

Report from CCPi for the Period 01/10/21 to 31/03/22

Prof Philip Withers (CCPi Chair), Prof William Lionheart (CCPi Co-Director), Dr Jakob Jorgensen (International) and Dr Martin Turner (CCPi Secretariat); 5 May 2021

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: pre-processing techniques for image calibration and noise reduction; reconstruction techniques to create a 3D/4D volume data set from projections; and segmentation / quantification techniques that can extract relevant objective values from these volumes; are 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 21.4.0) <https://www.ccpi.ac.uk/CIL>

We have two main highlight papers within the Royal Society Trans A Jul/Aug 2021 Special Issue Vol 379 issue 2204 <https://royalsocietypublishing.org/toc/rsta/2021/379/2204>
[<https://doi.org/10.1098/rsta.2020.0192> <https://doi.org/10.1098/rsta.2020.0193>]

Phase 3; 2020-2025, 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

Although recent EPSRC RSE proposals were not successful; we have gained many connections including with SPIERS software (22 Nov 2021) and HPC Tier 2 contacts. On completion of the Flagship grant dissemination activities continue, as well as continual employment within the team. Two further projects have started; an EPSRC grant “Rich Nonlinear Tomography for advanced materials EP/V007742/1” and a commercially orientated Synthetic Aperture Radar reconstruction toolkit (June – December 2021).

Networking meetings and workshops completed:

18-21 October 2021 IBSim-4i 2021 face-to-face meeting hosted by the Institute of Physics (IOP) at their new headquarters in King’s Cross, London. Involving CCPi sponsorship and a specific CIL invited presentation ([att 60+](#))

23-24,25-26 November 2021 Hackathon: algorithms benchmark for tomographic image reconstruction at Cosener's, STFC (Abingdon, Oxon) ([att 20+](#))

9-10 December 2021 the first ever CoSeC Annual Conference took place at Computing Insight UK 2021; including the CCPi core imaging library. ([att 50+](#))

15 December 2021 1-day training school for the Core Imaging Library (CIL) ([att 33](#)) and on 20 January 2022 an extended Q&A follow-on.

25 January 2022 UoMaH Seminar ([att 70+](#)) Introducing the CCPi Core Imaging Library

17-19 March 2022 CIL/SIRF Hackathon in Berlin

Training courses continue with Avizo etc... (NXCT.ac.uk **2-3 November 2021**; UoMaH **7-8 February & 21-23 March 2021**)

Meetings and hand-holding software development links are ongoing with NXCT.ac.uk; CLF EPAC; ISIS etc

Our network community is reached through two email lists and a new vibrant discord site:

Report from CCPi to the CCP Steering Panel

- CCPi-MMBERS@jiscmail.ac.uk 378 members
- CCPi-DEVEL@jiscmail.ac.uk 30 members
- Discord site 60 members

Awards and Papers:

Ryan Warr- Winner of the 2021 CoSeC Impact Award 2021;

Articles in Royal Society Trans A Jul/Aug 2021 including Laura Murgatroyd's Selected Cover Image: 23 Aug 2021 Vol 379 Iss 2204.

Computational capacity:

STFC cloud: providing continual support for summer and other training session (£~10k plus extension £~10k). Creation of a new CCPi website (£~6k); software licenses: ARTisT (Amin Garbout in Manchester) and from <https://www.postreality.io/> (Llion Evans, in Swansea)

3. Workshops and New Opportunities

Events are being planned 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:

4-6 April 2022 Second Hackathon: algorithms benchmark for tomographic image reconstruction at Cambridge

11-13 April 2022 PyConDE and PyData – abstract on CIL accepted

28 April 2022 PSMR training course – CIL cross-link with SyneRBI

13-16 June 2022 Dimensional X-Ray Computed Tomography (dXCT) conference, University of Manchester including two-days of training courses

7-9 September 2022 ToScA UK & Europe 2022 Queen Mary University London, UK

17-21 October 2022 IBSim-4i (sponsorship and short course in CCPi-CIL proposed)

4 January 2023 - 30 June 2023 Newton Institute - Rich and Nonlinear Tomography - a multidisciplinary approach RNT <https://www.newton.ac.uk/event/rnt/> Possible Royal Society Phil Trans A special Issue.

Extra items and rollover:

-Covid-19 vis work update (SARScov2 tomography) with Alan Roseman

-International visit from Evelina Ametova (evelinaametova@gmail.com) for 1-2 weeks across sites.

-International visit from ArtIST author Carsten Bellon from BAM

-Ongoing CIL training (27 April 2022); UoMaH (27-28 April 2022)

4. Issues and Problems

Website is to be update during 2022 and we have funds and resources available.

Reduction in CoSeC effort outputs and we continually need to plan for other projects. Management/Exec and Working Group meetings have all become virtual (zoom) and attendance has remained solid and further meetings proposed virtual or hybrid.

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