Purposes of and Principles for ABM's in Policy Development: A Proposal

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Abstract. We propose three additional ABM purposes and a set of principles to effectively influence policy development processes. The purposes focus on the value of the modelling process of a model in a policy development. This differs from them usual focus on the purpose of a simulation. The proposal is based on requirements for the ABM process in a policy development context and a case study.
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1 Introduction and Proposal

Within the Agent Based Modelling (ABM) community modelling to aid policy development is considered useful and needed[1,2]. Unfortunately it has proven to be a challenge to find a good connection with the policy world. We have reflected on this in [3] and provided an insight in the policy development process by analysing Dutch policy development on the national level. [3], among other things, discusses the goals of models from Epstein[4] for policy development and formulates seven requirements that make ABM development in this context more effective.

Since [3] we have done more work with and for policy developers in the Netherlands, both through use cases and participatory observations. Working with policy developers has thought us that many questions of policy developers can be considered as *vague*. For example "how do we structure our thinking about the world in such a way that we can devise a useful policy theory?", "How do we get a grip on things?" or "what is the question that *we as policy developers* have to answer?". These questions have no clear boundaries, definitions or desired outcomes. We found in these cases that the process of creating an ABM in itself is already a concrete result, without looking at the outcomes of the simulation. The modelling process and the ABM help policy developers to understand the (level of) complexity, what to focus on, ask better questions and communicate with others.

These experiences helped us reflect on the goals and purposes of our models and how they provide added value to the policy developers. The importance of this reflection is illustrated by discussions on purposes in recent work like [5] by

Edmonds et. Al.. This literature, however, focuses on the question if and when *a model itself* suites the intended purpose. But in these vague steps it is often hard to have a well defined and singular purpose for a model. Thus the purpose of a model and a simulation can also be derived from *the modelling process* and *how we use* a model in a particular step in the policy process. A steps can very exploratory, e.g. the policy developers want to get a better grip on a complex issue, discover what the roles and interests of stakeholders are or know which indicators (data) can be used best to monitor the policy issue.

Based on this insight we propose a number of additional purposes for modelling in a policy development context:

1. To gain a better understanding of the complexity of an issue and the system in which it is incorporated.
2. To improve alignment in world views between stakeholders.
3. To give policy developers clear next steps for the policy process. These steps are explicitly not "enact this and that policy".

This also leads to a number of principles that an ABM should adhere to in order to serve its purpose in our context of policy development.

1. Acceptance is more important than correctness or validity.
   Acceptance is needed to have real impact on the policy process. For this we need to focus on the things that are considered useful for the policy process. Correctness and validity become more important at later stages in the policy process.
2. Stakeholders are taken into account during development.
   In [3] we found that the work of Dutch policy developers best fits the Advocacy Coalition Framework(ACF)[6]. In ACF stakeholder management and forming coalitions are explicit steps in the policy process. As such, one needs to take the stakeholders and the interaction with them into account for the policy process to create buy-in and a sense of ownership of the model. This is different from using stakeholders to make sure the model or simulation is correct.
3. It is not about finding The answer, it is about finding valuable insights.
   In earlier phase of the policy process policy developers are looking for valuable insights, for example how the problem domain works and what the important questions are that they need to answer.
4. Creates value without empirical evidence.
   Often concrete empirical evidence is lacking or unsuitable for the challenges at hand. So we need to think how to provide value without relying on data.
5. Communicated in an understandable way.
   The phenomena that we create ABM's for are usually big and complex. In order to serve its purpose the ABM needs to be communicated in such a way that policy developers can understand the model and not just the result.
6. Explicitly state what the ABM does and doesn't do.
   Policy developers are used to receiving academic reports that tell them which

policies to pursue or not. So we need to explicitly state that we will not be providing them this type of insights together with the things that we will do to manage and discuss expectations.

We illustrate the purposes and principles with a case study in Section 2.

2 Case Study – EV-Transition

In this case study we worked with policy developers who are responsible for the EV-Transition; the transition from fossil fuelled cars (ICE) to electric cars (EV). One aspect of their work is monitoring the progress of this transition to see what is going well and where additional policies are needed. Basic indicators like the amount of ICE's and EV's sold and fiscal indicators (for example the amount of tax benefits given) are currently used for monitoring. Unfortunately the number of *non-fiscal indicators*, like the % of EV questions on the exams for auto mechanics, is limited. The policy developers looked into them but concluded after some work that this was too vague and complex for them the handle for now. This led to the following main question from the policy developers for the case study:

"Help us to get a grip on the non-fiscal indicator."

This main question reflects our first purpose which focusses on a better understanding of the complexity. During further discussions with the policy developers the need to be advised on what to do came up. Automatically they formulated this as providing possible policy options, a purpose of our work that would require a lot more knowledge about the situation than was available and thus deemed infeasible. We agreed to provide suggestions on the direction of steps for them to take. This means we provided guidance on the process itself, which shows the use for purpose number 2.

During the case study we worked with various groups of stakeholders through workshops inspired by Companion Modelling[7] to create ABM's. Here we found various perspectives on the EV-Transition and a certain distrust by some stakeholders on how the government sometimes uses research to enforce its own world view. By showing the different perspectives to the stakeholders we saw more alignment in their ideas with regards to the model and trust in outcomes based on the model. This makes it easier for policies that are based on this model to be accepted by the stakeholders, this is purpose number 3.

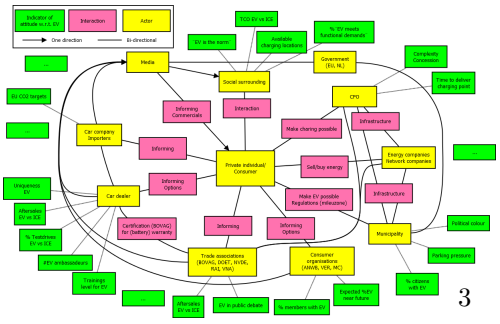

Fig. 1. Case study aggregated ABM model.

Based on the results from the workshops we created a single ABM (Figure 1) that represents the shared world view. This ABM depicts the 10 most important types of agents, according to the experts, for the EV-Transition with regards to non-fiscal factors. This ABM

also led to a prioritized list of 15 non-fiscal indicators for the monitoring of the transition. One example is the earlier mentioned exam EV questions % which affects the knowledge level on EV's at dealerships. If the mechanics have no knowledge about EV's to maintain EV's they will most likely stick to ICE's, of which they do have knowledge. One of the ways to change this is to teach mechanics about EV's during their training. To measure this we can look at the percentage of questions about EV's in the exams of auto mechanic exams.

3 Discussion

Our proposed purposes and principles have a number of consequences for the work and thinking of academics that want to influence the development of policies and improve them. We will discuss some of them here briefly.

One topic is subjectivity. As scientists we are trained in objective fact finding and creating new objective knowledge of how the world "actually works". But when one focusses on acceptance of the ABM *in favour of validity* one can argue that this is not always in favor of objectivity. Here we would like to recall the purposes of the models that we proposed. These purposes are revolving around improving the world, not finding *the* solution. Multiple solutions can improve the world, help in understanding or provide value to policy developers. Also keep in mind that policies are political choices with no objective best choices.

Another topic is the way one works with policy developers. The most prevalent way for academics to work with policy developers is that a research question is put forward by the government for academics to find the answer to. This is often pretty late in the policy development process and creates distance between the policy developers and researchers; "We have written everything down in the research question document, call us when you're done!". So in order to understand what the policy developers really need it will mostly be up to the researchers to create more contact and discussion with the policy developers. Also, having contact earlier with policy developers in the policy process is a necessity for our proposed purposes to be of any use. This is explicitly seen in the case study, the goal of "getting a grip" is not something that is easly put into a research question while it is something that ABM excels at.

In this paper we proposed purposes for our models that go beyond the purpose of a simulation and take into account the policy making context in which they are used. The *process* to create a simulation serves various valuable purposes, especially in earlier phases of a policy process. For many of these phases the actual outcome of the simulation does not have to be realistic or based on real data to be useful. Giving the right type of insights for a policy process phase is of the biggest importance. At the same time we realize that there is much more to our proposal that we could discuss in this short paper and are looking forward to discuss this further with the community.

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