



HarmoniQuA

**QA and Good Modelling Practice:
the HarmoniQuA approach**

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Structure

- Modelling and QA
- Problems to be solved
- Existing QA for modelling
- HarmoniQuA's approach
- Flowchart
- Demonstration modelling KB
- Conclusions

Modelling and QA

- ❑ Modelling is widely used in water **management management**
- ❑ **ISO 9000** (quality management) is not enough
- ❑ **Good Modelling Practice** guidelines on top of ISO 9000
- ❑ Conducted by big and small consultants, knowledge/research institutes and universities
- ❑ Many **domains** of water management: groundwater; precipitation-runoff; hydrodynamics; flood forecasting; surface water quality; ecology, and sometimes socio-economics
- ❑ **QA = guidelines** (what to do) + **log** (what you did) + **audit**

Modelling problems

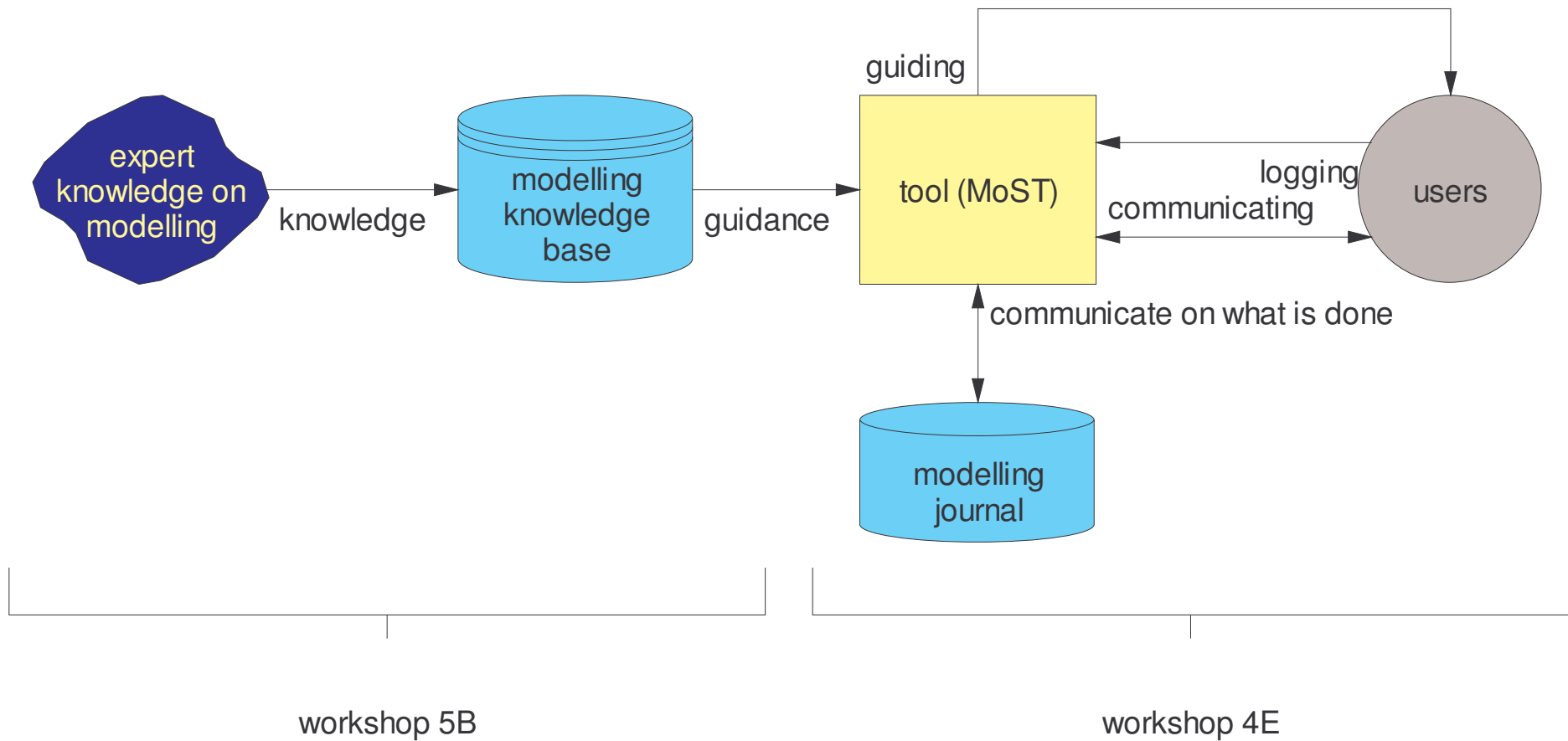
- ❑ **Ambiguous terminology** and a **lack of mutual and shared understanding** between key-players (modellers, clients, auditors, stakeholders and concerned members of the public);
- ❑ **Malpractice** (careless handling of input data, inadequate model set-up, insufficient calibration and validation and model use outside of its scope);
- ❑ Lack of **data** or poor quality of available data;
- ❑ **Insufficient knowledge** on processes hindering ecological (biota) modelling;
- ❑ **Miscommunication** of the modeller to the end-user on the possibilities and limitations of the modelling project and overselling of model capabilities;
- ❑ Confusion on **how to use model results** in decision making;
- ❑ **Lack of documentation and transparency** of the modelling process, leading to projects, which hardly can be audited or reconstructed;
- ❑ Insufficient consideration of economic, institutional and political issues and a **lack of integrated modelling**.

Existing QA guidelines

- ❑ Some examples:
 - ❑ Good Modelling Practice Handbook - Netherlands
 - ❑ Murray-Darling groundwater flow modelling, Australia
 - ❑ Bay-Delta modelling protocol for water and environmental modelling in Californian
 - ❑ WaPUG Code of Practice for the hydraulic Modelling of sewer systems, UK
 - ❑ Groundwater Resources Modelling Guidance Note, UK
- ❑ Overview is given in:

Refsgaard, J.C., H.J. Henriksen, B. Harrar, H. Scholten and A. Kassahun, 2005. Quality assurance in model based water management - review of existing practice and outline of new approaches. Environmental Modelling & Software 20, 1201–1215

HarmoniQuA QA approach: scheme



HarmoniQuA QA approach: dedicated

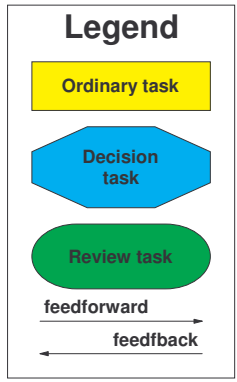
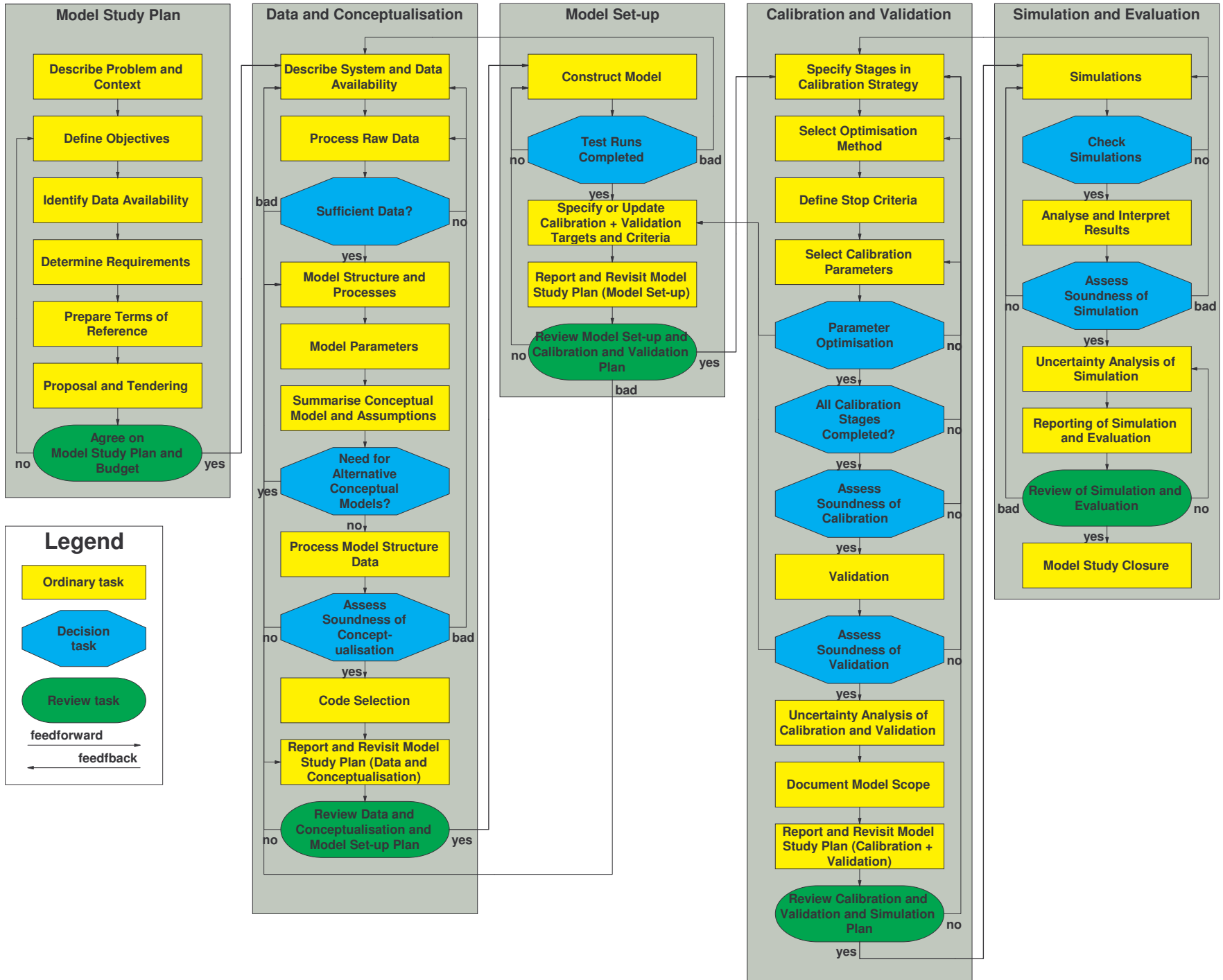
- ❑ Multidisciplinary teams with the following roles:
 - ❑ Water manager
 - ❑ Modeler(s) (experts in one or more water management domains)
 - ❑ Auditor
 - ❑ Stakeholders
 - ❑ Public
- ❑ Domains
 - ❑ groundwater; precipitation-runoff; hydrodynamics; flood forecasting; surface water quality; ecology, and sometimes socio-economics
- ❑ Guidance is filtered for role and for domain

HarmoniQuA QA approach: decomposition

- ❑ *Modelling* has to be seen as a **process**
- ❑ The modelling *process* can be decomposed into **steps** (groups of associated tasks)
- ❑ A *step* can be decomposed into **tasks**
- ❑ A *task* can be decomposed into **activities**
- ❑ **Methods** / tools can be used to do a *task* or an *activity*
- ❑ *Steps, tasks, activities, methods* are **described in detail**, e.g. each *task* has *name, definition, explanation, [list of] activities with associated methods, pitfalls and sensitivities, other info (examples, relevant references and URLs, ...)*
- ❑ 3 types of *tasks*:
 - ❑ **Normal**
 - ❑ **Decision** (decide whether or not to redo part of the work)
 - ❑ **Review**
- ❑ Tasks have a **preference order**

HarmoniQuA QA approach: knowledge collection

- ❑ Stepwise improvements of modelling KB
 - ❑ Set-up in workshop with 5 experts (modelling, knowledge engineering)
 - ❑ Internal discussions by HarmoniQuA partners
 - ❑ Internal review by 3 partners not involve in development
 - ❑ External review by 3 experts
 - ❑ 2 rounds of test cases (in total 21)
- ❑ All experts are invited to comment modelling KB content:
<http://harmoniqua.wau.nl/tools/EditGuideline> (registration required)
- ❑ Yesterday, we had a kick-off meeting of the
Post HarmoniQuA Collaboration Framework
(aiming to keep the modelling-KB and MoST alive; feel free to join)



Demonstration

- Guideline part of MoST used to get guidance

Conclusion

- Specific (modelling) guidance **on top of ISO 9000**
- Organized/structured in **knowledge base**
- Should reflect **consensus** on modelling process → please participate in discussions!!!
- Where to find:
 - Modelling KB: <http://harmoniqua.wau.nl/tools/index.jsp>
(registration required)
 - Papers on KB:
<http://harmoniqua.wau.nl/public/Product/papers.htm>
 - Extended training material: <http://harmoniqua.wau.nl/training/>