

## Report from CCPi for the Period 01/04/21 to 30/09/21

Prof Philip Withers (CCPi Chair), Prof William Lionheart (CCPi Co-Director), Dr Jakob Jorgensen (Flagship) and Dr Martin Turner (CCPi Secretariat); 5 November 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 the 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 21.2.0) <https://www.ccp.ac.uk/CIL>

Phase 3; 2020-25, 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 enabling improved integration with relevant third-party software and smooth user migration between platforms. Good software development practices are followed; including code project management, version control, issue tracking, and systematic code testing and build of regular public releases through Anaconda.

### 2. Highlights for the Current Reporting Period

The Flagship grant has completed with excellent outcomes including papers and training courses; and a [Kickoff meeting for the EPSRC “Rich Nonlinear Tomography](#) for advanced materials EP/V007742/1” project, **October 2021**, includes some follow-on work with Bill Lionheart as PI.

**17-21 May 2021** Dimensional-XCT Conference. [CCPi 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 [CCPi advertised and promoted https://www.toscainternational.org/](#)

**26 May 2021** Workshop: Digital volume correlation (DVC) analysis: state of the art and applications in materials science. [Specific CCPi hosted sessions](#) to coordinate post-analysis modes of the CIL framework with a further training course planned for end 2021.

**19-23 July 2021** Fully3D <https://kuleuvencongres.be/fully3d-2021/home> where we presented papers and gave a multiday [CCPi CIL training programme](#).

**1-3 Sep 2021** ToScA (Tomography for Scientific Achievement) Europe user group conference  
<https://www.toscainternational.org/> CCPi sponsored and gave two 3 hrs CCPi CIL training courses.

**CCPi specific Seminar Series:** CCPi ran C-19 virtual zoom items; over 25 events covering a total of 369 attendees with 45 speakers.

[1] Summary: Third V-Lunch-and-Learn: June 2021 - July 2021 7 Speakers over 3 events; 28 virtual attendees.

[2] Summary: Second V-Lunch-and-Learn: November 2020 - March 2021 8 Speakers over 6 events; 86 virtual attendees and also promoted three UoMaH Imaging sessions.

[3] Summary: First V-Lunch-and-Learn: April-July 2020 30 Speakers over 14 events; 11 sessions with 252 virtual attendees and also; one informal open coffee session (4 virtual attendees); and supported a IMA Cryo-CT event (153 virtual attendees) and an Internal University imaging event (9 virtual attendees).

**Two key papers, announcing CCPi Phase 3 code**, specifically on the CIL (software library) were published in 2021, within a Royal Society Phil Trans A special issue, organised with CCP SynerBI.

[1] Jørgensen JS et al. 2021 Core Imaging Library Part I: a versatile python framework for tomographic imaging. Phil. Trans. R. Soc. A 20200192.

[2] Papoutsellis E et al. 2021 Core Imaging Library - Part II: multichannel reconstruction for dynamic and spectral tomography. Phil. Trans. R. Soc. A 20200193

**Training courses** continue with:

[1] Regular Avizo training sessions joint with NXCT.ac.uk

[2] 26 June -16 July 2021 Training School for the Synergistic Image Reconstruction Framework (SIRF) and Core Imaging Library (CIL)

[3] 1-3 September 2021 ToScA 2x three hour intensive taster course and talk at IBSim-4i

**Our network community** is reached through:

CCPi-MMBERS@jiscmail.ac.uk 382 members    CCPi-DEVEL@jiscmail.ac.uk 26 members

<NEW> LinkedIn CCPi group created, <https://www.linkedin.com/groups/9090791/> 18 members

Zenodo CCPi community data sets/files <https://zenodo.org/collection/user-ccpi> 67 open documents

### 3. Workshops and New Opportunities

Events are being planned where we can increase the core network activities as well as have further training courses introducing new users to the CIL software framework. We are supporting/speaking:

**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 a specific CIL invited presentation.**

**23-24 November 2021** Hackathon: algorithms benchmark for tomographic image reconstruction at Cosener's, STFC (Abingdon, Oxon)

**15 December 2021** 1-day training school for the Core Imaging Library (CIL)

<https://forms.office.com/r/LGFgQ2Nddz>

New grants and extensions have been proposed with five of the EPSRC Software for Research Communities call grants involving CCPi CoSeC staff or code.

### 4. Issues and Problems

**Website is to be updated** for end 2021; this is an opportunity to add and /or increase cohesion of services (wiki / blog / shared docs...). Also, information from the STFC wiki in DL(STFC) that closed down could and needs to be migrated.

## Report from CCPI to the CCP Steering Panel

**Virtual/Physical/Hybrid:** Management/Exec (27 July 2021) and Working Group (21 June 2021) meetings have continued to be virtual (zoom) and attendance has remained solid. Combination with presentations being promoted but there is a debate as to what combination of physical, virtual and hybrid events are best.

**CoSeC costing reduction** is a concern and extra grants for the CoSeC team are being sought both internally and externally.

**Rescheduling Events** Some events continue to be postponed and delayed and now being reapplied for.

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