Report from CCP-PETMR for the Period 01/04/2015 to 15/06/2015

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1. Background

The recent integration of positron emission tomography (PET) and magnetic resonance (MR) imaging into a single simultaneous imaging system opens up exciting potential for synergistic imaging. This CCP aims to bring together the best of the UK's PET and MR image reconstruction expertise to capitalise on this unique opportunity. We have two primary aims: **PET-MR Networking** (bringing researchers and groups together towards the goal of synergistic PET-MR image reconstruction and analysis by advancing understanding of PET-MR and the algorithms used for each modality) and **developing PET-MR Software Infrastructure** (development and promotion of a common software framework to tackle the specific challenges of PET-MR imaging).

2. Highlights for the Current Reporting Period

Our CCP has started 1st of April. This period has therefore been largely dedicated to starting activities and meetings, including:

- Meetings of Executive Committee to assign tasks and prepare Working Group meeting
- Working Group meeting on 13th of May 2015. We had 19 attendants from academia, representing all the UK groups working on (or interested in) PET-MR data processing and 5 attendants from industry (GE, Imanova, Philips, Siemens). Main outcomes:
    o Clarity about CCP aims, activities and budget
    o Agreement about general software strategy (a platform accommodating various existing open source packages for PET or MR reconstruction, initially targeting MATLAB users but also accommodating Python) and open source license (Apache 2.0)
    o Initial discussions on data formats
    o Volunteers for sub-groups on specific activities
- Establishment of web-site http://www.ccppetmr.ac.uk/, TWiki and mailing list.
- STFC initial experience with STIR (PET reconstruction), Gadgetron (MR reconstruction) and SWIG (C++ interface constructor)

In addition, together with the EU COST action TD1007: "Bimodal PET-MRI molecular imaging technologies and applications for in vivo monitoring of disease and biological processes", we co-organised and co-sponsored the 2nd International Training School on PET-MRI Engineering, April 27-30, 2015, University of Leeds, http://www.pet-mri.eu/PETMR_School_15.html. This 4 day school was attended by 33 trainees (9 from the UK).

3. Workshops and New Opportunities

No dates have been fixed yet. Preliminary schedule follows:

UK workshops:

- Q4 2015: 1-day workshop jointly organised with CCPi:
  Synergistic Reconstruction of Multi-modality and/or Multi-spectral data
- Q2 2016: 2-day workshop:
  Issues in PET-MR Reconstruction and Quantification
  (educative sessions, software training, research presentations)

Developer's Meetings:

- July 2015: software design of overarching framework
- September 2015: Training: Software Carpentry (git, compiling, good programming practices)
- December 2015: framework update and first release preparation

International activities:

- Nov 2015: STIR User's Meeting at IEEE Medical Imaging Conference
- Nov 2015: Satellite Workshop at IEEE Medical Imaging Conference
  Open Source Software in Medical Imaging

4. Issues and Problems

We found expectations of what this CCP can (or would like to) achieve were high. We will need to balance this with the available resources.

There were some delays in getting a domain name. The management of the web-site http://www.ccppetmr.ac.uk/ is at present very hard. The design is inflexible and can only be updated by STFC core support, who then have to ask somebody else to upload it to the live server. This is a waste of STFC core support time. Moreover, it is causing delays in external communication.

Assigned STFC staff has limited knowledge about PET and MR, but have some familiarity with X-ray CT. To alleviate this, Ron Fowler attended the PET-MR training school in Leeds. Our WG has decided to target MATLAB first, which is also not an area of expertise of Ron and Evgueni.