Report from CCPi for the Period 01/04/18 to 30/09/18

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1.   Background

Non-destructive 3D X-ray, Neutron, PET and MR imaging are essential tools in many areas of science with diverse applications from Energy, to Healthcare to Security and across all Materials Science topics.

The CCPi was established in 2012 to support the emerging UK tomography community with a toolbox of algorithms to increase the quality and level of information that can be extracted by computed tomography. There are four major open source software parts: pre-processing techniques for image calibration and noise reduction; reconstruction techniques to create a 3D volume data set from projections; segmentation/quantification techniques that can extract relevant objective values from these 3D volumes; and a software framework development to enable the exploitation across a wide range of imaging devices.

The size of this community has grown with many academic groups around the UK taking up tomographic imaging and purchasing new lab based x-ray CT scanners as well as exploiting new national facilities. The size of our community has subsequently risen from ~250 in 2013 to over 400 in 2018; 60+% growth. Our focus brings together the UK imaging community, specifically to maximising the return on investment in imaging software development through developing, maintaining, and prompting the CCPi toolbox, the "Core Imaging Library", http://www.ccpi.ac.uk/CIL

2.   Highlights for the Current Reporting Period

Progress has been robust with further integration of CCPi Flagship staff within the main Core development team and recruitment of two+ new RSE. Network t-conf meetings occur regularly with updated website, newsletters, talks and training events. Over the last period;

- Four funded Fellowship visitors; **Brian Bay** (Oregon State University [week visits in July & September 2018]) DVC code being incorporated within the CIL, **Llion Evans** (University of Swansea) sponsored events (22 May & 3-6 Sep 2018, Image-based Modelling IBFEM-4i) and speakers at RAL (14-15 June 2018) **Francois Hild** (University Paris-Saclay) and **Maxime Moreau** (French Institute of Petroleum).

- First version of a CCPi CIL software is being made more robust and includes Flagship code and hackathon (26-27 July 2018) results; thanks to Edoardo Pasca, Jakob Jorgensen, Daniil Kazantsez, http://cil.readthedocs.io/en/latest/

- Two publications; an accepted paper "Exploring the potential of neutron imaging for life sciences on IMAT", Journal of Microscopy; and a submitted paper to Software X "CCPi-Regularisation Toolkit for computed tomographic image reconstruction with proximal splitting algorithms"

- UK-USA collaborations: included a presentation and poster at the SSI workshop (24 April 2018) and a submitted USA BSSW Fellowship (October 2018) by Brian Bay (Oregon State University).

- CCPi code is integrated within ISIS/IMAT beamline structure and CCPi Flagship has recently been approved beamtime (11-15 February 2019).

- Network training activities included; a workshop on 'fibre reinforced composites' (15 May 2018); an Avizo visualisation hands-on session at RAL (17 May 2018); and Avizo courses at UoM (5-6 June 2018).

3.   Workshops and New Opportunities

Following events are being organised for the coming year:

- Three major events have occurred over the period, with CCPi exhibition stand to promote tomography, and they will be repeated in 2019:- Advanced X-ray Imaging Workshop and Fringe Meeting (14-15 June 2018, organised by DLS / MDC); Dimensional XCT conference (2-3 July 2018, organised by NPL); and ToScA Symposium (10-12 September 2018, organised by RMS).

- University of Manchester, run monthly Lunch-and-Learn sessions complimenting the visitors and software-show-tell events at RAL (Harwell Campus).

- A CCPi-CCP_PETMR co-workshop has been proposal during the MIC (IEEE, Sep 2019) conference has been submitted.

4.   Issues and Problems

Core support for CCPi has been admirably carried out by Edoardo Pasca (0.6 FTE) over the current year, who has also had to cover extra administration effort, due to SCD restructure, including managing the CoSeC involvement. Recruitment is currently undergoing and candidates are being interviewed.

http://www.ccpi.ac.uk/