

## CCPi Working Group Meeting – Monday 15<sup>th</sup> May 2018

ICAM, University of Manchester and Atlas Visualisation Facility, Rutherford Appleton Laboratory

### Minutes

Attendees – in person:

- \*m Jakob Sauer Jørgensen (Manchester, JJ)
- \*m Martin Turner (STFC/Manchester, MT)
- \*m Philip Withers (Manchester, PW)
- \*m Chris Race (Manchester CR)
- \*m Tim Burnett (Manchester TB)
- \*m Catherine Disney (Manchester CD)
- Graham Davis (Queen Mary London, GD)
- Peter Lee (UCL, PL)
- Winfried Kockelmann (ISIS, WK)
- Daniil Kazantsev (Manchester, DK)
- Mark Basham (DLS, MB)
- Edoardo Pasca (STFC, EP)
- Robert Atwood (DLS, RA)
- Martyn Winn (STFC, MW)
- Alan Kyffin (STFC, AK)

Attendees – Remote VC links:

- Thomas Blumensath (Southampton, TB)
- Kris Thielemans (UCL, KT)
- Hammid Dehgham (HD)
- Andrew Ramsey (AR)

Apologies: Gordon Brown, Barbara Montanari, Christoph Rau, Alison Davenport, Evgueni Ovchinnikov, Bill Lionheart, Oliver Dorn, Jay Warnett, Stefan Mairhofer, Farah Ahmed, Manuchehr Soleimani

Minute	Item	Action
15.05.01	Attendees introduced themselves. MT reviewed previous actions. - EU COST proposal is being resubmitted – May 2018 - Letter of Support has been given for DLS segmentation code: SurVos - CPC paper submission on all of CCPi is ongoing – due Spring 2019 - Talks: full set of monthly+ sessions (at RAL and Manchester) including ISO standards Jan 2018; ISIS/IMAT April 2018; NPL May 2018; “The MTC” July 2018; ICAL July 2018 - Developers Day visit: planned for Huddersfield (Paul Dunn) 22 June 2018	DK        MT
15.05.02	Requests for funds: - Lee Margetts and Llion Evans – approved workshops on related topics for Image based Modelling. ~£1k each requested and approved as long as they collaborate. - EP to manage two summer students and CCPi to fund ½ of one of the	MT

	students, costing £1k-1.5k for ML integration tasks (link to code/use-cases for CR etc.)	
15.05.03	Conferences approved: - ToScA (Sep 2018) funds for £1500 requested - dXCT (July 2018) funds for student access/presentation; usual process - RAL Advance Imaging (June 2018) , travel for external speakers approved - Catering and setup for related Fringe event on day before (14 June)  Pullup posters and stand to be manned when applicable.	EP
15.05.04	Extra Workshops to be linked to CCPi: - EGUK Sep 2019 ‘Visual Analytics’ course CECAM, at Daresbury Labs - dXCT - planning for 2019 (Huddersfield) and 2020 (Manchester)	MT init. contacts
15.05.05	Joint workshop with PETMR at MIC in November 2019 at Manchester. Half day on the Saturday is proposed with a 2-page outline proposal needed by end of May/early June	MT & KT
15.05.06	Avizo-Amira update on project collaborations – to coordinate licenses between DLS, RCaH, ISIS and SCD.	Ongoing Link SN
15.05.07	Software updates – past actions: - Simpleflex integration and usage – tree analysis - Simpleflex use case and publication - Software with TB for using MapReduce for tomo reconstruction. Meeting developers at May and June 2018	Ongoing EP EP MT/EP
15.05.08	Software updates over last 6 months: CIL Release version 1.0: - CIL software release update – presentation by EP Presentation available (EP) and launch of rel candidate end of May 2018 - Flagship software integration to CIL update – presentation by JJ Presentation available (JJ) and launch of rel candidate end of May 2018 Question: What user interface may be constructed?; Q: Confirming all will be 3D volumes Q:Release mechanism and access via Conda etc [website and newsletter announcement] Announcement: Setup and handholding are available from staff for example uses and practical problems. Eg savu meetings	MB link to EP
15.05.09	Software / project integration for next six months. Invited talks by: - Chris Race on ML and AI in Materials Science Q on various uses; imaging, reconstruction, segmentation, property prediction and “Microstructural Fingerprinting” Announcement of two new Summer students (approved ¼ payment by CCPi) on ML topics. ...also new PhD post is available from Rolls-Royce for Sep 2018 (contact CR) - Jakob Jorgensen and Parmesh Gajjar - Laminography reconstruction Sarah Fisher and Danny Holmes (Summer student) –requiring a couple of weeks work to link to CIL Q regarding who in medical TomoSynthesis may be willing to present their experience? - Alan Kyffin regarding Anvil–“Jenkins” testing system Q regarding range of HW available and full license of MATLAB not just compiler - Catherine Disney / Brian Bay on DVC code Example of strain (DVC) given and timings given for ~100,000 points Q: on comparison with other systems and timetable for CIL integration / evaluation.  Discussed: Add more users to laminography code, potential link to EBIC; investigate ZEISS ZEN Intellesis for Machine Learning segmentation; ‘digital twinning’ part of Industry 4.0 (Massimo Noro at STFC); and if codes require speed-ups – HPC optimisation.	EP <i>et al</i> for possible CIL inclusion
15.05.10	MT informed WG of the SLA international review (submission ~20 August 2018) that may require posters, interviews and... case studies (of networking activities).	
15.05.11	Access routes for beamtime: IMAT(IMAT), i13 (nano CT with TXM), EBIC, ...	

	to be advertised in newsletter		
15.05.12	Exchange Programme – new application being advertised.		ALL
15.05.13	Announcements: - Bioimaging Network, Prof Peter Lee – Col on CCPi, <a href="http://mecheng.ucl.ac.uk/imagingbiopro/">http://mecheng.ucl.ac.uk/imagingbiopro/</a> - New EU/H2020 proposal with TB; linking DTU. Links to Soton and DLS requested - Launch of Drishti VR – to be advertised in newsletter. - New NPL/Bath project (MS) with CCPi-RSE overlap; invite to seminars.		
15.05.14	Future show-and-tell and SCD seminars		ALL
15.05.15	Use of Archer and SCARF18. Initial use of Archer for 1. Savu testing and possible use for 2. removing jobs from Flagship workstation.		MT/MB/JJ
15.05.16	Link to TB code for parallelised reconstruction methods. Discuss at developers’ sessions for CIL (end May 2018)		EP/TB
AOB	GDPR, websites and mailing lists (inc JISCMail “CCPi-Devel”)		MT
	New staffing likely to need visiting UoM status - MT & S-J C		
	NPL links described and approval of membership to WG and possible travel for meetings between TL et al on Best Practice Guide creation.		
Next Mtg	Date to be decided on doodle poll but proposed at RAL – Nov 2018		
<b>Minute</b>	<b>Action</b>	<b>Person Responsible</b>	<b>Completion due date</b>
15.05.01	CRC paper submission	DK	Apr 2019
15.05.0b	Visit to Huddersfield	MT	Jun 2018
15.05.02	Image based Modelling funds (32k)	MT	Aug 2018
15.05.03	Pull-up posters etc for conferences	EP/MT	Oct 2018
15.05.04	Extra workshop applications	MT	Jul 2020
15.05.05	PETMR joint w’shop application	MT/KT	Jun 2018
15.05.06	Avizo licenses	EP/SN	Ongoing
15.05.07	Simpleflex integration to CIL	EP	Dec 2018
15.05.16	Soton code to integrated to CIL	EP/TB	Dec 2018
15.05.08	CIL-Savu integration	EP	Ongoing
15.05.09	CIL-Flagship new code integration [next 6 mths]	JJ/EP	Dec 2018
15.05.12, 14	Exchange visitors, speakers and software show-and-tell	ALL	Ongoing
15.05.15	HPC evaluation	Developers/MB	Dec 2018
Admin	Website cleanup and newsletter authority	MT et al	Jul 2018

Ongoing case studies and outcomes; see previous Exec Meeting, and list here:

- Public Engagement activities (MT)
- IMAT integration (MT/SN)
- Beamhardening correction (RF)
- Quantification Algorithms (SN)
- CGLS reconstruction code and use (inc. open source data) (EP)
- Links to DLS and savu (EP/SN)
- SimpleFlex use case in DLS (EP)
- ...

## Appendix A: Chair's Report for the Period 01/10/17 to 31/03/18

Prof Philip Withers (CCPi Chair) and Dr Martin Turner (CCPi Secretariat) 14 May 2018

### 1. Background

Non-destructive 3D X-ray, Neutron, PET and MR imaging are becoming 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 parts: pre-processing techniques for image calibration and noise reduction, reconstruction techniques to create a 3D volume data set from projections and segmentation, quantification techniques that can extract relevant objective values from these 3D volumes, and software framework development to enable the exploitation of CCPi codes in a wide range of existing commercial and open source software.

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. The size of our community has also risen from ~250 in 2013 to over 380 in 2018, over 50% growth in the last five years. Our focus aims at bringing 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.

### 2. Highlights for the Current Reporting Period

Progress has been robust with the integration of two CCPi Flagship staff within the main Core development team. Network t-conf meetings occur regularly with updates through the website, newsletters, talks and training events.

- Creating and releasing the first version of a CCPi integrated Core Imaging Library (CIL) including the Flagship code (details at <http://www.ccp.ac.uk/CIL>); involving three day hackathon and continual weekly development sessions; thanks to Edoardo Pasca, Jakob Jorgensen, Daniil Kazantsev, Sri Nagella, <http://cil.readthedocs.io/en/latest/>

- Two publications for the Flagship code (end of first year); one in Software X (<https://github.com/dkazanc/TomoPhantom>) and the other on core routines for Colour X-ray reconstruction in IOP (<http://iopscience.iop.org/article/10.1088/1361-6420/aaba86>)

- Continual UK-USA collaboration by video-conf meetings that follow on from the EPSRC SSI travel grant – allowing exchange of Research Software Engineering skills between sites (Kitware Inc, USA and CCPi). Summary reports and poster is available (<https://zenodo.org/communities/ccpi>)

- CCPi code is integrated within ISIS/IMAT beamline structure and through the Savu framework used in the DLS (Diamond Light Source) – new users within the CCPi community have been recruited to

the first neutron tomography experiments; and two IMAT beamtime applications submitted (March 2018).

### **3. Workshops and New Opportunities**

Next three major events are being organised for Summer 2018, with CCPi exhibition stand to promote Tomography:- Advanced X-ray Imaging Workshop (June, organised by DLS / MDC); Dimensional XCT conference (July, organised by NPL); and ToScA (September, organised by RMS).

- University of Manchester, run monthly Lunch-and-Learn sessions – allowing visits and talks from various interest groups complimenting the visitors to RAL (Harwell Campus). New speakers and presenters welcome for the 2018-2019 season.

- Two planning cross linked workshops in 2019; a CCP PETMR co-workshop during the MIC (IEEE) conference; and a CECAM sponsored training event during the EGUK conference on visual analytics.

- Two new co-linked funded organisations include:

- Dr Llion Evans – Fellowship awarded at Swansea University, on industrial-scale tomography – kick-off 22 May 2018.
- Bioimaging Network, Prof Peter Lee (Col on CCPi) <http://mecheng.ucl.ac.uk/imagingbiopro/> kick-off 25 June and 5 July 2018.

### **4. Issues and Problems**

Recruitment for Group Manager, since resignation, and failure to recruit a full-time developer for Core CCPi activities have caused severe issues; both need reapplication / restructure within SCD/STFC that is ongoing - and actions are with CoSeC management.

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