Coordinating Panel for Software and Computing Status Report

presentation to HEPAP
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Snowmass 2021 Computational Frontier (CompF)

- CompF recommended the creation of a **standing Coordinating Panel for Software and Computing** (**CPSC**) under the auspices of **DPF**

The goal of Snowmass is to provide input for the Particle Physics Project Prioritization Panel (P5) with a ten year timescale. While S&C is clearly an enabler of the HEP science drivers, it is not managed like a 'project' as in the case of facilities, experiments, and surveys. S&C is no less important, often transcends traditional boundaries, and changes on a much faster timescale than Snowmass processes. For this reason, we have identified one central recommendation for the 2021 Snowmass:

> We recommend the creation of a standing Coordinating Panel for Software and Computing (CPSC) under DPF, mirroring the panel for advanced detectors (CPAD) established in 2012.
>
> *Purpose: Promote, coordinate, and assist the HEP community on Software and Computing, working with scientific collaborations, grassroots organizations, institutes and centers, community leaders, and funding agencies on the evolving HEP Software and Computing needs of experimental, observational, and theoretical aspects of the HEP programs. The scope should include research, development, maintenance, and user support.*
>
> Further details of the community vision for the CPSC can be found in the body of this report.

Larger CompF context

Continued S&C support for facilities, experiments, surveys, and theoretical calculations is essential for the health of the HEP science program. This includes S&C personnel as well as computing power, storage, and networking.

CompF **identified four key areas of need,** where increased investment would significantly enhance the physics output of the US HEP community.

1) Long-term development, maintenance and user support of essential software
2) Support R&D efforts cutting across projects or discipline boundaries
3) Support for computing professionals to enable us to use heterogeneous resources effectively
4) Strong investment in career development for HEP S&C researchers

Computing is a global endeavor and addressing the above items should include coordination with worldwide partners. CompF also strongly supported continued, significant investment in computing technologies including quantum computing and machine learning, which were not part of the 2013 Snowmass process.

1. The US HEP community should take a leading role in long-term development, maintenance, and user support of essential software packages with targeted investment.
   - A new structure is needed to fund modernization, maintenance, and user support of existing tools (grants typically only fund ground-breaking R&D or development of new software).
   - Examples include (i) event generators and simulation tools like Geant4 [2, 3, 4] that do not belong to a particular facility, experiment, or survey, (ii) S&C tools associated with one or more experiments, and (iii) data/software preservation after an experiment has ended.

2. Through existing, reshaped, and expanded programs, R&D efforts cutting across project or discipline boundaries should be supported from proof of concept to prototype to production.
   - Computational HEP is a vehicle for cross-cutting R&D. Supporting research in this area at a variety of scales would be broadly impactful.
   - Examples include S&C for theoretical calculations/generators; cosmological, accelerator, and detector modeling; machine learning methodology and hardware ecosystems; and algorithms and packages across experiment boundaries.

3. Support for computing professionals/researchers and physicists to conduct code re-engineering and adaptation will enable us to use heterogeneous resources most effectively.
   - Most HEP software runs on a single computing platform, making it difficult to use the multitude of hardware accelerators and diverse computing resources like cloud, HPC, etc.
   - To satisfy the needs of inherently serial algorithms that are still transitioning towards computing accelerators or are not cost-effective to port, an appropriate level of traditional CPU-based hardware should coexist with more powerful heterogeneous resources.

4. Strong investment in career development for HEP S&C researchers will ensure future success.
   - Sustainable efforts in computation require continual recruitment and training of the HEP workforce. We need to create an environment that is inclusive, supportive, and welcoming in order to integrate diverse skill sets and experiences.
   - Successful training events have been carried out through HEP experiments, institutes/organizations, and growing numbers of university courses. We need to continue and grow these efforts for documentation and training at multiple levels.
   - Faculty/staff positions for physicists with expertise in S&C for HEP are scarce and person-power shortfall in this area endemic. Funding agencies can catalyze faculty-level appointments in S&C with joint appointments at national laboratories.

First steps: Exploratory Group and Formation Task Force (FTF)

- The initial steps were taken by an "**exploratory group**", of the three CompF Conveners, D. Elvira, S. Gottlieb, B. Nachman, and for DPF, Joel Butler, and Sekhar Chivukula

- The DPF EC agreed that the CPSC should have a document similar in purpose to the one that defines CPAD's charge, governance, internal organizational structure, and some initial activities, including some awards programs and community meetings.

- The exploratory group wrote a charge, approved by the EC, to guide the work

- The DPF set up the **"Formation Task Force (FTF)"** of 21 members to write this report

- Ian Fisk was selected to chair the FTF

- The FTF held its first meeting on Jan. 11 of 2024 and has met ~biweekly since then.
  - The 9th meeting was on May 2.

Since the last HEPAP meeting in December of 2023

Formation Task Force

- Chairperson:
    - Ian Fisk , *Flatiron Institute, Simons Foundation*

- Members:
    - Tulika Bose, *University of Wisconsin*
    - Peter Boyle, *Brookhaven National Laboratory*
    - Joel Butler*, *Fermi National Accelerator Laboratory*
    - Gavin Davies, *University of Mississippi*
    - Peter Elmer, *IRIS-HEP/Princeton University*
    - Daniel Elvira**, *Fermi National Accelerator Laboratory*
    - Matthew Feickert, *University of Wisconsin*
    - Steven Gottlieb**, *Indiana University*
    - Salman Habib, *Argonne National Laboratory*
    - Michael Kirby, *Brookhaven National Laboratory*

- Members:
    - Charles Leggett, *Lawrence Berkeley National Laboratory*
    - Adam Lyon, *Fermi National Accelerator Laboratory*
    - Verena Martinez Outschoorn, *University of Massachusetts, Amherst*
    - Maria Elena Monzani, *SLAC National Accelerator Laboratory*
    - Ben Nachman** , *Lawrence Berkeley National Laboratory*
    - Amy Roberts, *University of Colorado*
    - Liz Sexton-Kennedy, *Fermi National Accelerator Laboratory*
    - Giordon Stark, *University of California, Santa Cruz*
    - Jan Strube, *Pacific Northwest National Laboratory*
    - Ruth S Van De Water, *Fermi National Accelerator Laboratory*
    - Michael Williams, *Massachusetts Institute of Technology*

    *DPF liaison, **CompF convener ,

Charge to FTF

The main goal of the CPSC is to facilitate communication, to help identify issues and problems and coordinate responses among subsections of the HEP computing ecosystem
- It is not a funding agency with a budget
- It is not a service provider

The Formation Task Force is an **ad hoc subcommittee of the EC**. It was requested to address and define
- the scope of the CPSC and its charge;
- the general areas of engagement, including the people with whom they are likely to interact;
- the proposed organization of the CPSC, namely the size, selection process for members, method for selecting chairpersons, terms and term limits for members and chairpersons, etc.;
- a possible initial set of working groups;
- the types of activities that it should promote;
- the ways of communicating and being available as a resource to the HEP S&C community; and
- the draft text for the DPF By-laws.

The CPSC should launch studies when its members think there are important issues that must be examined, and their findings made available to the S&C community

Development, Acceptance, and Implementation

- The FTF's draft report is due in the spring, ~4 months after the panel was appointed
- There is now a very first draft that is being edited and which we hope to submit for comment to the DPF EC in the next week or two for initial reactions and comments
  - We expect this will lead to some revisions
- After approval by the EC, the DPF will prepare any modifications to the DPF by-laws needed to accommodate the CPSC and will submit them to the APS for approval.
- **Once the report is approved by the EC, the work of the FTF is finished, and the EC will begin the process of establishing the CPSC as a standing body of DPF**
  - As has been done in the past, the Panel can get started informally while the APS approval process is going on

Table of Contents:

Forming the Coordinating Panel for Software and Computing

The Formation Task Force

May 2024

Commissioned by the Executive Committee of the
Division of Particles and Fields,
American Physical Society

Contents

Status

- Report is currently 22 pages long

- Missing
  - Executive Summary
  - Concluding paragraph
  - Acknowledgements

- Incomplete
  - Section 6 will acquire some more instances of implementation strategies
  - Appendices

Panel Governance and Organization - I

- The CPSC will be a standing committee of the DPF, reporting to the EC
  - It will have 15 members appointed to 3-year terms, implemented with a stagger so that 5 new members will be selected each year except for the first year.
    - Open solicitation of nominations, panel members chosen from nominees by selection committee consisting of a total of six EC representatives and Panel members including the Panel chair
      - For the first year, there is not yet a CPSC so the DPF EC will set up a procedure to choose the initial members and chairperson
  - Guidance for selection of Panel members
    - **The broad representation that is desired cannot be accomplished with a small panel which is, however, considered desirable for agility, unless special attention is given to the type of member that is chosen**
    - **In choosing members for the CPSC we should be remember that within the overall field of scientific S&C there are many more common needs for communication, training, community development, career advancement, and improving representation than there are sub-field-specific needs.**
    - The EC and the chairperson, with the help and advice of the Panel membership, will ensure the committee is composed of people who have a broad viewpoint, connect to more than one constituency, and can avoid representing too vigorously their own professional interests.

Panel Governance and Organization - II

- Selection of the Chairperson and Deputy
  - The Chairperson is chosen from members for a term of 3 years
    - The report does not yet list chairperson's functions
  - The Chairperson, in consultation with the DPF EC, will choose a deputy, whose main responsibility is to substitute for the chairperson if they become unavailable and to otherwise assist them in delegated tasks.
- The CPSC can appoint observers, consultants, and affiliates to broaden representation, especially to other nations and international organizations
- The CPSC is likely to create task forces and working groups to accomplish the real work of the Panel and also to expand participation
  - Discussed in detail in section 6 of report
- There was a consensus for the FTF not to specify an organization with a specific boxology but to see how the Panel develops

Panel Governance and Organization of Interest to DPF - III

- Interactions between the DPF EC and the Panel
  - The DPF is sponsoring the CPSC. This takes the form of facilitating the formation and subsequent operations of the Panel, connecting it to scientists who are members of DPF and more broadly of APS by promoting its activities in DPF newsletters and special messages, and providing gentle management oversight for its activities.
  - The CPSC is expected to define its own path, considering the suggestions and recommendations in the FTF report.
  - The CPSC is expected to keep the DPF EC informed of its activities by providing a report periodically and presenting its status approximately quarterly at EC meetings either in writing or by an in-person presentation if requested.
  - Specific activities that will be carried out by DPF and the CPSC working together are
    - Encouraging and gathering nominations for the Panel and selecting the final members
    - Choosing the chairperson from among the selected members of the Panel
    - Appointing any prize committees and monitoring the process of determining the awardees according to APS/DPF rules
    - Reminding all participants that they are required to obey the APS Code of Conduct
- The formal relationship between the CPSC and the DPF Executive committee will be specified in the DPF bylaws. Since it takes some time to receive final approval of modifications to the bylaws, the CPSC will begin to operate as soon as the DPF EC approves submits the bylaw changes to the APS.

> The DPF sponsorship of the CPSC will mainly consist facilitating its formation and monitoring and providing gentle oversight of its activities.

Naming the "Panel"

- The working name "Coordinating Panel for Software and Computing" and its acronym "CPSC" will be replaced with the winner of a competition for the most appropriate name and acronym/abbreviation
  - We hope the competition will create some initial buzz about the Panel
  - This was done for CPAD
  - DPF ran a competition for the Snowmass Logo

Some Implementation Suggestions

- Form Technical Working Groups (TWGs) to study issues of concern
- Appoint advisors and consultants
- Conduct Annual Meetings
- Conduct Virtual Town Meetings
- Develop and support communications tools for the S&C community
- Administer Prizes and Awards (with DPF)

CompF request (conveners)

Initial exploratory
Team, CPAD experience,
agencies – Conveners and Joel,
Sekhar

Exploratory team makes initial pass at stakeholder list

Status report to EC. EC discussion

Exploratory team makes initial pass at charge

Status report to EC
EC discussion of Task Force charge.
Approve charge (new name)

EC discussion of Formation Task Force (FTF) Selection process

Dec 23

Create and populate FTF

FTF produces draft report

We are now nearing the end

May 24

EC discusses, approves report, including draft modifications to DPF bylaws

Report is made available to HEPAP, if requested, for their information

Chair and members of the CPSC are chosen by the process in the report

Panel has first meeting

We are working on the draft document and hope to have a complete, reviewable draft sometime in May

We made one report to HEPAP at the Dec 23 meeting, and this is a status report now on May 9.

There will be a report by Ian Fisk and a panel discussion at DPF24/Pheno on May 14

Summary and Outlook

- The FTF is carrying out its task and has have made significant progress towards producing its report
    - The draft report will go to the EC soon (in a week or two)
- After the EC is ok with it, it can be shared with other readers, yet to be determined, before being finalized.
    - HEPAP may decide that it wants to look it over and its input would be most welcome

Ultimately, we hope that the CPSC will help advance the role and practice of computing in HEP and all of Particle Physics!

Backup

CPSC HEPAP May 2024-jb

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