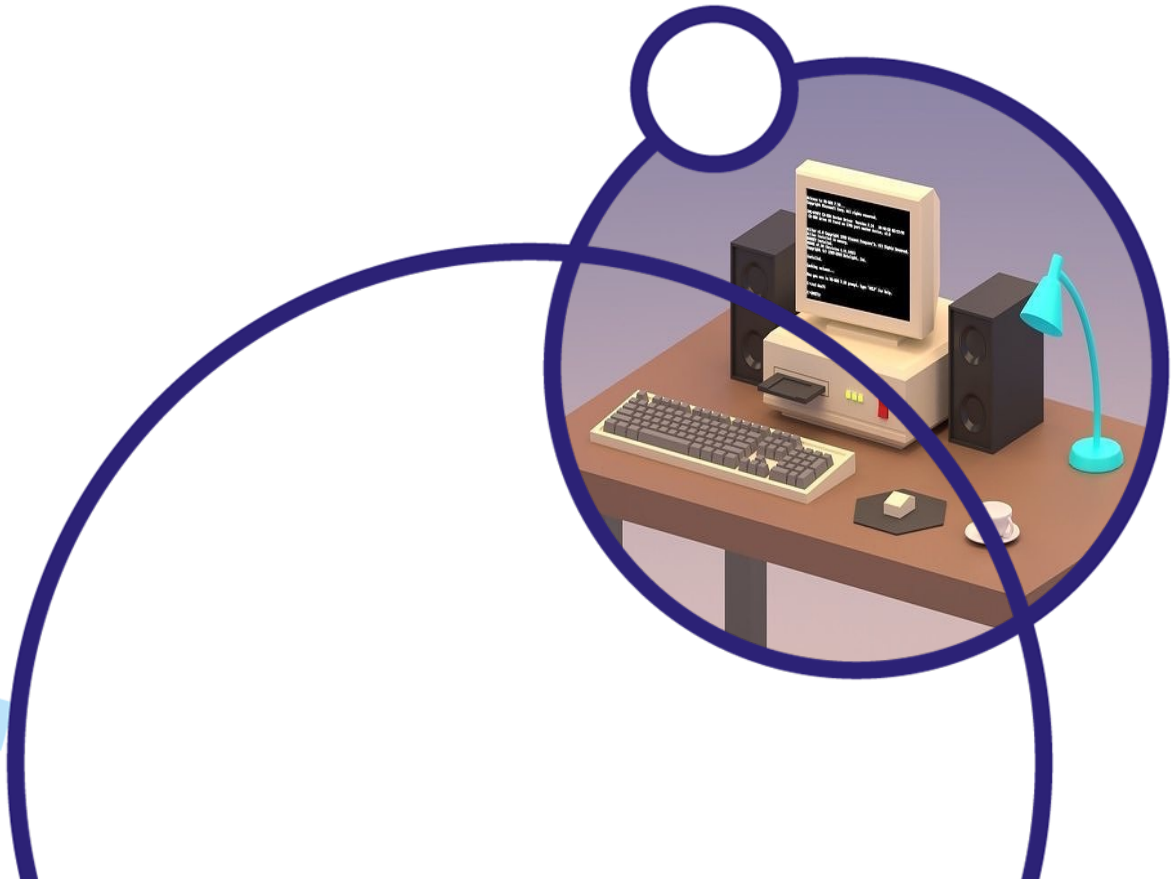
Nederlandse Hydrologische Vereniging

stowa

Bijeenkomst
Goed Modelleren in de Praktijk

13 juni 2024



Lieke Melsen,
Wageningen University

Programma 13 juni

- 13:30 Opening
- 13.45 Harold van Waveren (Rijkswaterstaat)

  Hoe is Good Modelling Practice 25 jaar geleden tot stand gekomen?
- 14:15 Koen van der Hauw (SWECO) en Wouter Swierstra (Royal HaskoningDHV)

  Modelleren in de praktijk en de rol van GMP
- 15:00 Pauze
- 15.15 Harry Boukes (zelfstandig)

  Goed opdrachtgeverschap
- 15:45 Discussie + demo GMP wiki van Wageningen Research
- 16.30 Napraten met hapje en drankje

Good Modelling Practice Handbook

GMP is an AQUEST project

STOWA report 99-05

Dutch Dept. of Public Works, Institute for Inland Water Management and Waste Water Treatment, report 99.036

ISBN 90-5773-056-1

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ir. J.J. Noort (STOWA observer)

Nog altijd relevant omdat ...

- Het gebruik van modellen is toegenomen
- De modelcomplexiteit is toegenomen
- De vraagstukken urgenter zijn
- Het maatschappelijk debat toegenomen is

Nog altijd relevant omdat ...

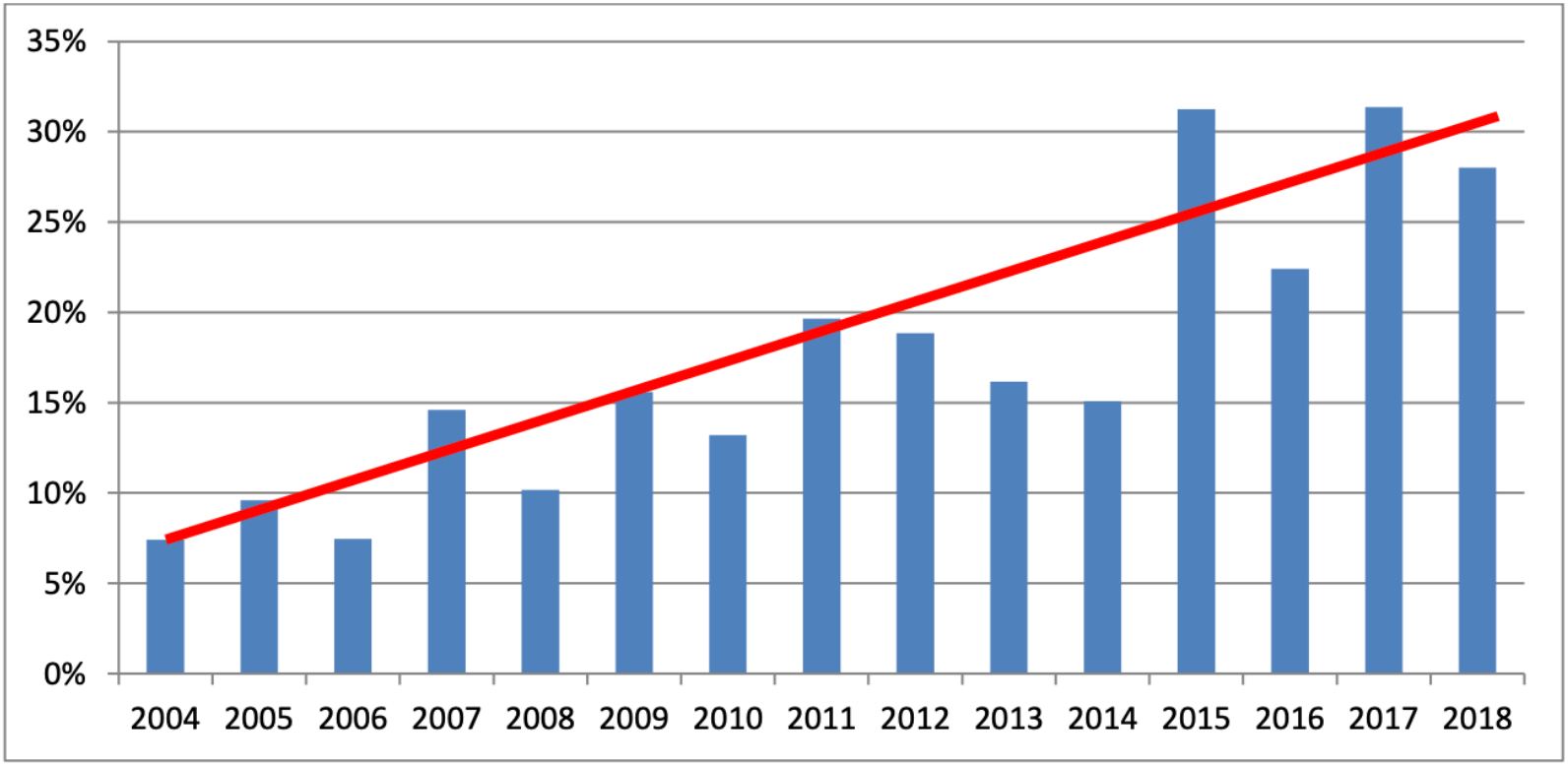

Figure 3. Share of EC Impact Assessments supported by models, per year (2004-2018)

Modelling for EU Policy support: Impact Assessments
doi:10.2760/748720

Nog altijd relevant omdat ...

Pieter Omtzigt

24 februari 2021

De overheid maakt op tal van onderwerpen gebruik van modellen, of het nu gaat over belastingen, klimaat- of milieumaatregelen, inkomenspolitiek of zelfs coronamaatregelen. Deze modellen bepalen in toenemende mate het beleid.

Nog altijd relevant omdat ...

- Het gebruik van modellen is toegenomen
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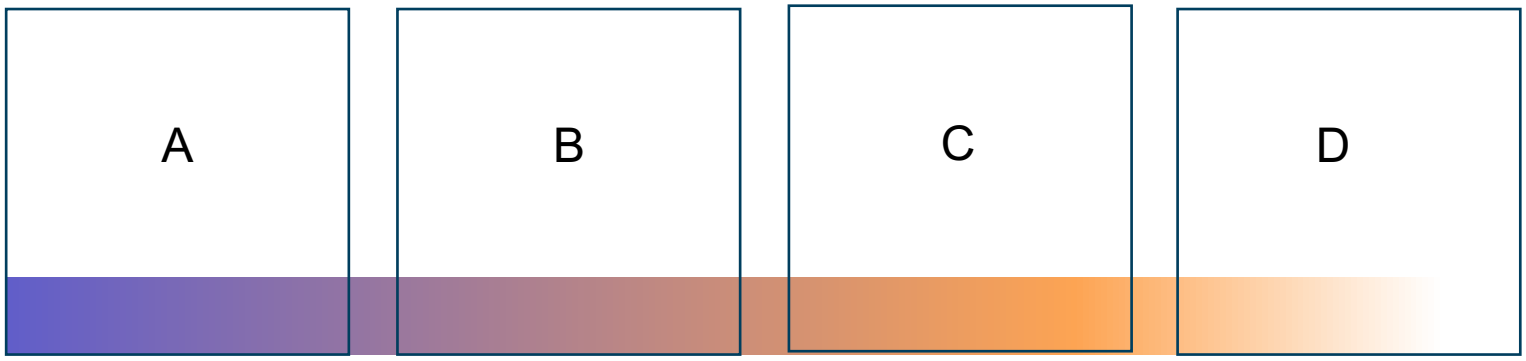
Wanneer is deze middag geslaagd?

Als we een duidelijk idee hebben waar we naar toe willen met good modelling practice

Wie hebben we in de zaal?



Strikte eisen

Losse richtlijnen

Niets

verbeelding, inspiratie, creativiteit,
vindingrijkheid, ervaring, vaardigheid

Is modelleren een kunst?

Kan je kunst inkaderen of beperken?

Wat als kunst besluitvorming ondersteunt?

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Standaarden

Verschillende vormen, verschillende doelen

Software delen / voorschrijven

Automatiseren

De procedure / workflow voorschrijven

Data delen / voorschrijven

Documenteren

Standaarden

Verschillende vormen, **verschillende doelen**

Kwaliteitsborging

Draagvlak voor resultaten

Legitimiteit

Transparant, reproduceerbaar, uitlegbaar

Verantwoordelijkheden
(opdrachtgever vs modelleur)

Voorbeelden uit wetenschappelijke literatuur

Responsible Modelling

Position Paper

Ten iterative steps in development and evaluation of environmental models

A.J. Jakeman [a,b,*], R.A. Letcher [a,c], J.P. Norton [a,c]

[a] Integrated Catchment Assessment and Management Centre, Building 48A, The Australian National University, Canberra, ACT 0200, Australia
[b] Centre for Resource and Environmental Studies, The Australian National University, Canberra, ACT 0200, Australia
[c] Department of Mathematics, The Australian National University, Canberra, ACT 0200, Australia

Received 5 January 2005; accepted 10 January 2006
Available online 20 March 2006

Fit-for-purpose environmental modeling: Targeting the intersection of usability, reliability and feasibility

Serena H. Hamilton [a b], Carmel A. Pollino [b], Danial S. Stratford [b], Baihua Fu [a], Anthony J. Jakeman [a]

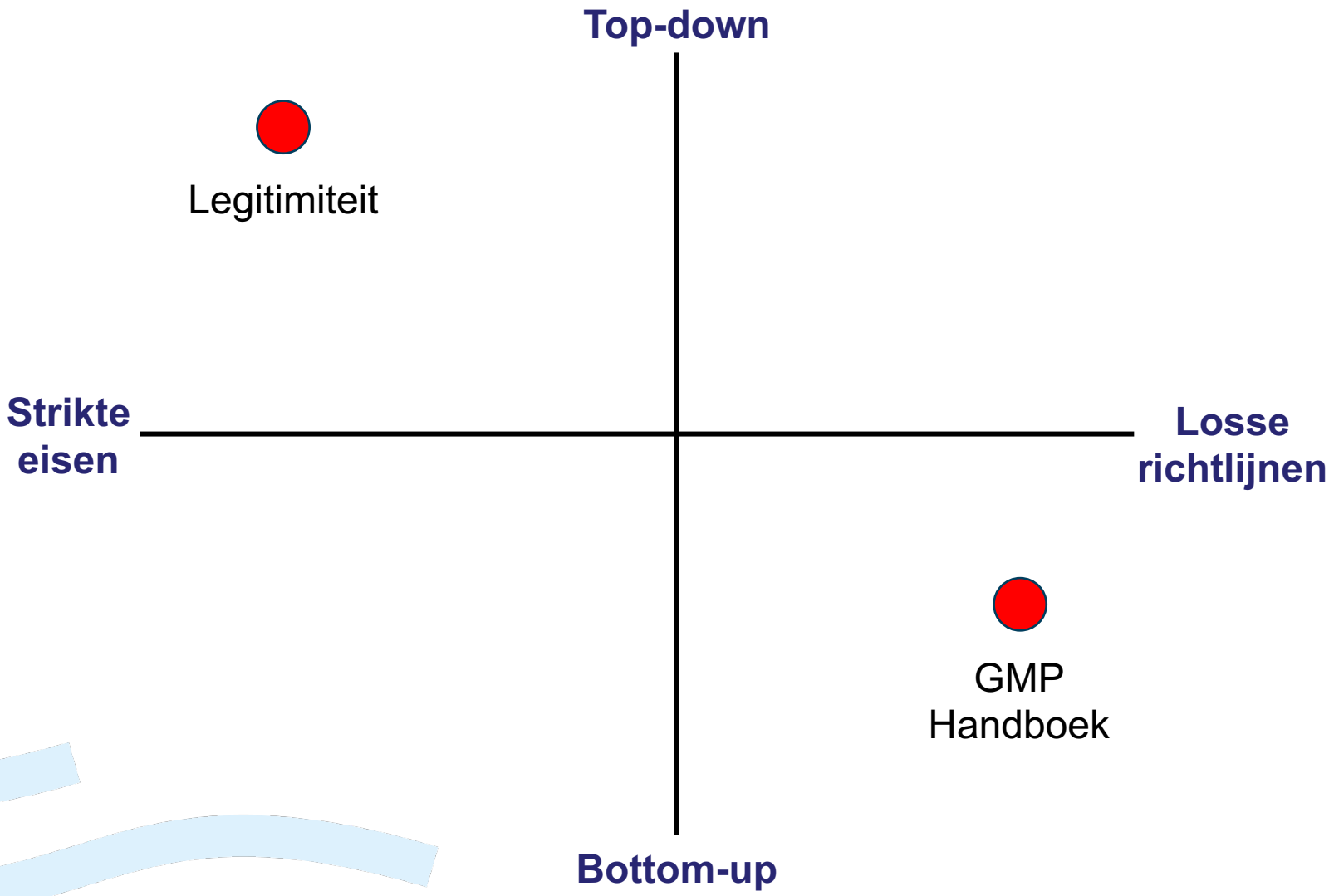
Five ways to ensure that models serve society: a manifesto

Andrea Saltelli, Gabriele Bammer, Isabelle Bruno, Erica Charters, Monica Di Fiore, Emmanuel Didier, Wendy Nelson Espeland, John Kay, Samuele Lo Piano, Deborah Mayo, Roger Pielke Jr, Tommaso Portaluri, Theodore M. Porter, Arnald Puy, Ismael Rafols, Jerome R. Ravetz, Erik Reinert, Daniel Sarewitz, Philip B. Stark, Andrew Stirling, Jeroen van der Sluijs & Paolo Vineis

Towards better modelling and decision support: Documenting model development, testing, and analysis using TRACE

Volker Grimm [a,b,c,*], Jacqueline Augusiak [d], Andreas Focks [d], Béatrice M. Frank [e], Faten Gabsi [f], Alice S.A. Johnston [g], Chun Liu [g,h], Benjamin T. Martin [a,i], Mattia Meli [j], Viktoriia Radchuk [c,e], Pernille Thorbek [h], Steven F. Railsback [k]

Standaarden



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Analytics

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  - Model setup
  - Programming and code verifica
  - Model evaluation
  - Model usage and interpretatior
  - Developing linked models
  - Inventory and handling of input
- Model governance
- Model management
- Data management
- Quality assurance
- Stakeholder interaction
- Reporting results

Space tools

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Analytics

Good Modelling Practice

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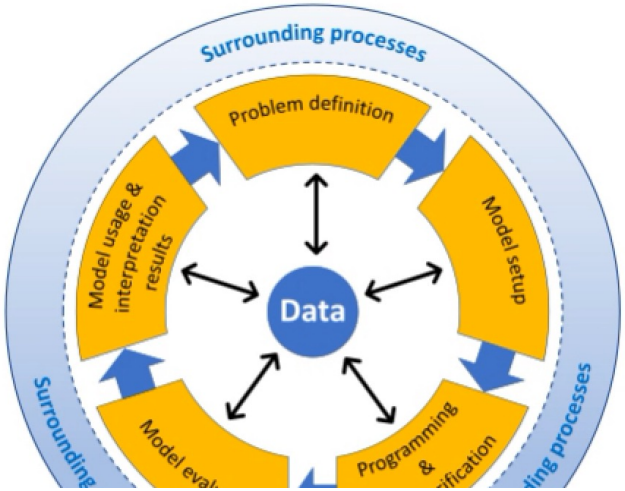
The modelling cycle

As mentioned on the home page, the modelling process can be described as a cycle subdivided into a number of phases based on their purpose. It may take several cycles before a model is fit for purpose. A specific phase can be further subdivided into a number of steps. Going through the different phases in the modelling cycle is a good practice in itself. In addition, each (step within a) phase has its own specific GMP actions. It is advised to always start the GMP cycle with the problem definition phase, also if an already existing model is available. This will help to develop or re-use models that are suitable for the intended purpose of a study. In this wiki, we use the different phases and processes in the modelling cycle (see picture on the right) to organize the different GMP actions.

GMP for the different phases of the modelling cycle

The links below explain the meaning of the different phases in the modelling cycle and (if applicable) how they are subdivided into smaller



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- Good Modelling Practice
  - Problem definition
  - Model setup
  - Programming and code verifica
  - **Model evaluation**
    - GMP - Model calibration
    - GMP - Model validation
    - GMP - Sensitivity analysis
    - GMP - Uncertainty analysis
    - GMP - Assessment of fitness
  - Model usage and interpretatior
  - Developing linked models
  - Inventory and handling of input
- Model governance
- Model management
- Data management
- Quality assurance

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Model evaluation

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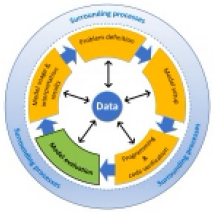
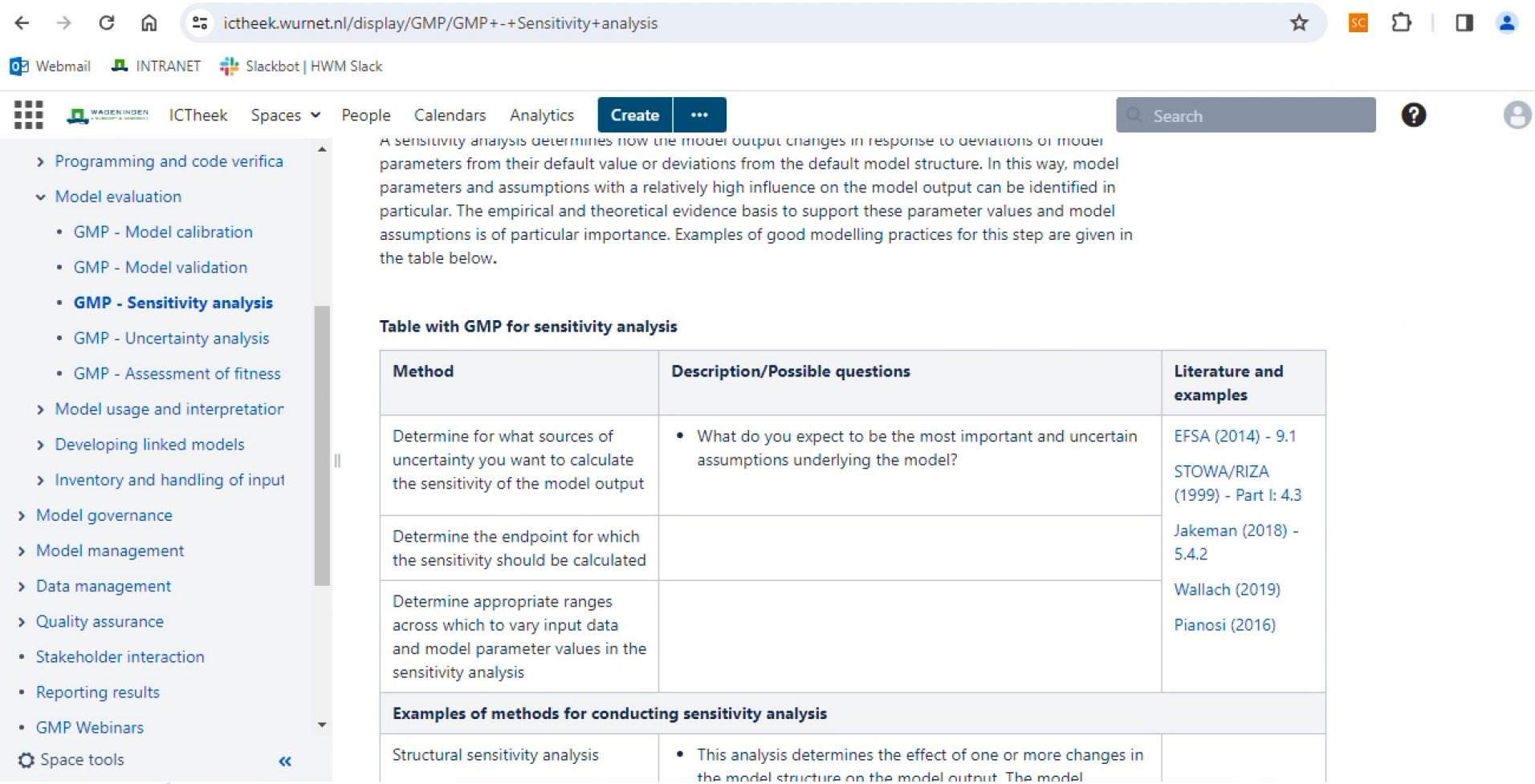
In this phase, the ability of the model to describe and predict observed data in a qualitative and quantitative way will be tested. In addition, the importance of uncertainty in e.g. parameter values and model assumptions for the uncertainty in the model output will be assessed. This phase can be subdivided into a number of different steps:



Step 1. Model calibration

This involves the estimation of uncertain model parameters by fitting the model to observations (data). This may be necessary when one or more model parameters cannot be directly and reliably determined from available data. Comparing the goodness of fit between different model versions also provides information about the importance of model assumptions for producing realistic model output. One should be aware that sometimes a calibration can result in something like "right for the wrong reason". Examples of good modelling practices for this step can be found here: GMP - Model calibration.

Step 2. Model validation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parameters from their default value or deviations from the default model structure. In this way, model parameters and assumptions with a relatively high influence on the model output can be identified in particular. The empirical and theoretical evidence basis to support these parameter values and model assumptions is of particular importance. Examples of good modelling practices for this step are given in the table below.
Table with GMP for sensitivity analysis
Method
Description/Possible questions
Literature and examples
Determine for what sources of uncertainty you want to calculate the sensitivity of the model output
What do you expect to be the most important and uncertain assumptions underlying the model?
EFSA (2014) - 9.1
STOWA/RIZA (1999) - Part I: 4.3
Determine the endpoint for which the sensitivity should be calculated
Jakeman (2018) - 5.4.2
Determine appropriate ranges across which to vary input data and model parameter values in the sensitivity analysis
Wallach (2019)
Pianosi (2016)
Examples of methods for conducting sensitivity analysis
Structural sensitivity analysis
This analysis determines the effect of one or more changes in

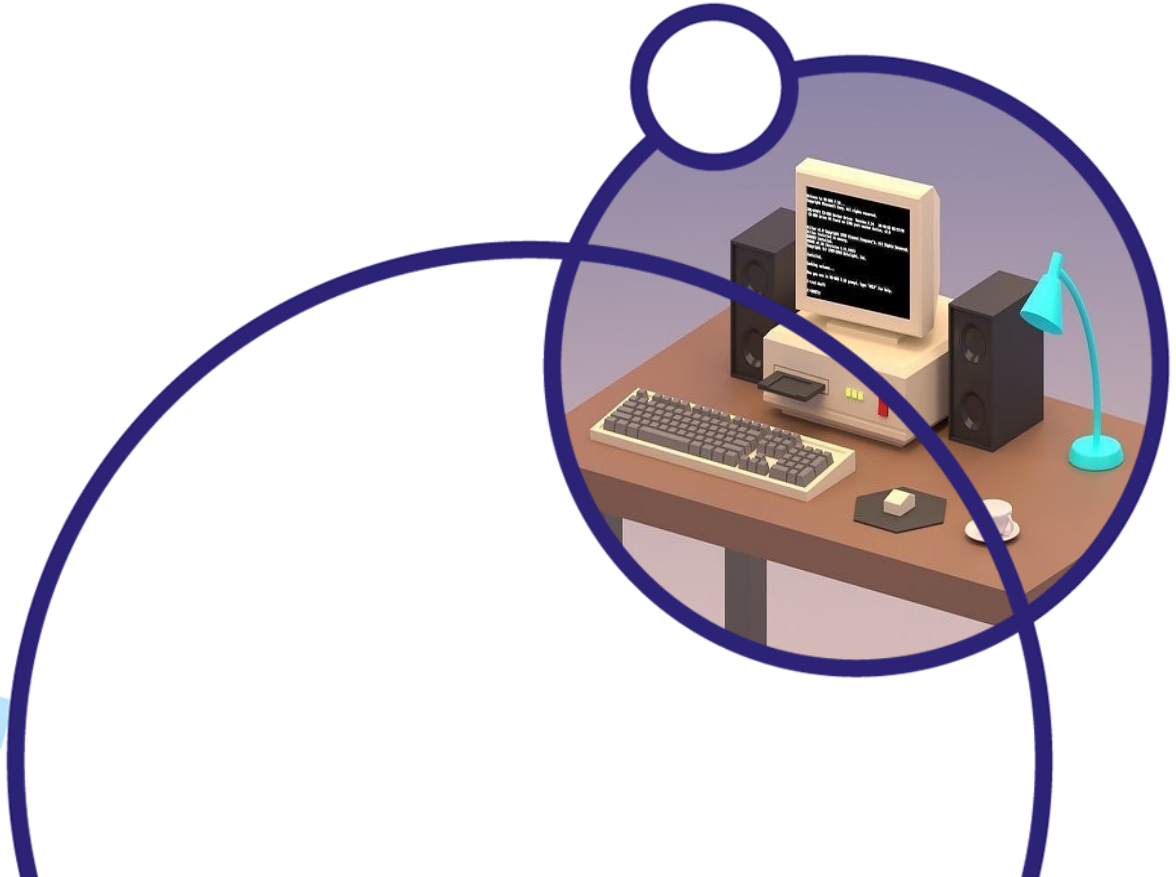
Wanneer is deze middag geslaagd?

Als we een duidelijk idee hebben waar we naar toe willen met good modelling practice

Wie moet het gaan doen?
Waar ligt de verantwoordelijkheid?

Bedankt voor jullie inbreng!

13 juni 2024



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