HEPAP Report

Fermilab Users Meeting

FNAL; June 11, 2014

Andrew J. Lankford

HEPAP Chair

University of California, Irvine

The P5 Report

Culmination of a long process to shape our future

- **Community study – "Snowmass"**
- **Community input - public P5 meetings**
- **P5 deliberation**

Thank you !

- **Members of the community who participated**
- **Members of P5**
  - ***who devotedly committed themselves to this responsibility***
- **Steve Ritz – P5 Chair**
  - ***who tirelessly led process of input, deliberation, & outcome***

P5 Report

P5 developed a coherent program.

- Optimized for scientific progress
- More than a collection of “cool” experiments
- 10-yr Strategic Plan in context of 20-yr global vision

Please view the strategic plan as a whole.

- A plan to address exciting, profound science
- A plan to move particle physics forward

P5 provided a strategic plan. HEPAP approved. Implementation is in the hands of DOE & NSF.

All scenarios offer a rich scientific program

- Is the glass half-empty or half-full?
- Full of intriguing questions & exciting scientific opportunities
- Full of science and technology opportunities for the U.S. particle physics community
- No winners, no losers, merely choices.
- The report says “Our field is ready to move forward.” Are we?

HEPAP Report

Outline:

- **Subcommittee for Assessment of Workforce Development**
- **Accelerator R&D Subpanel**
- **National Scientific Program Advisory Subpanel**
- **Future subcommittee on university & laboratory roles**

Each of these activities represents P5 “follow-up” in some respect.

HEPAP Activities

Subcommittee for Assessment of Workforce Development

Key elements of the charge

- **Identify disciplines in which significantly greater emphasis in workforce training is necessary**
  - **To address gaps in current and future Office of Science mission needs**
  - **At the graduate student or postdoc levels**

- **Please consider:**
  - **Disciplines not well represented in academic curricula**
  - **Disciplines in high demand resulting in difficulties in recruitment and retention at U.S. universities and DOE national laboratories**
  - **Disciplines identified above for which DOE labs may play a role in needed workforce development**
  - **Specific recommendations for programs that can address discipline-specific workforce development needs.**

- **Letter report to Pat Dehmer, Acting Director, DOE Office of Science**
  - **Describing findings and recommendations**
  - **Due no later than June 30, 2014**
    - **Implies discussion at May HEPAP meeting**

Subcommittee process

Subcommittee membership:

Ritchie Patterson (Cornell) – **chair**
Ilan Ben-Zvi (BNL, HEPAP)
Patty McBride (FNAL, HEPAP)
Tao Han (Pittsburgh, HEPAP)
Ian Shipsey (Oxford/Purdue, DPF, HEPAP)

The subcommittee consulted:

- **HEPAP and the HEP community for input on possible disciplines in need of workforce development.**
- **Members of the community with experience and expertise in workforce training for disciplines of interest.**
- **Subcommittees of other SC FACAs regarding disciplines of common concern or interest.**
- **Existing resources from past studies.**

The subcommittee id'd the following areas in need of workforce development:

- **Accelerator science**
- **Instrumentation**
- **Large-scale computing & "big data"**

Status

- **Discussion by HEPAP at May meeting, including recommendations**
- **First draft reviewed by HEPAP last week**

HEPAP Activities

Accelerator R&D Subpanel

Overview

Accelerator R&D is crucial to the future of particle physics,
both mid-term and long-term.

Particle physics demands a healthy, multi-faceted program of R&D.

- **Focused on** (time dimension):
  - **Accelerator projects in the foreseeable future**
    - *e.g. HL-LHC, Japanese-hosted ILC*
  - **Enabling technologies for new accelerators in the more distant future**
    - *e.g. very high energy hadron and e+e- colliders*
  - **Striking a balance between "directed" & "basic" accelerator R&D**
- **Focused on** (technology dimension):
  - **Numerous technical subjects:** novel concepts for acceleration; superconducting RF; accelerator, beam and computational physics; particle sources; beam instrumentation and control; normal gradient/high gradient structures & RF sources; superconducting magnets (also see Snowmass)
- **Accelerator test and user facilities** *(e.g. ATF at BNL, FACET at SLAC, ASTA at FNAL)*
- **Basic accelerator science**

Accelerator R&D is a major commitment of the HEP program.

- **Significant fraction of HEP budget** (15-20%)
- **New thrust for NSF in basic accelerator science**
- **Also, HEP stewardship responsibility**

Subpanel membership

- **Co-chairs:** **Marty Breidenbach** & **Don Hartill**

- **Members from:**
  - **HEPAP**

    Ilan Ben-Zvi
    Georg Hoffstaetter
    Robert Tschirhart
    Bruce Carlsten
  - **Particle physics accelerator and experiment communities**

    William Barletta
    Roger Dixon
    Steve Gourlay
    Young-Kee Kim
    James Rosenzweig
    Michael Syphers
    Rik Yoshida
  - **International accelerator community**

    Oliver Bruning (CERN)
    Tadashi Koseki (KEK/J-PARC)
    Lia Merminga (TRIUMF)

- **Observers from Nuclear Physics & Basic Energy Sciences**

  Zhirong Huang (BES)
  Geoffrey Krafft (NP)

Elements of Charge - 1

Summary of charge:

- examine the research in the current HEP accelerator R&D program and identify the most promising research areas to support the advancement of particle physics.

***National Goals*:** Describe medium- and long-term U.S. accelerator R&D required for a world-leading future program in accelerator-based particle physics consistent with the scientific priorities described in the HEPAP-P5 report for Scenarios A and B.

***Current Effort*:** Examine current scope and evaluate how well these address the HEP mission, as expressed in the HEPAP-P5 report.

***Impediments*:** Describe any impediments that may exist for achieving these goals *e.g.* resources, management, expertise and infrastructure.

Training: Assess, including partnerships between national laboratories and universities, and opportunities to enhance the training.

Elements of Charge - 2

Balance:

- healthy and appropriately balanced program for medium- and long-term R&D, including test facilities, in light of the budget envelope considered by P5.
- further guidance for a plan based on the science and technology case for increased investment in the HEP Accelerator R&D program called for in P5's Scenario C.
- particularly interest in how partnerships between universities, national laboratories and international collaborators could be most effective in achieving the goals.

SC Accelerator R&D Stewardship program is *not* part of this assessment.

Comments on potential synergies or conflicts between the two programs welcome

Preliminary findings presented to HEPAP by the end of November 2014
Final report by March 2015.

HEPAP Activities

National Scientific Program Advisory Subpanel

NSPAsP

National Scientific Program Advisory subPanel

Goal: A more effective and transparent mechanism for HEPAP to advise on the execution of particle physics projects

Concept was outlined at HEPAP March meeting.
The concept is still in development.

Connections with HEPAP-P5 report:

- **Possible role in advising on "Small Projects Portfolio", "Short Baseline Portfolio"**
- **Possible role in review of projects previously recommended by P5 that experience significant changes in cost or schedule, in particular for continuing compatibility with the P5 strategic plan**
- **This subpanel does not monitor whether agencies are following P5 plan or whether strategic plan is in need of update.**
  - **That is HEPAP's responsibility.**

Concept

Goal: A more effective and transparent mechanism for HEPAP to advise on the execution of particle physics projects

- **P5 process does strategic planning, *i.e.* sets overall goals and priorities.**
- **DOE CD process and NSF review process take over technical review when a project concept is ready to become a project.**
- **Often there are scientific & technical issues to be evaluated between.**
  - **Especially for projects in the early phases**
  - ***e.g.*, for small experiments to be added to the portfolio**

NSPAsP will perform scientific & technical review

- **Role analogous to that performed by PAC for experiments at FNAL**
- **With additional criterion of alignment with objectives of P5 strategic plan and considering P5 selection criteria.**
- **Advice on project viability & appropriateness to the portfolio**

HEPAP Activities

Future subcommittee laboratory & university roles

Approaching the subject of laboratory & university roles

- **HEPAP will form a subcommittee to consider the respective roles of laboratory & university groups in the execution of the HEP program.**
  - **Concept arose from topics such as university infrastructure, senior scientists, Theory Panel Report, differences in costs**
  - **In addition, CoV recommended an examination of the balance between the laboratory & university research programs.**
  - **Also related to P5 text and recommendations concerning the research program. Potentially provide information or advice to agencies.**
- **An approach:**
  - **Start discussion in the context of agency (DOE & NSF) missions**
    - What are the missions of the agencies?
    - How do labs, and how do universities contribute to agency missions?
    - What are "missions" of labs and of uni's in this context?
    - What can agencies do to enable labs and uni's to fulfill their "missions"?
  - **Focus on: How to best accomplish science goals in this context?**
  - **What are respective roles of the various types of institutions in accomplishing the program's science goals, and in satisfying the missions of the program?**
  - **How can roles and working relationships be defined (or redefined) so as to optimize science accomplishment and to satisfy missions?**

Back-up slides

Concept - 1

A *National Scientific Program Advisory subPanel* is a concept in development.

- **The concept as described today is partial, and is DOE-centric,**
  - ***i.e.* focuses on goals/needs/methods of HEP**
  - **Response to previous HEPAP/CoV concerns about having a more transparent/regular review process**
    - **for new projects and for projects that have undergone significant cost/scope changes since they were last reviewed by P5.**
- **We will work to make the subpanel useful for NSF, as well,**
  - **recognizing that "one size does not fit all"**

Goal: A more effective and transparent mechanism for HEPAP to advise on the execution of particle physics projects

- **P5 process does strategic planning, *i.e.* sets overall goals and priorities.**
- **DOE CD process and NSF review process take over technical review when a project concept is ready to become a project (to be *projectized*).**
- **Often there are scientific & technical issues to be evaluated between.**
  - **Especially for projects in the early phases**
  - ***e.g.*, for small experiments to be added to the portfolio**

Concept - 2

NSPAsP will perform scientific & technical review

- **Role analogous to that performed by PAC for experiments at FNAL**
- **With additional criterion of alignment with objectives of P5 strategic plan and considering P5 selection criteria.**

- **Scope of scientific review:**
  - **Usual merit review criteria, including *e.g.*:**
    - **significance of scientific objectives**
    - **capability to achieve scientific objectives**
  - **Quality of the team**
  - **Technical approach**
  - **Budget review sufficient to set CD0 range.**
  - **Assessment of potential for impact on the particle physics program**

- **Advice on project viability & appropriateness to the portfolio**

Concept - 3

NSPAsP is planned as a subpanel of HEPAP

- **Convened as needed**
- **Provides initial review of experiments proposed to join the US particle physics portfolio**
- **Membership adjusted to provide appropriate range of expertise**

NSPAsP & FNAL PAC

- **NSPAsP will review in a manner analogous to FNAL PAC**
- **NSPAsP is a more general mechanism applying to all aspects of the program, and is FACA-compliant.**
- **Where applicable NSPAsP will work in concert with, not duplicating FNAL PAC.**

Possible mode of operation

- **Agencies collect proposals on a regular basis through solicitation/FOA**
  - **Perform initial screening for appropriateness to call and of cost**
- **Proponents would provide any prior outside reviews, to see if ready for NSPAsP**
  - ***e.g.* FNAL PAC review, LHCC review, lab director's review**
  - **If no outside review, one would be performed prior to NSPAsP**
- **NSPAsP provides scientific evaluation, incl. compatibility with P5 strategic plan and position within global context, and evaluation of technical readiness**
- **In cases of multiple projects, NSPAsP provides prioritization**

Laboratory & university roles - 2

- **Bear in mind:**
  - **DOE & NSF missions differ**
- **Consider:**
  - **How does DOE mission differ for Fermilab & multi-purpose labs?**
  - **How do mission or goals differ for large and small universities?**

- **How do respective roles vary in experimental areas as experiments progress stage by stage from detector R&D through construction to physics analysis?**
- **How do respective roles vary in different areas of theory?**

- **How can roles be designed such that there are no 2nd class citizens?**

- **What degree of "academic freedom" should there be: in theory? in experiment? at universities? at labs?**
  - **What degree of mobility should there be within the field? to neighboring fields? (forays?)**