

DELFT UNIVERSITY OF TECHNOLOGY

MODEL-BASED DECISION MAKING
EPA1361

Political Reflection

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1 Political Reflection

The process of making and applying an advisory report does not end with the composition of a conclusion. After finishing a report, the real-world decision-making processes are just about to begin. Based on the written report, the problem owner is set with the challenge to take certain actions that will implicate real consequences. In this political reflection we will discuss the translation of our advisory report into real action and what steps we have taken to make this process as effective as possible.

2 Tensions and Challenges

For models to be able to serve as good decision-making tools, there are a few challenges they must overcome. Saltelli et al. (2020) proposed 5 major challenges when addressing models. One of those challenges is the bias of modelers. Every modeler has their own thoughts and ideas which almost always will affect their models. In order to properly use a model, the modelers point of view must be considered and understood. Another challenge is addressing the aim of a model. Over the past few years policy-makers and politicians tend to turn more and more to models and science for their arguments (Stirling, 2010). When this happens, it is very easy and inviting to take such a decision-making model and bend its intent to their will. Therefore, it is necessary for modelers to define the abilities and shortcomings of their models in fine detail. What is the intended use, what questions is the model supposed to answer and what questions cannot be answered while using the model. Also, what must not be forgotten, is that the model used to approach the optimal scenario's under deep uncertainty is not and never will be a perfect representation of the real world, for models are made to solve 'tame' problems and real-world problems are often wicked and complex (Rittel and Webber, 1973). Where the model only considers around 5-10 input variables and policy levers, the real world will have to deal with a much larger set of variables, proposed by a large group of actors. These actors will all be trying to make their opinion the most looked after. This will result in not only tensions between the actors involved, but also the task for the actual decision-makers to weigh the importance of these actors. Same goes for the model outcomes, where in the debate multiple actors proposed solutions and KPI's that were not included in the model as criteria and therefore could not have been taken into account during the analysis.

As analysts for Rijkswaterstaat we were tasked with providing insights into the most cost-efficient and safe flood risk management policy, which is robust under multiple deep uncertainties, in a way that is acceptable to all relevant actors involved. Schut et al. (2010) argued that uncertainty in combination with multi-stakeholder involvement, is what makes these types of problems so complex. To be able to fully accomplish our task, a difficult trade-off has to be made. This trade-off is between the analytical model-based 'optimal' policies on the one hand, and the real-world desires and objectives of the political actors involved on the other hand. We as analysts are relatively limited in addressing this trade-off, because models do not always depict the real-world scenarios correctly (Box, 1976). This causes tensions to arise. However, this is not always so evidently clear to the policy makers that will (or will not) adopt our proposed advice. Our analysis and model-based advice therefore has to be used delicately by decision makers. Our role was to firstly investigate how the IJssel river case was composed of various involved stakeholders, each with different objectives and interests. Decision makers should consider the fact that we as analyst do not always know the full truth concerning actor positions and that the eventual results from our analysis are also based on our perceived actor perceptions. Gelderland, for instance, showed relatively cooperative behavior towards Rijkswaterstaat regarding the Room for the River initiative in the first place, but later in the debate they pointed out that they would only accept dike strengthening as a policy intervention. Our recommended policies do not consider Gelderland's views very strongly and therefore our advice can give Rijkswaterstaat a distorted picture of reality. This can have major implications, should Rijkswaterstaat propose a policy from our recommendations that conflicts with Gelderland's views. Secondly, us analysts needed to formulate the problem for which the model could provide useful and analyze the results for multiple simulations, using a certain modeling methodology. In each of these steps certain assumptions were made, simplifications were carried out and interpretations were made that could be biased. The manner in which a problem is framed eventually largely determines how the outcomes are perceived by decision-makers and stakeholders (Tversky and Kahneman, 1981). Also, solutions are limited to the model set-up, alternative solutions such as those proposed in the debate are not tested and taken into account in the modeling process.

Overall, there are a lot of general tensions and challenges that can adversely impact how the analysis-based advice is used in the real life decision making process. Moreover, there are also tensions that arose during the two separate debates, where Rijkswaterstaat had to consider the opinions of all actors involved and come up with a policy proposal that would satisfy all actors in the arena.

3 Accounting for Tensions and Challenges

The tensions and challenges mentioned in the chapter 2 may cause problems during the real-world decision-making process. Therefore, we as analysts, took precautions in order to minimize the possible holdups during this process. Firstly, the framework for the model we used in the report was not our own creation, but made by Ciullo et al. (2019). This significantly limited the possibility for us to perform a biased analysis, based on our own thoughts and ideas. The analyses were performed with an open-minded approach, exploring all the possible options without rushing to conclusions between the various applied analytical methods. The used MORDM methodology (Kasprzyk et al., 2013) proposed a step-wise approach to the case, making the compilation of our report an iterative process with numerous feedback opportunities. We were very cautious in drawing sub-conclusions from analyses and tried to perform all the steps of the analysis as objectively and scientifically grounded as possible.

The actors involved all have different conceptions of the problem and therefore different mind models (Di Matteo et al., 2017). It is important to align the mind models and conceptual ideas that actors have about a system, so that all parties involved attach value to the result and advice that is withdrawn from the model (Huitema et al., 2009). To address this, we have included model constraints in an early stage of the analysis to try to cope with the actor tensions that originated in the debate. The constraints were basic requirements for which all actors agreed upon during the debate, concerning number of deaths and investment costs. This aimed to bring the proposed policy recommendations from our analysis closer to each other in resemblance, in terms of implications. This can lead to less conflict of interest and more alignment between the actors' positions.

To cope with improper use of our model-based advice, we have addressed the model limitations very extensively in the Discussion section of our advice report. Specifically, we have included guidelines intended for decision-makers, explaining what the capabilities of our models are, e.g. how it can be used, for what purposes, and how it should not be used. It is important that decision-makers read the discussion section, but this is often neglected, as decision makers sometimes simply read the management summary (Cohen, 2012). Therefore, we have included a short reference of urgency to read the discussion session thoroughly in our management summary. This makes sure that decision-makers, using our report for policy development, are well informed about the abilities and shortcomings of our model, and the especially the model-based advice, in relation to the real world.

4 Future Handling of Tension and Challenges

Tensions and challenges are inevitable in the process of developing policy measures concerning a multi-actor case. As much as modelers would like to keep these to a minimum, it is nearly impossible to perfectly satisfy every actor involved. By applying the measures discussed in chapter 3, we aimed at making the decision-making process as smoothly as possible. However, there are still actions left undone when it comes to limiting the impact of the proposed tensions and challenges in chapter 2.

What could have been useful to ensure that some tensions could be eradicated is simply having more time to make model adaptations. Our understanding of the model grew as we have moved forward in the modeling process. However, after the advisory report had been finalized, some aspects came to light that could have been included in the model, if the project for instance was carried out over half a year. Then more relevant performance metrics and input variables could have been considered and included in the model. Also, challenges concerning completeness and model-to-real-world tensions could have been dealt with in more sufficient way. Furthermore, including actors and decision-makers in the modeling process could be a very valuable strategy. This can help with coping with the interest misalignment between actors and during the decision-making process. As modeling is an iterative process, it is wise to include the relevant people in this process so that they can align their objectives and perceptions with the modelers. Lastly, in order to address the real-world-to-model challenge posed in chapter 2, cases similar to this one could have been analyzed and used to better the decision-making process in this case. Through the observation and analysis of historic data, similar projects, and the corresponding challenges, tensions, and policy choices in these cases, we could have avoided encountering the same issues. However, as the Room for the River program is set to be the biggest Dutch water project since the delta works (De Bruijn et al., 2015; Rijke et al., 2012), this may be easier said than done.

5 Strategy Reflection

Looking back at this project, entailing the tensions and challenges as mentioned in chapter 2, we as modelers have made a good effort to prevent an adverse impact on how the proposed advice is used in decision-making. By eliminating the modeler bias, and providing Rijkswaterstaat with an objective policy advice, it is now their responsibility to make the right decisions on how to use our advice in the real-world decision-making process. In hindsight, in order to make sure our advice really does have the desired impact, more communication between modeler and stakeholder is an absolute necessity. As is mentioned in chapter 4, the inclusion of decision-makers and actors into the modeling process could have been a valuable asset to our strategy. Other challenges and tensions that prove to be problematic could arise in the implementation step of the project. Dependent on the final decision of Rijkswaterstaat of what to do with this advisory report, some compromises shall have to be made by stakeholders. Stiff actors without room for any change in their proposed plans and opinions could cause new tensions and challenges. These types of challenges are near to impossible for us modelers to address. These are phenomena that just simply exist within the unpredictable world of politics in which modelers have very limited influence themselves. Furthermore, we believe that with our mentioned measures Rijkswaterstaat is able to argue and implement well considered policy choices.

In conclusion, it can be said that modelers and analysts should be cautious when handing out advice to decision-makers. Single-best solutions are often the outcome of analyses, but policy-making should shift away from this (Ciullo, 2020). Which stakeholders and actors are valued more in the IJssel River Case has not yet been determined, which makes it very difficult to select a most preferable policy. That is why we present *policy options* as well as precautionary advice on the conditions under which these policies can be of success, to prevent decision-makers from making hasty conclusions that our analysis cannot support.

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