

Notes on 2nd software framework meeting: Developers workshop

Location: ICAM Pariser Building, University of Manchester

Attendees:

In person:

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| Kris Thielemans (UCL) | Ross Maxwell (Newcastle) | Nikos Efthimiou (Leeds) |
| David Atkinson (UCL) | Martin Turner (STFC/Manchester) | Will Hallett (Imanova) |
| Alaleh Rashidnasab (UCL) | Evgueni Ovtchinnikov (STFC) | Phil Noonan (Imanova) |
| Julian Matthews (Manchester) | Harry Tsoumpas (Leeds) | |
| Ignacio Partarrieu (Manchester) | Steven Sourbron (Leeds) | |

Via Webex:

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| Simon Arridge (UCL) | Ron Fowler (STFC) | Ju-Chieh Cheng (Amsterdam) |
| Claudia Prieto (KCL) | Jannis Fischer (Zurich?) | Georgios Papanastasiou (Edinburgh) |

Meeting notes:

Kris Thielemans presented an overview of the aims and agenda followed by a discussion on certain points.

- Will Hallett queried whether it would be possible to interface the proposed code with existing code from the manufacturer.
- Ross Maxwell supported the view that it would not make sense to ignore things that are already done well.
- Kris stated that this should be possible offline but not on the manufacturer's scanner consoles (example, use manufacturer's code to create the scatter estimate).
- Will raised the issue that for the software to be used for certain applications such as for commercial use it would need to be validated.
- Julian Matthews stated that testing of modules was envisaged but that this is likely to fall short of validation, as what is being validated would need to be defined. Validation for specific applications is perhaps something that could be addressed as a group later.

Updates since last meeting

- Procurement decisions for PET-MR scanners had been made by 4/5 sites. Until the final site decision was made it was not possible to disclose these decisions, but it is likely that there will be a mix of scanners from both manufacturers within the UK.
- Some progress has been made regarding file formats and converters. For the Siemens mMR the listmode format is released publically on the Siemens web-site. Mike Casey has agreed for code to read Siemens normalisation files and sinograms to be included in STIR, effectively

making the data format open. GE have not yet responded although to date have been open and keen.

- A CCP scientific workshop on joint reconstruction is planned for December and hosted by Bill Lionheart (Manchester). There was a request from Ross Maxwell that better notice is given for such meetings which will mean that the details of this meeting will need to be worked out in the next month.
- There will be a satellite workshop at the forthcoming IEEE medical imaging conference in San Diego, see the web-site.

The remainder of the meeting prior to the break focussed on the draft user specifications. The content of this document records the outcome with a few discussion points highlighted below:

- There was a discussion of the relative merits of a black box approach (operational advantages but limited use for educational purposes) versus a modular approach (educational and flexibility advantages but requires greater user knowledge). This included discussion on how far the modularisation goes, with this likely to be a trade-off between effort and the perceived benefits of the finer modularisation. A potential solution is to replicate some code (well-designed/parametrised C++ code and a simpler MATLAB/Python example with reduced functionality).
- There was a proposal to consider Octave as an addition/alternative to Matlab, due to likely changes in licensing and cost. This is still a developing picture and it was decided to postpone a decision for now.
- There was a discussion of the inclusion of Windows as an initial platform. Although clearly desirable there were envisaged additional complexities and that for the initial version the focus should be on Linux.
- There was a suggestion of a remote reconstruction capability which would have a number of potential advantages: well set up and maintained reconstruction environment; potential teaching resource; and enable common reconstructions for multi-centre studies. Funding for such a resource is unclear at present.
- There were discussions around the versions of software dependencies and whether the very latest or slightly older version of software should be supported. In particular python v3 was discussed, as this is a major change.
- Listmode reconstruction capability and the speed of projectors were discussed but it was felt that this should be postponed to future version.

Short break

Much of the second half of the meeting focussed on the second half of the user specifications document where envisaged applications and examples were documented. In addition three presentations were given by:

- Ron Fowler: Awareness regarding software developed by CCPi and available code on the CCPForge
- Kris Thielemans: Update on STIR
- David Atkinson: Update on Gadgetron/ISMRMRD

At the end of this discussion there was still a good deal of uncertainty in this later part of the document it was decided to use the time remaining to take decisions and solicit defined contributions:

- It was agreed that the current document will be split. The first part with current general agreement would be distributed for final agreement with a 1 week notice period.
- Contribution to pseudo code examples was requested with the following responses:
 - Julian Matthews: TOF/RM extension using current projectors and the reconstruction using image based priors.
 - Steven Sourbron: 4D reconstruction using sliding windows
 - Harry Tsoumpas and Phil Noonan: Motion correction
 - Nikos Efthimiou: Importing and use of new or different projectors
- It was suggested that this pseudo-code examples should be provided within 1 month with a small focuses meeting setup to review and complete this second document.
- An ambitious timeline for a preliminary beta version of the code was proposed by the end of the year.