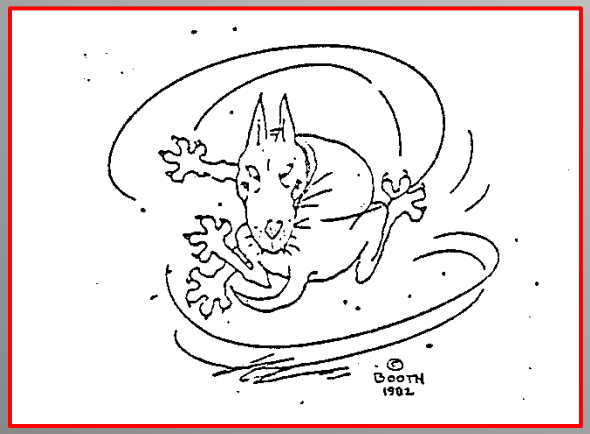
Report of the 2013 Committee of Visitors Review of the Department of Energy Office of High Energy Physics

for Fiscal Years 2010, 2011 and 2012



Paul Grannis
HEPAP Meeting, Dec. 6, 2013

Charge to the CoV

The CoV is charged [by Office of Science] with "assessing (1) the efficacy and quality of the processes used to solicit, review, recommend, monitor, and document application, proposal, and award actions and (2) the quality of the resulting portfolio, including its breadth and depth and its national and international standing."

Some questions specific to this review: (from the HEPAP charge)

The 2010 CoV made several recommendations for which this CoV should evaluate the OHEP implementation:

- Use comparative reviews (in addition to individual mail-in reviews)
- Increase the OHEP budget fraction for projects (at the expense of research)
- Formulate a strategic plan for accelerator stewardship in DOE
- Improve the database of program information

Some questions specific to this review: (from the HEPAP charge)

In 2008, the P5 report recommended long-term goals and priorities. Have the recommendations of P5 and other recent HEPAP panels been implemented?

Since 2010, OHEP has re-organized its Research Program into **Energy, Intensity & Cosmic** Frontier subprograms. The CoV should evaluate how this management organization has worked. Are proposals that cross boundaries adequately reviewed?

The CoV is charged to "identify issues that it [CoV] is not able to consider in depth in this review for subsequent consideration or study". HEPAP will charge a subpanel to address "sociological issues", some of which are informed by the confidential information that we will examine; in such cases, we are asked to include comment in our report or closeout discussion.

Is the program well balanced? (among Frontiers, research vs. operations, domestic vs. foreign expt's, labs vs. universities, senior vs. junior researchers; technical infrastructure at universities)

Committee composition

CoV chair: Paul Grannis (Stony Brook)

Subcommittee on Energy Frontier
*Darien Wood (Northeastern)
Karl Jakobs (Freiburg)
Rob Roser (Fermilab)
Heidi Schellman (Northwestern)
Evelyn Thomson (Penn)

Subcommittee on Intensity Frontier
*Kate Scholberg (Duke)
Steve Kettell (BNL)
Jack Ritchie (Texas)
Jenny Thompson (Univ. College London)
Rick van Kooten (Indiana)

Subcommittee on Cosmic Frontier
*Dave Burke (SLAC)
Brenna Flaugher (Fermilab)
Giorgio Gratta (Stanford)
Josh Klein (Penn)

(*=chair)

Subcommittee on Theory
*Joe Lykken (Fermilab)
Andy Albrecht (UC Davis)
Michael Dine (UC Santa Cruz)
JoAnne Hewitt (SLAC)
Nathan Seiberg (IAS)

Subcommittee on Accelerator R&D
*Steve Peggs (BNL)
Jamie Rozenzweig (UCLA)
Vladimir Shiltsev (Fermilab)

Subcommittee on Facilities Operations
*John Seeman (SLAC)
Mike Lamont (CERN)
Ed O'Brien (BNL)

Subcommittee on Projects
*Gina Rameika (Fermilab)
George Ginther (Rochester/FNAL)
Fulvia Pilat (Jlab)

Committee activities

The CoV met in Germantown on Oct. 9 – 11. The draft agenda shown in the report contained presentations from OHEP; several breakout sessions for the seven subcommittees to view materials, discuss findings and formulate recommendations; and several full committee executive sessions to discuss recommendations and highlight those that cut across subcommittees.

The Office of High Energy Physics presentations and detailed interactions with subcommittees were thorough, informative and very helpful. We are grateful to the OHEP for their hospitality and cooperativeness.

Our overall conclusion is that OHEP is carrying out its mission with integrity, efficiency and keen awareness of the trends in the field.

The report submitted to HEPAP is organized with a chapter on Overarching Issues with 18 recommendations, followed by sections from each subcommittee with 16 additional recommendations specific to each area, and variations on the 18 overarching recommendations.

My primary focus today is on the 18 overarching recommendations.

Findings | Comments | **Recommendations**

Overarching Issues

A. OHEP Organization

OHEP re-organized oversight and budget codes for experimental HEP from Proton accelerator-based, Electron accelerator-based, and Non-accelerator-based to Energy, Intensity and Cosmic Frontier categories.

The new classification based on physics thrusts is important in communicating the field within the government. There are however many overlaps the physics and techniques between frontiers.

While an organizing principle is needed, it is necessary to keep the coherence of the program in mind and to protect against 'stovepiping'. For example, the ability to move funds flexibly from one frontier to another when need arises should be retained.

A particular suggestion (not recommendation) was that OHEP consider rotating program managers from one frontier to another at ~5 year intervals to promote broad stewardship and awareness of the full program.

Recommendation 1:

OHEP should strive to keep the overall program management coherent, keeping in view the connections and balance among the frontiers, and minimizing the obstacles to well-motivated transfers of funds across frontier boundaries.

B. Comparative proposal reviews

- Comparative reviews were instituted in 2012, with all proposals for that year in each frontier, theory, accelerator (detector) R&D examined together.
- Additionally, mail-in reviews were conducted, sometimes with independent reviewers. Proposals with more than one frontier activity were reviewed in multiple panels.
- Comparative review of Laboratory research was also instituted, with all work within a given frontier at all Labs examined in successive years.
- 2012 comparative reviews resulted in reduction or termination of funding of several long-supported PIs. Bridge funding to ease the effects of termination was provided where possible.
- In some cases, awards were reduced or delayed if start-up or other non-DOE funds existed.
- Over the review period, the time between proposal and award (and provision of redacted review reports) decreased somewhat.
- The need to align start dates at a common point meant that some bridging funds were needed, thus further increasing budgetary pressure.
- One instance was found where a redacted review report to proponents contained a comment that was not relevant and was inappropriate.

B. Comparative proposal reviews

The COV finds the comparative review to be an improvement over the previous mail-in-reviews-only process. The outcomes that we viewed were fair. The panel sizes and choice of reviewers were in most cases appropriate, but in a few cases we found that there were as few as three reviewers. In such cases, it is possible that the opinions of one vocal reviewer could carry undue weight.

The mail-in reviews add important information or independent expertise to the comparative review process.

The alignment of review panels along the frontier boundaries is natural, but the Committee worries that this subdivision could lead to a more parochial view of the program than is desirable. Many of our comments and recommendations go in the direction of assuring a review process that takes the full context of the program into account. We urge OHEP to continue to assess the optimum way to achieve this balance.

The comparative reviews would be enhanced if the relevant materials were provided to the panels before the review, and if questions of factual clarification from the panel to proponents could be made before or during the review.

B. Comparative proposal reviews

In proposals addressing multiple frontiers, the synergy among the parts is important to consider. Despite the comparative review focus on a specific frontier, it is important to consider aspects of the full proposal.

For PIs transitioning between frontiers it is important to assess their prior track record. Often the physics questions and techniques in one frontier bear directly on work in other frontiers. It would be useful to recognize this connectivity by including reviewers from other frontiers. This would help ensure that the record of a PI in transition is taken into account. Special 'transition grants' might be considered to facilitate changes in research areas. It may be useful to provide a check-box for proponents to indicate their desire to have their proposal reviewed by comparative review panels representing the relevant frontiers. It may also be useful to ask reviewers to specifically comment on the synergies in such cross-frontier proposals.

Comparative reviews in subsequent years should be conducted with common practices and standards, keeping the full program in view. It may be useful to provide a summary of the full program actions in the yearly comparative review, and to appoint a significant fraction of reviewers to serve in multiple years.

B. Comparative proposal reviews

Even within the constraints of the non-FACA review panels, the current comparative reviews should provide the OHEP program managers with sufficient information to synthesize evaluations and rankings that reflect the collective assessments of the panel members

Program managers' comments in the folder on the reasons for the action taken were often terse, or absent, making the special considerations for an action difficult to discern.

There should be renewed vigilance by program managers to assure that inappropriate comments are removed from the reports and do not flavor the deliberative process unfairly.

Reducing or delaying grant funding because of the existence of alternate sources of support such as university startups, or other non-DOE sources. is counterproductive, as it penalizes those who have demonstrated substantial initiative and promise.

B. Comparative proposal reviews

If a PI's funding is discontinued, his/her postdocs/students should be protected. The goal of six months continued support can cause difficulties in finishing a project, or in the postdoc's ability to find a subsequent position.

The time between proposal and notification has moved in the right direction, but in some cases the COV found that administrative delays within OHEP contributed substantially to delay

The impact of realignment of grant start dates was primarily examined for theory but has affected all university programs. After realignment is completed in FY15 the resources liberated might be used to ameliorate the negative effects incurred during the previous three years.

This COV did not make a substantial review of laboratory comparative reviews, although in the cases we examined the level of scrutiny of individuals was lower than for universities. The laboratory reviews are not proposal-driven but are based on Laboratory's mission-based work plans. A more detailed evaluation of the laboratory research reviews should be made by the next COV, including comparison with university comparative reviews.

B. Comparative proposal reviews

Recommendation 2:
Continue the comparative reviews. These should be augmented with independent mail-in reviews.

Recommendation 3:
Ensure that comparative reviews evaluate a particular proposal in the context of the full program over the full three year cycle within each frontier.

Recommendation 4:
Ensure that review committees are given appropriate charges, that there are sufficient reviewers of each proposal, and that program manager oversight of reviews is uniform.

Recommendation 5:
Modify the FOAs to request that proposals which address topics in several different review panel areas include a discussion of the synergy gained from this broader scope.

Recommendation 6:
Institute mechanisms to streamline the movement of PIs moving from one frontier to another. The past record of such PIs should be considered in the reviews.

B. Comparative proposal reviews

Recommendation 7:
OHEP should charge the comparative review panelists to collectively discuss the relative strengths and weaknesses of proposals so that the program managers can judge the relative rankings of proposals.

Recommendation 8:
Ensure that program manager's comments in grant folders clearly document the reasons for the action taken.

Recommendation 9:
Work to further reduce the time between proposal and proponent notification and to provide appropriate redacted review comments that will enable PIs to refine future proposals. Provide information to proponents on their comparative review score and the distribution of scores over all proposals reviewed by a panel.

Recommendation 10:
Work with the community to leverage and coordinate funding sources for the HEP research program such as university startup packages or other non-DOE funding sources .

C. Project budget fraction

The fraction of OHEP budget for projects dipped to ~5% in FY07, down from prior levels of ~20%. The 2010 CoV recommended an increase. By FY12, after ARRA, the project fraction had increased to about 17%.

Projects represent the investment in the future to keep the field vital. The recent increase has been accompanied with a decrease in research budgets. While further increases may be desirable, decisions should be taken with budget constraints in mind.

Recommendation 11:
Further increase in the budget fraction devoted to projects is desirable but should be subject to the recommendations of the 2014 P5 report and budget constraints.

D. Senior Research Scientists

The 2012 comparative review resulted in the termination of several senior research scientists at universities. The CoV found these terminations to be reasonably documented.

It is important to have information in the proposal that allows evaluation of senior research scientists.

A criterion used by some reviewers for termination was whether a good postdoc could perform the tasks. The CoV felt that this criterion is ill-advised. Indeed good postdocs can do what senior scientists do, but for their career advancement, should not.

The continuity and expertise of senior scientists have been major factors in the success of many large projects.

Recommendation 12:
Allocate a few dedicated pages in proposals for senior research scientists to describe their activities and critical accomplishments.

E. Management of experiments below the project level

"Projects" have TPC > $5M and are subject to the rigorous CDx process. Due to the success of OHEP (and SC) in managing projects, some tailoring of the CDx process is allowed.

Sub-project level experiments benefit from identifying goals, milestones and costs at their inception, but often these experiments introduce innovative techniques or attack novel physics question and should be allowed a higher degree of risk. Formal project management for these can give an unwarranted burden.

Recommendation 13:
Once goals, milestones and costs have been established for small scale experiments, formal OHEP project oversight should be kept to a minimum.

F. Detector R&D

Detector R&D activity ranges from the purely generic to development and testing of prototypes for particular experiments. The OHEP management of detector R&D programs was in flux during the review period.

Detector R&D, like accelerator R&D, seeds new advances for the field. Directed R&D funding for specific approved experiments should be attributed to that experiment.

However, the R&D that develops new techniques or capabilities, whether motivated by finding new methods for potential future initiatives or purely generic, forms a continuum and should be treated uniformly, as both bring wider benefits to the program.

The motivation for detector R&D is shared by other SC programs and cooperative approaches could usefully be pursued.

Recommendation 14:
OHEP should develop a coherent and stable approach to funding detector R&D which embraces the broad range of proposals for new ideas and techniques appropriate to its mission.

G. OHEP Manpower

The 2010 CoV recommended an increase in OHEP staff. The program management staff increased from 13 Feds (+ 4 IPA/detailee) in 2010 to 15 (+ 9) in 2013. Administrative staff levels declined somewhat.

The ratio of program managers to budget dollars is similar for OHEP and other SC Divisions.

The CoV appreciates the work of the IPAs and detailees who perform central roles in managing the program.

The Theory program handles ~85 grants but is managed by just one person.

Recommendation 15:
An additional IPA serving the theory program should be found.

H. Program Manager travel

Travel budgets have been reduced since the last CoV review. Travel budgets are set at the level of the Office of Science.

Site visits to universities at the 3-year renewal time are an important aspect of effective program management, allowing assessment of relative individual PI strengths, the synergies at work within the group and group infrastructure.

Visits to Project sites enhances the evaluation of progress and problems, the quality of project infrastructure and allows detailed discussion with project managers.

The large off-shore research in international collaborations that rather uniquely characterize HEP requires special OHEP travel to negotiate the terms of US participation, monitor international cooperative agreements, attend oversight Council meetings, and evaluate the US performance in these projects, thus diminishing the budget for domestic program oversight.

Recommendation 16:
Seek to increase the OHEP travel budget.

I. Communications

Communications with HEP researchers is critical for the smooth operation of the program. OHEP has worked hard to keep the lines of communication open, but the flow of information is not always successful. A specific suggestion was to include co-PIs as well as PIs in notification messages.

Effective communication with higher levels of DOE and the wider government of advances in HEP and aspirations for the future is essential to the health of the program. OHEP can also stimulate communication to the broader public.

Recommendation 17:
We urge OHEP to redouble and improve its communications both with the HEP community and in the wider governmental circles.

J. Travel restrictions

Although outside the CoV purview, we note the damaging aspect of the current travel rules for Lab-supported personnel that restrict their ability to travel to meetings to present recent work and interact with the broader community.

Conferences and workshops are essential in a globally-connected field like HEP. They are the means by which new findings and techniques are disseminated and discussed in intensive face-to-face settings. The rules also have inhibited Lab hosting of conferences. The restrictions on travel can damage the competitiveness of the US program. We urge relaxation of the travel rules, consistent with appropriate concern for efficiency and budgetary responsibility.

K. Balance of university and laboratory programs

The CoV did not have the time or the appropriate documentation to conduct an in-depth review of the balance between the university and Lab programs. Similar balance questions exist relating to senior vs. junior researchers and Lab/university funding balance across the frontiers.

There is some imbalance between Early Career awards established by the Office of Science to laboratory and university physicists ($500K/yr vs. $150K/yr) , owing to the support of full salaries of lab staff, but only summer salaries at universities. Re-evaluation of the relative sizes of EC awards would be useful.

Recommendation 18:
Undertake a separate review of the balance between the Laboratory and university research programs.

L. OHEP data base

The Office of Science is developing its electronic data base (PAMS) to manage all aspects of program management. First partial roll-out was in 2011. Now the proposal process is incorporated in PAMS, with award management coming soon.

We look forward to the full roll-out of PAMS over the coming year so as to streamline the OHEP management of the program and will allow more complete characterization of the program. The use of PAMS would make future CoV reviews more efficient.

Subcommittee Reports

Only those recommendations that do not overlap with those in the 'Overarching Issues' section are discussed here. However, the motivations and comments on these related recommendations should be read to further amplify the Committee's conclusions.

Reviewers can judge the performance of a group through comparison of the current proposal goals and achievements to those in prior grants. The size of prior grants allows a judgment of the cost/benefit ratio of group's research.

Recommendation 19:
Make previous proposals and levels of support available to reviewers.

LHC experiment proposals contained variable COLA allowances for researchers at CERN.

Recommendation 20:
If there are clear guidelines on COLA for overseas experiments, provide them to the reviewers.

LHC experiment research and operations efforts are strongly connected but appear to be managed largely independently.

Recommendation 21:
The management of the research, operations and upgrade components of the LHC experiments should be closely coordinated.

Sometimes review committees need factual clarification concerning a proposal in order to properly evaluate it.

Recommendation 22:
Consider a mechanism for seeking factual clarification of proposals from the PIs during the comparative review process.

The time between proposal and notification of outcomes to proponents, and provision of redacted referee reports has improved but can be further improved. The strength of administrative support for grant processing may be inadequate.

Recommendation 23:
Improve the quality of OHEP administrative support.

3. Cosmic frontier considerations

The US leads in cosmic frontier research. This program is now recognized at the OMB and Congressional levels.

Recommendation 24:
Maintain U.S. science in the lead of the Cosmic Frontier.

Successful Stage I/II experiments are now leading to Stage III/IV projects. The larger scale will bring new modes of operation, previously seen in the Energy and Intensity Frontiers. More extensive instrumentation, larger computing and data storage needs, and international collaborations will be needed.

Recommendation 25:
Support computation, simulation, and phenomenology that are directly needed for planning, execution, and analysis of Cosmic Frontier Stage III and Stage IV experiments.

Theoretical physics not only supports the experimental program, but also generates new ideas that open new opportunities.

Recommendation 26:
OHEP should explicitly recognize that a thriving theory program is essential for identifying new directions and opportunities for the field, in addition to supporting the current program.

Postdocs are the lynchpin of theory research, but are vulnerable to budget pressures. The recognition of outstanding young theorists through special fellowships occur in a few labs and universities. The DOE could emulate other agencies (NSF, NIH, NASA etc.) in broadening these opportunities.

Recommendation 27:
Create a new theory postdoc fellowship program, with recipients chosen via national competition and supported for three years at any DOE supported university or lab group of the recipient's choosing.

5. Accelerator R&D considerations

OHEP has re-organized its Accelerator R&D management through the General Accelerator R&D program focused on HEP. There are connections to SciDAQ (Scientific Discovery through Advanced Computing) run by ASCR. Recently the Office of Science-wide Accelerator Stewardship program was initiated, with the BNL Accelerator Test Facility as its first component in FY14. Thus the OHEP accelerator program serves stakeholders ranging from HEP, through other Office of Science Divisions, to the wider public.

The new multi-pronged program will require careful planning and organization.

Recommendation 28:
Evaluate the General Accelerator R&D (GARD) program to identify and prioritize components that are central to the evolving HEP mission, after delivery of the 2014 P5 report.

5. Accelerator R&D considerations

The Accelerator Stewardship program was instituted after the period considered by this COV review, but there were presentations and discussions with program managers during the review. It is important that this program be structured so as to serve the broader needs of the Office of Science. The subcommittee offers some suggestions to help guide the program development.

Suggestion 29:
Identify goals and areas of mutual and/or complementary accelerator R&D interest jointly with other parts of the Office of Science and other agencies and stakeholders, at the foundation of the Accelerator Stewardship program.

Suggestion 30:
Establish procedures to jointly review proposals addressing Accelerator Stewardship goals, including those outside traditional boundaries, at the initiation of the program.

Suggestion 31:
Review the progress of the Accelerator Stewardship program periodically (e.g. annually), reporting to OHEP, including reviewers representing other parts of the Office of Science, and representing other governmental agency stakeholders. Consider including SciDAC accelerator activities in the periodic reviews.

Long term programs devoted to improvements of existing facilities (e.g. the Fermilab Proton Improvement Program, and some AIP/GPP programs) could benefit from project-like review to establish their costs, milestones and deliverables. Some such programs have suffered delays owing to Lab budget constraints and other priorities. Such reviews could be conducted using project-like methods either by the host Laboratory or by DOE.

Recommendation 32:
Perform project-style reviews for programs that have significant budgets and extend over multiple years.

6. Facilities operations considerations

The Facilities Operations considered were the Fermilab Program, LHC detector operations, FACET, LARP, MAP, and ILC. The program management was found to work well in most cases.

More rigorous inclusion of 'response to previous review recommendations' in subsequent external reviews, particularly LARP, would be desirable.

The transition from R&D to construction should be carefully managed.

Recommendation 33:
Request that the LARP leadership address the recommendations from a compilation of the 2010-2012 LARP reviews.

Recommendation 34:
Monitor activities that are transitioning from R&D to full construction (e.g. LARP magnet program) so as to clearly define and track the transition steps.

7. Projects considerations

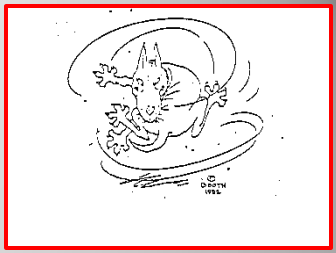
OHEP managed 17 projects during the period reviewed, ranging from new starts to completions. OHEP oversight was good, and flexible enough to meet the problems that were encountered.

Project success is measured by the final cost (< 110% of original TPC). There is no requirement that the original project schedule be met, and delays have become the norm.

New projects at the CD0 and CD1 stage have been developed so as to be ready for baselining if funds become available. ARRA offered such an opportunity.

As noted in Recommendation 11, the COV welcomes the increased fraction of the budget devoted to Projects since the 2010 COV, but awaits P5 advice on the appropriate level of Project funding for future years.

Conclusions



- The COV has appreciated the opportunity to examine the High Energy Physics program in detail.
- We found some areas where improvement could be made, as reflected in our recommendations. However …
- We emerged with a strong appreciation for the OHEP management of the program, consistent with its mission and with the priorities set by the field through the advisory committees.