Supplementary Material

Model documentation in the eye of the beholder: Lessons learned from a flood risk model for a dike in the Netherlands

Supplementary Material A: Interview guide consultancy company

Introduction

Introduction interviewer

• Master student Earth and Environment of the WUR, writing her thesis.

Introduction research project

• It is part of the HydroLib-project and aims to create awareness on (implicit) model decisions and their effects on model output and policy making, by investigating a case study.

Purpose of interview

• Describe the factors that define certain choices made by modellers/developers, leading to implicit decisions in a model/script. You were selected as you were involved in the development of the pre-processing scripts made for the flood-risk modelling of the Grebbe dike, used by the WA.

Length and structure of interview

• The interview will take around 1 hour. In the first part, first some background questions are asked, then some questions about the specific model choices, uncertainty and the process of script development. It ends with some questions about documentation and information transfer.

Privacy

• The answers to the questions are anonymous. The results following from the interviews will be send to the interviewees for approval.

Recording

- Do you give permission that this interview is being recorded and transcribed afterwards?
- Do you want to receive the transcriptions for approval before they are used?
- Do you have any questions before we start?

Background information

1. What is your academic background? (e.g., more focused on IT or on Hydrology, or something else)
2. What is your professional background? (e.g., mainly worked in Academics, or consultancy, or decision making etc.)
3. What previous experience do you have with hydrological modelling, both in academics as in the rest of your career?
4. What do you think is the most important application of hydrological modelling? And of flood-risk model specifically?
5. What is your current role in the CC? How often do you work with models/scripts?

Case specific choices

1. What has been your role in the development of the CC pre- and postprocessing scripts for use of the D-HYDRO model for flood risks of the Grebbe dike?
2. Who else was involved in the development of these scripts?
3. For this study, we are looking at some specific decisions that are embedded in the script you developed. Can you explain for each one of the choices in the table, how that choice was made? And whether you considered alternatives? Did you try alternatives for each of the decisions?

Pre-processing script	Component	Decision-making process	Alternative/possible range
Elevation model	Buffer around breach = 60m		
Elevation model	Resampling method = average		
Elevation model	Different no-data values		
1D water courses	Friction coefficient = 0.035		
Refinement grid	Refinement factors = [1,1,4]		

Uncertainty, choices, and ethics

1. To what extent do you have confidence in the model?
2. To what extent do you have confidence in the model output?
3. How do you normally cope with uncertainty in hydrological modelling?
4. How do you judge if model output is truthful / plausible? How do you estimate the plausibility of extrapolations beyond observation range (as is the case for flood-modelling)?
5. What is the purpose of these scripts, in your opinion?
6. Which part of the model output has priority in these scripts? Or more specifically: which parameter(s)/location(s) is/are most important and should therefore be most accurately predicted?
7. What do you think is/are the most important choice(s) in flood-risk modelling? (e.g., data/model)
8. To what extent are your model choices influenced by the purpose of the scripts you develop?
9. To what extent do you think the model output is used in policy making? And if so, how?
10. To what extent do you consider the implications of policy making while developing the scripts?
11. To what extent are the model choices influenced by the client you develop the scripts for? To what extent are they involved in the process of script development?
12. How often do you discuss choices with colleagues? Which type of choices are these?
13. To what extent do you feel like your choices influenced the output of the model?
14. Are there any other remarks you wish to make, concerning the choices we discussed?

Information transfer

1. How do you normally log your work for a script/model?
2. How often do you document the arguments/reasons for certain choices you make in a script/model?
3. How often do you use a script that was developed my someone else?
4. What do you consider relevant information to be documented related to a script/model?
5. Who should be able to use the scripts you develop?
6. What background knowledge do you consider necessary when using a script?

Guidelines

1. Do you use any protocols or guidelines in the model development process?
2. If yes, are there any guidelines for uncertainty analysis?

If yes, are there any guidelines for documentation and reporting of the model development process?.

Supplementary Material B: Interview guide Water Authority

Introduction

Introduction interviewer

• Master student Earth and Environment of the WUR, writing her thesis.

Introduction research project

• It is part of the HydroLib-project and aims to create awareness on (implicit) model decisions and their effects on model output and policy making, by investigating a case study.

Purpose of interview

• Describe the way in which different model output scenarios affect decision-making. You were selected as you would potentially use the model output created by the simulations to make decisions under flood risk conditions for the Grebbe dike.

Length and structure of interview

• The interview will take around 1 hour. In the first part, first some background questions are asked, then some questions about the specific model choices, uncertainty and the process of script development. It ends with some questions about documentation and information transfer.

Privacy

• The answers to the questions are anonymous. The results following from the interviews will be send to the interviewees for approval.

Recording

- Do you give permission that this interview is being recorded and transcribed afterwards?
- Do you want to receive the transcriptions for approval before they are used?
- Do you have any questions before we start?

Background information

1. What is your academic background? (e.g., more focused on IT or on Hydrology, or something else)
2. What is your professional background? (e.g., mainly worked in Academics, or consultancy, or decision making etc.)
3. What is your background experience with hydrological models in combination with decision making?
4. What is your role in the Water Authority? And specifically, concerning the decisions made in case of possible flood risks of the Grebbe dike?

Scripts development process

1. How was the request for this modelling study formulated?
2. What is the purpose of the scripts?
3. What requirements did you have for the scripts? And what are the most important requirements in general?
4. They had to be reusable for other cases, why was that?
5. What agreements did you make concerning documentation/transparency?
6. How did you select this consultancy company?
7. How did the collaboration with the consultancy company go?
8. What were your instructions for the consultancy company for this project?
9. To what extent were you involved in the development process? What were the agreements made on this?
10. Were there any choices you were involved in when developing the scripts?
11. Were you aware/involved in the following five choices made within the scripts? And if you were not, to what extent do you agree with the choice or would you prefer an alternative? (see Table).

Documentation information transfer

1. How were the scripts transferred to you?

2. Which information did you receive with the scripts, apart from the documents I also received? Where there any other documents or oral explanations?
3. Which guidelines did you receive?
4. Was there any documentation you missed while using the scripts?
5. Did you try running the scripts?
6. Do you normally check certain choices made in a model/script?
7. How could you be facilitated in checking a model/script?
8. What documentation do you consider necessary when receiving a model/script?
9. Do you normally run the scripts/models you receive?
10. Who should be able to use the scripts within the water authority?

Scenarios

1. If the water is high, what is the procedure of communication and measures taken by the WA?
2. What policy options can be formulated?
3. To what extent are stakeholders involved in the decision-making process? Who are these?

For these questions, the scenarios resulting from the sensitivity analysis performed by the consultancy company are shown to the interviewee:

1. We have done a sensitivity analysis by alternating script components in the pre-processing of data for the D-HYDRO model. This has resulted in different outputs of the D-HYDRO model. We will show you multiple outputs of the model concerning maximum water depths, flow velocity and arrival times. For each of them, indicate what you would do.
2. Scenario 1: How would you act? Who would you consult? Who would you inform? What measures would you take? How urgent would your actions be?
3. Scenario 2: How would you act? Who would you consult? Who would you inform? What measures would you take? How urgent would your actions be?
4. Scenario 3: How would you act? Who would you consult? Who would you inform? What measures would you take? How urgent would your actions be?
5. Scenario 4: How would you act? Who would you consult? Who would you inform? What measures would you take? How urgent would your actions be?
6. Would you act differently for each of the model output scenarios? If so, what would the difference be?
7. Is there anything more you would like to add, concerning your decision-making in case of these scenarios?

Pre-processing script	Component	Involved in choice?	Agree with choice?
Elevation model	Buffer around breach = 60m		
Elevation model	Resampling method = average		
Elevation model	Different no-data values		
1D water courses	Friction coefficient = 0.035		
Refinement grid	Refinement factors = [1,1,4]		

Uncertainty, models and decision making

1. To what extent do you trust the model and these scripts, and the output they generate?
2. How do you normally cope with uncertainty in decision-making?
3. Which part of the model output has priority in these scripts/model? Or more specifically: which parameter(s)/location(s) is/are most important and should therefore be most accurately predicted?
4. What is the importance of a model like this, in the decision-making in case of a flood event? On a scale of 1 to 10?
5. What are other important factors in this decision-making?
6. Are there any other remarks you wish to make?