in development with others, following a Lorentz Workshop in january: "*Agent-based modelling for fast-paced policy: Establishing principles for policy actor and modeller interactions in responding to crises*" which lists 9 principles

Longer-term, sustained modelling projects

- Not one-off projects but sustained development, verification, validated over many years
- Obviously difficult to achieve in a single institution
- Not necessarily a single model refined over time by a single institution, but could be a collective effort
- E.g. the ICC modelling

Give more power to the analysts

- By having a robust and demonstrated product that policy actors want, and so come to the analysts (rather than analysts trying to sell their techniques to them)
- Polite push back on what is possible as part of their learning – setting reasonable conditions[5]
- Demonstrate the dangers of not modelling to understand the risks/complexities

Give more knowledge to the policy actors

- Give them lists of questions that they could use to challenge modellers[2]
- Provide documentation at many levels, from very high-level narratives down to code
- Review the modelling using other experts
- Give them good visualisation and narratisation (i.e. LLM) tools to help them understand the outcomes themselves

Use skilled intermediaries

- Bridging between researchers and policy actors is a skilled job
- We should not expect to be as good as those that do this full-time – that penumbra of consultancies, think-tanks, advisors etc. around policy actors
- E.g. working with the Gov. department through Ipsos Mori made my life many times easier (and also theirs, I think)

Summary of what might help

1. Education of policy actors and modellers about each other
2. Set expectations about techniques and goals
3. Manage the risks of modelling
4. Disciplinary self-checking/policing
5. Guidelines/frameworks to structure policy ↔ analyst interaction
6. Longer-term, sustained modelling projects with stakeholders
7. Give more power to the analysts
8. Give more knowledge to the policy actors
9. Use skilled intermediaries

Notes & References

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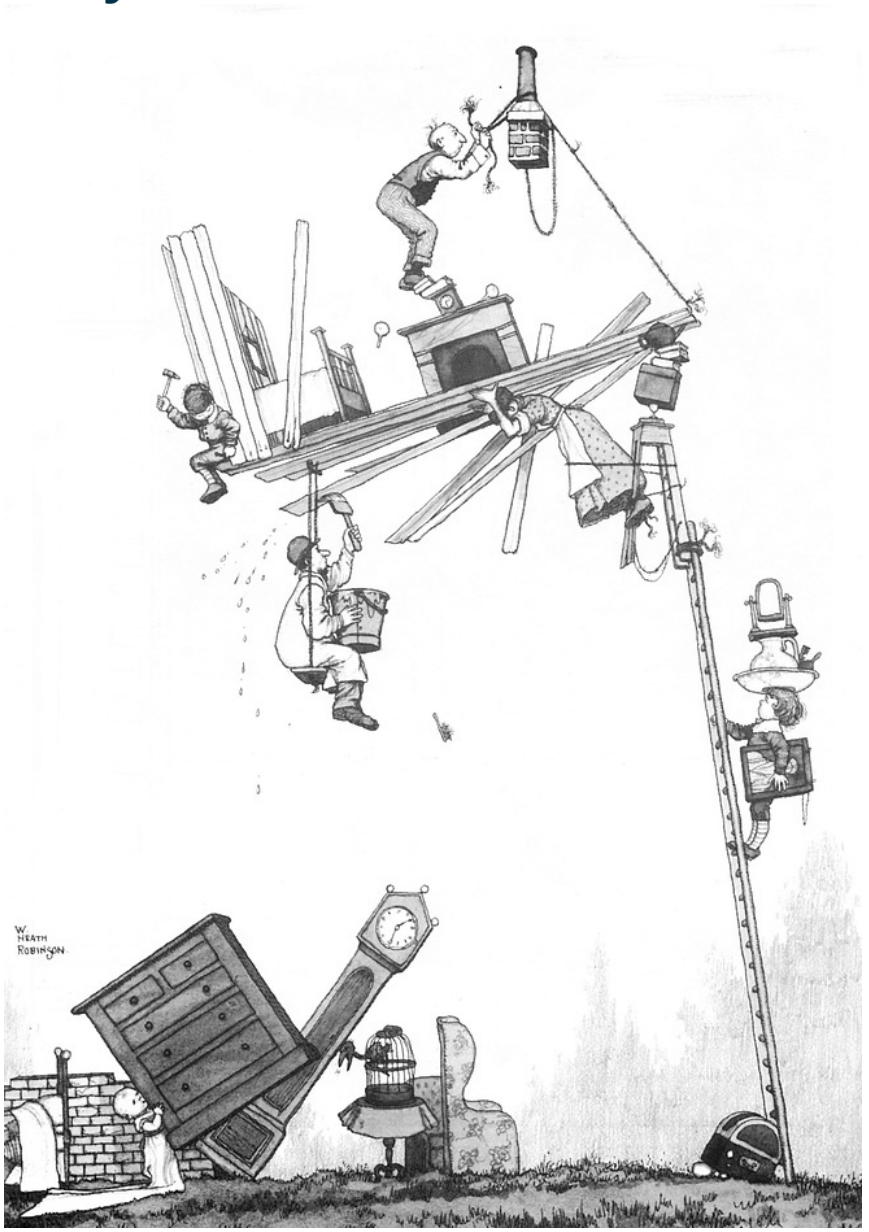
Thanks!



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