Scientific Computer-Based Experiments

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Science, mathematics and especially numerics are pervaded by computer-based experimentation. Many of those computer-based experiments (CBEx) are potentially easy to reproduce, but all too often their scientificity is impeded unnecessarily. And while not only science, but also engineering and industry rely heavily on numerical experiments, and in spite of more than half a century of experience with CBEx, this issue seems still not resolved.

In this tutorial the concepts of replicability, reproducibility and reusability of CBEx will be defined, alongside associated requirements and recommendations. These ideas are distilled into best practices with the aim of seamless adaption into different types of CBEx. Furthermore, the sustainability of scientific software projects evolving from or through CBEx is discussed.