

Universal GUI to plan CT experiments

J.R.A. Godinho ^{1*},

¹ Helmholtz-Zentrum Dresden-Rossendorf, Helmholtz Institute Freiberg for Resource Technology, Chemnitz
Straße 40, 09599 Freiberg, Germany
*Speaker : j.godinho@hzdr.de

1. Introduction

This contribution will demonstrate an interactive open-access GUI that aims to standardize a protocol to plan and to assess the feasibility of CT experiments. This standardization promotes quality assurance and improves comparability of laboratory source CT images obtained in different facilities.

The planning of a CT experiment consists of converging the preliminary knowledge about the sample with the technique requirements in order to answer specific scientific questions. This often involves combining the expertise of a “User” and a “CT expert”. The User is an expert in a specific field of science related to the sample and has formulated specific scientific questions or hypothesis that may be answered using CT. The CT expert is a person with advanced knowledge of CT, who does not necessarily have an in-depth knowledge about the specific field of science related to the experiment.

2. Results and Discussion

Several conclusions were drawn from the experiences between Users and CT experts gained in the EXCITE network [1] – an European infrastructure that provides user access to microscopy facilities in various countries. Particularly, some challenges were found during the first interaction between user and CT expert. 1) The User has not yet formulated a scientific question and is just exploring the possibilities of the technique, which makes it difficult to the CT expert to help. 2) The User rarely reads comprehensive CT reviews, which often results in having unrealistic expectations. 3) CT experts operating CT facilities are often overloaded running multiple experiments, thus cannot dedicate sufficient time to plan new experiments, e.g. reviewing the literature behind the scientific question. 4) Important details about the sample characteristics are often undervalued or neglected by both parties before the day of the scan.

In this contribution, a protocol is suggested to smoothen the communication between Users and CT experts without the overlap of each other’s expertise. The protocol is supported by an intuitive step-by-step framework and interactive GUI that links the scanning

parameters with the sample properties and the scientific question.

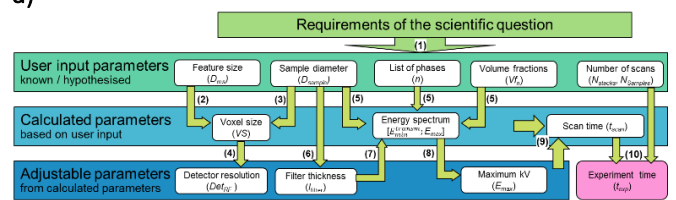
The protocol and GUI has been tested by users of a coreTom (Tescan). The Users were able to independently perform a quick assessment of the feasibility of CT experiments on their specific samples, without the in-depth knowledge about CT scanning physics. The Users were also able to refine the scientific questions and the testing hypothesis behind the experiment, ahead of the first discussions with the CT expert. Additionally, CT experts report a decrease in the number of experiments turned down due to infeasibility, as well as a more efficient use of resources due to less failed scans and less time spent for planning.

Further incorporation of a database for other scanner manufacturers and scanner settings can make this a universal tool to be used at CT provider facilities. Online training actions and video tutorials are on the making to ensure usability by the wide scientific community.

3. References

[1] <https://excite-network.eu/>

a)



b)



Figure 1. (a) Scheme of a step-by-step protocol to plan CT experiments. The steps can be followed using an open source GUI (b).