Report from CCPi for the Period 01/10/20 to 31/03/21

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1. Background

The CCPi network was established in 2012 to support the UK computed tomography community and build a framework of algorithms, aimed at increasing the quality and level of information from raw data.

The open source software parts are: pre-processing techniques for image calibration and noise reduction; reconstruction techniques to create a 3D/4D volume data set from projections; segmentation/quantification techniques that can extract relevant objective values from these volumes; all within a python software framework enabling advanced exploitation across a wide range of imaging devices. Our primary focus is through developing, maintaining, and promoting the CCPi “Core Imaging Library” (latest release CIL v 21.00) https://www.ccpi.ac.uk/CIL

Phase 3; 2020-2025, started in September, and aims to further expand and deliver code to support an increasing and more diverse tomographic imaging community. This includes the ISIS/IMAT beamlines, further beamlines within the DLS (Diamond Light Source), and integration with the new CLF facility EPAC 2020-25 “Project-Tomographic imaging using intense laser-driven radiation sources” and the new EPSRC National Research Facility for Lab X-ray CT (EP/T02593X/1). The number of local lab imaging devices utilising advanced software code continues to increase.

The CCPi team have combined code structure and training with the CCP SyneRBI code base. This enables improved integration with relevant third-party software and smooth user migration between platforms.

2. Highlights for the Current Reporting Period

Good software development practices are followed; including code project management, version control, issue tracking, and systematic code testing and builds. We make public releases through Anaconda of the Python software CIL https://www.ccpi.ac.uk/CIL

- The EPSRC National Research Facility for Lab X-ray CT EP/T02593X/1 was launched in November 2020, through a Hub in Manchester with spokes in Southampton, Warwick and UCL, with CCPi advertising and networking. A key related aspect will be a Data Analysis and Visualisation facility to assist UK users in analysing their tomographic data.

- Construction has started building the, five year, CLF EPAC Facility “Tomographic imaging using intense laser-driven radiation sources”; and early test reconstructions with the CIL are proceeding prior to long-term potential embedding of the software.

- Second Virtual-Lunch-and-Learn sessions occurred, November 2020 - March 2021. 8 Speakers over 6 events; 86 virtual attendees and also supported three University of Manchester at Harwell Ideas Forum Imaging Series seminars.

Two key papers, announcing CCPi Phase 3 code, specifically on the CIL (software library) are due for publication, end 2021, in a Phil Trans A special issue, organised together with CCP SyneRBI.

Supported the 5th Workshop on Advances in X-Ray Imaging held this year virtually in 1-2 February 2021. The aim was to bring scientists from different fields to discuss developments and applications of a variety of X-ray imaging and complementary techniques, and to build international collaborations.

Supported a (Compact Light Source) CLS Infrastructure Workshop, 16 December 2021, which EPSRC could have a funding stream for. This organised a formal response to the EPSRC call for statements of a need for large scale infrastructures.

Supported NPL's online workshop for the society of Dimensional-XCT on the 2 December 2020 that was collocated with the AdvanCT EURAMET project results.

Training courses continue with Avizo sessions (1-2 December 2020; 22-23 March 2021)

Our network community is reached through two email lists:

- CCPi-MMBERS@jiscmail.ac.uk 393 members
- CCPi-DEVEL@jiscmail.ac.uk 21 members

3. Workshops and New Opportunities

Many events are being planned for Summer 2021; where we can increase the core network activities and have further training courses introducing new users to the CIL software framework. We are supporting/speaking at:

17-21 May 2021 Dimensional-XCT Conference. CCPi is a Gold sponsor for organisation with the aim to create an independent legal organisation to manage this further. Linked to support for the new BSI/ISO standardisation process (ISO/TC 213/WG 10)

24-26 May ToScA (Tomography for Scientific Achievement) USA user group conference https://www.toscainternational.org/

26 May 2021 Workshop: Digital volume correlation (DVC) analysis: state of the art and applications in materials science. Specific CCPi hosting invitation to coordinate post-analysis modes of the CIL framework.

19-23 July 2021 Fully3D https://kuleuvencongres.be/fully3d-2021/home where we Include a multiday CCPi CIL training programme.

1-3 Sep 2021 ToScA (Tomography for Scientific Achievement) Europe user group conference https://www.toscainternational.org/

18-21 October 2021 IBSim-4i 2021 will be hosted by the Institute of Physics (IOP) at their new headquarters in King's Cross, London. Involving a specific CIL invited presentation.

New grants and extensions have been awarded that will increase the software developer group of the CIL; including an EPSRC "Rich Nonlinear Tomography for advanced materials EP/V007742/1" project starting in Spring 2021 (to follow-on work from the Flagship grant).

4. Issues and Problems

Website is to be update for end 2021; this is an opportunity to add and /or increase cohesion of services (wiki / blog / shared docs …) within the Drupal7 website. During this time the wiki in DL closed down which means alternative websites being used and sought.

Management/Exec (27 July and 26 October) and Working Group (16 December) meetings have all become virtual (zoom) and attendance has remained solid.

Some events continue to be postponed and delayed including the Royal Society Summer Exhibit.

Ongoing action for recruitment for C-19 extension approvals; including CCPi Phase 2, and shared links with CCP-EM users.

There has been ongoing excellent support from the CoSeC team http://www.ccpi.ac.uk/