PPTAP: Software and Computing Roadmap Workshop

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Workshop Overview

- This workshop aims to gather community input for the S&C part of the UK R&D roadmap
  - This R&D roadmap is a huge scientific, funding and impact opportunity and we need to ensure we make the strongest possible case

- The workshop broadly has the following structure:
  - **Day 1:** Experiments, infrastructure and external experts provide a overview of the S&C R&D requirements, challenges and synergies.
    - Focussed on collecting input and establishing overview
    - Any general points that require more detailed discussion will be identified and discussed in Tuesday afternoon session
  - **Day 2:** More detailed discussion of **a selection of cross-cutting points**
    - Discussion will be on points raised/noted yesterday and some identified from survey/previous discussions
    - Key areas like training, career prospects and research technical professionals

Recap of Monday

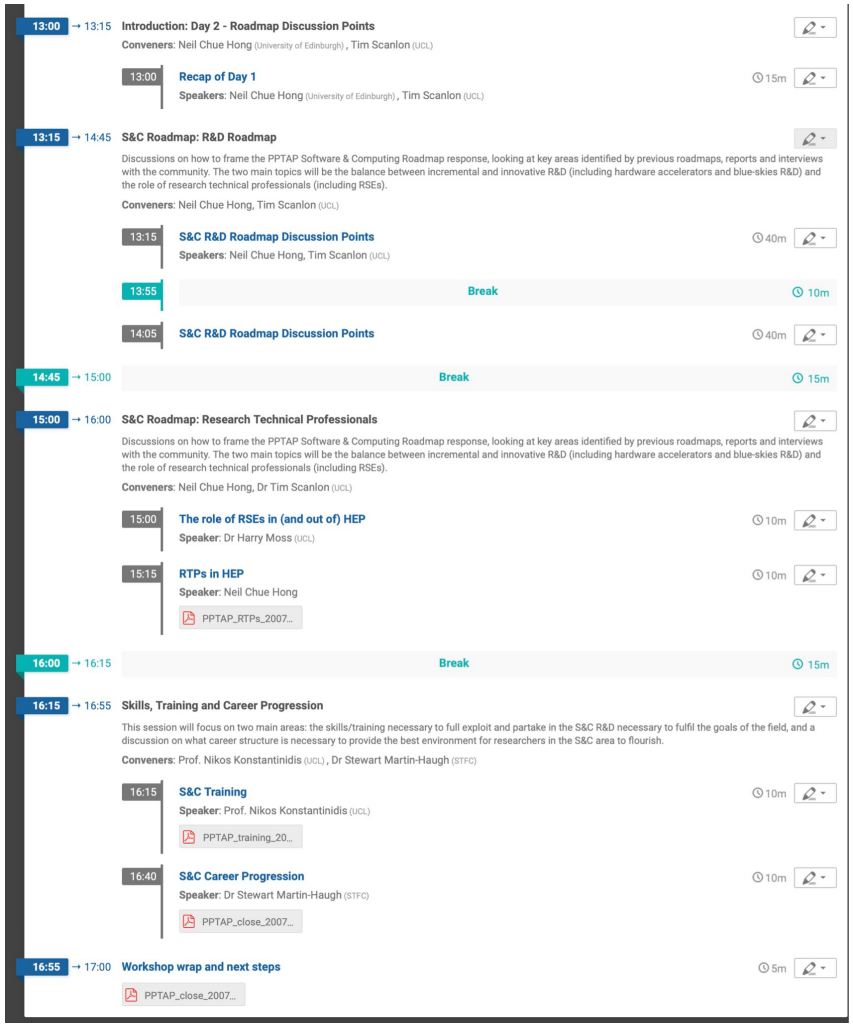
- Monday's session provided a detailed set of inputs
  - **What's been done before and other roadmaps (Mon)**
    - Complete (have we missed any?) set of documents detailed yesterday
  - **Short/medium/long-term challenges, requirements and priorities (Mon)**
    - Excellent and concise overview of major challenges/requirements across most of our programme
    - Despite very different physics goals and signatures clearly a very large degree of overlap in R&D challenges/requirements
  - **UK's strengths and how these relate to priorities (Mon)**
    - Obtained a thorough picture of the UK's strengths in S&C
  - **Synergies with other areas (Mon)**
    - Received excellent overview of international landscape
    - Although more discussion on how to engage is needed
    - Smaller but useful discussion on how to engage with other research areas
  - **Rationale: benefits to physics and benefits to UK (Mon)**
    - Detailed discussion on interactions with industry and impact potential
  - **Framework of funding (Tue)**
  - **Skills, training and career development needs (Tue)**
    - Both discussed today

Discussion Points from Day 1

- Main points identified for further discussion during Day 1:
  - GPUs/Heterogeneous architectures
    - Are the performance overheads of portability libraries like Alpaka low enough that the benefits outweigh the disadvantages?
    - Is there a role for FPGAs in any areas apart from real-time applications?
  - Large-scale computing
    - Should HTC and HPC look more alike (to users)
  - Cross-experiment and cross-cutting knowledge exchange
    - How do we ensure knowledge transfer between experiment and theory?
    - Is the primary driver for more cross-cutting software development for the analysis stage being driven by user's frustrations at experiment specific analysis codes?
    - Should be better at sharing expertise (for instance applied machine learning)
  - RSEs, training and career prospects (all raised many times)
    - Dedicated session later today
  - Climate Impact / Power Consumption
    - Should energy efficiency be considered in overall costings?
    - What are the Issues around power consumption for GPU/CPU etc.?
  - Digital Twins
    - How to engage, benefit or feed into this area

Today's Agenda

- Using live Google document to collect additional feedback
  - Please leave thoughts, suggestions or feedback in document
    - Especially if can not attend a session or if time runs out
    - Neil and I will be taking notes in this document throughout
  - Day 1: https://bit.ly/PPTAPSoftwareComputingNotes
  - Day 2: https://bit.ly/PPTAPSoftwareComputingNotesDay2



- Please raise a hand if you want to ask a question or raise a point during the discussions

Backup

Rationale

- International community is currently putting together R&D roadmaps in the **detector** and **accelerator areas**
  - **Software and computing (S&C)** is not directly included
  - UK is providing significant input into that process

- STFC launched the PPTAP process to create a UK R&D roadmap and to feed into the above process
  - Previously no 'PP R&D strategy' in STFC and no way of developing one
  - **S&C is included as one of the three key pillars in the STFC roadmap**

- This workshop aims to gather community input for the S&C part of the UK R&D roadmap

- This is a big opportunity to make the case for new funding to UKRI
  - Decisions could have long-lasting consequences
  - If we fail to make our strongest possible case we are missing a huge scientific, funding and impact opportunity
    - **We are here today to ensure we make the most of this opportunity!**

Process

- As there is no European roadmap, following a slightly different process to the detector and accelerator parts of the PPTAP roadmap

- Process
  - Review/collect **pre-existing literature**
    - Extensive amount of roadmaps/projects already (see next talk)
  - **Discussions** with a range of S&C experts
    - Understand present/future landscape
  - **Survey** to gather information from wider community
    - Collect individual input
    - Probe areas where a range of views exist
  - **PPTAP S&C Workshop**
    - Collect project/experimental input
    - Forum to discuss key areas where a range of views may exists
  - **Final roadmap**
    - Software & Computing R&D Roadmap Report
    - Input into main PPTAP document

Document Compilation

- Following the workshop:
  - Will review all the information and feedback we've collected
    - Use it to produce first draft of S&C R&D roadmap
  - The first draft of the document will be circulated to all workshop participants
    - Document will be open for people to post comments
    - Identify any key missing points
    - Iterate on the exact wording
  - Feedback will be incorporated in 2nd version
    - Will also be circulated to all participants for comment
  - Used to produce final version to be integrated into the overall PPTAP report
    - People will also be invited to comment on the final PPTAP report