

## Report from CCPi for the Period 01/10/19 to 31/03/20

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### 1. Background

The CCPi network was established in 2012 to support the emerging UK computed tomography community building a framework of algorithms aimed at increasing the quality and level of information. The major open source software supported parts are: 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; all within a software framework enabling the exploitation across a wide range of imaging devices. We are now organising Phase 3; 2020-2025 that will integrate code with new local and national lab facilities; including within ISIS/IMAT beamline structure, 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 has grown with many academic groups around the UK taking up tomographic imaging. Our primary focus is through developing, maintaining, and promoting the CCPi toolbox, the “Core Imaging Library”, (latest release CIL v 20.04) <http://www.ccpi.ac.uk/CIL>

The CCPi team has integrated the code base and development with the RTMCT (Flagship grant) developer group and combined this structure with the CCPETMR code base in terms of naming schema. This choice was made to integrate with relevant third-party software and allow users to migrate 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; <http://cil.readthedocs.io/en/latest/>

- Major award was for the new EPSRC National Research Facility for Lab X-ray CT EP/T02593X/1 £10.1m for new xray facilities coordinated at a Hub in Manchester with spokes in Southampton, Warwick and UCL, starting Aug 2020.
- A major event in this period was a Synergistic Symposium with CCP-PETMR, on 3-6 Nov 2019 covering 4 days of workshop and training courses <https://www.ccpetmr.ac.uk/symposium2019>
  - Connected to the Synergistic Symposium were three CCPi Hackathons (2-4 Oct / 16-18 Dec / 3-5 Mar) and a test Training Course on the CIL (Core Imaging Library) (26 Oct).
  - Resulting in a Phil Trans A special issue together with CCPETMR/Synerbi with two specific papers on the CIL
- Networking continues; with monthly Lunch-and-Learn sessions (12 Nov / 10 Dec / 14 Jan / 11 Feb) and planning for the next four major XCT summer events are ongoing (see below). As well as key talks/poster at: 5-6 December 2019 CIUK and 9 March 2020 STEM for Britain 2020 in the Houses of Parliament, British Science Week.

Report from CCPI to the CCP Steering Panel

- Training courses continue with Avizo sessions (5-6 Nov & 11-13 Feb) and promotion of SuRVos (Super Region Volume Segmentation) (18-19 Nov)
- Beamtime specifically for CCPI was awarded for 18-21 Nov 2019 ISIS IMAT and EnginX; with ongoing data analysis.
- Successful proposal to support a Royal Society Summer Science Exhibit (Jul 2020) and Turing Institute Summer School (Jun 2020).

### 3. Workshops and New Opportunities

We had multiple major events planned for this Summer:

- Advances in Xray Imaging Conference / Fringe event and Turing Summer School at RAL (9-12 Jun 2020)
- Dimensional XCT week event of seminars/standards discussions and hands-on training at Manchester (29 Jun-2 Jul 2020) [Linked to support for the BSI/ISO standardisation process (ISO/TC 213/WG 10)]
- Royal Society Summer Exhibit, (3-13 Jul 2020)
- ToScA Europe in QMC London (2-4 Sep 2020)
- IBSim-4i (Image-Based Simulation for Industry) (7-10 Sep 2020) <https://ibfem.co.uk/events/>

Awarded funds for support from Turing Institute, exhibition funds from major companies (x10) and local support for Royal Society Summer School during these events.

Potential cross links with CCP EM planned with new CCPI Phase 3 starting in Sep 2020 and continual connections with CCP PETMR (now CCP SYNERBI).

### 4. Issues and Problems

We submitted final comments for Phase 3 that was approved (available online at website) and now planning on a five-year plan with new CoI team (first Exec Meeting 31 Jan) for start 1 September 2020 being arranged and staffing progressing well.

#### **Pandemic C-19 issues:**

1. Most of the above face-to-face events are postponed and deferred to the end of the year or into 2021. This has come at an extremely bad time.

**ACTION** About £30+k of core CCPI network costs from Phase 2 to Phase 3 are being requested to be deferred; and small Flagship additional extension to do software documentation, training material...

2. Speeded up coding links for C-19 visualisation and reconstruction needs with CCP-EM users.

**ACTION** staffing on Flagship requested to extend for overlap extension for PDRA staffing and future funds required.

3. Certain software demonstrations/teaching have now reverted to virtual sessions with new weekly sessions started.

**ACTION** administration is ongoing but while some of our meetings can go on line – others are on the back of other events which have been postponed.

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