

Definition of Terms in context of Virtual Testing

Exchange TUC – OSCCAR

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OSCCAR has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768947

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May 2020

Glossary - Or: What is a valid model?

- “The validation should be the process where EVIDENCE is generated – CREDIBILITY is thereby established that the model has adequate accuracy and the level of detail for the intended use!” (ASME V&V 10-2006)

Literature:

ASME V&V 10-2006, IMVITER deliverables, Step Roadmap VPH 2007

Glossary - Or: What is a valid model?

- As a first assessment of a model, it is appropriate to check whether the equations are solved correctly. This can for instance be done by simulation of a problem with known analytical solution (benchmark) and is referred to as verification.

Verification: Assessment of accuracy of computational model solving the mathematical problem.

Glossary - Or: What is a valid model?

- As a next step, checking whether the *right* equations are solved is to be done. The question to be answered is how the model predicts physical reality. Experiments under well controlled conditions provide measurements that are used for this. For such a validation, there is hardly a natural termination. Instead, with new experiments becoming available, the question needs to be answered again if a model predicts the physical reality accurately. Also, validation is specific for an application, i.e. for the addressed problem.

Validation: Assessment of the degree to which a computational model is an accurate representation of physics being modelled.

Glossary - Or: What is a valid model?

- Unfortunately, many modellers use the term “validation” for what should be referred to as

Calibration: The process of modifying (parameters of) a model or tool to reach a performance target defined beforehand.

Hence, calibration often follows the objective of improving the result (assessed accuracy) gained in the validation.

Glossary - Or: What is a valid model?

- From the idea of validation described above, it can be easily understood that rather few end users will be able to decide whether a model is predicting the physical reality accurately enough for their problem. It is therefore useful to install processes for creating trust of users in models. A certification of a model is one option. This may include some kind of prevention of undesired modifications to the model. Certification of a model by an authority reduces the responsibility of the user for model validity. A model certification needs to be done for single problems/applications.
- **Certification:** The process of official approval that a model and its associated data are acceptable for a specific purpose. Purpose describes the use in an existing procedure, e.g. consumer rating or legislation with Virtual Testing.