

National Instrumentation Board and Targeted Resources Subgroup Draft Report

Response to Charge Elements Q1, Q2 and Q3

Q1. Please comment on the need, merit and process for evaluating and promoting the national R&D program through a standing body. Please indicate possible reporting strategies and suggest the auspices under which such a body might be organized.

Q2. Please comment on the appropriate role for a standing panel on instrumentation in the instrumentation R&D programs for upgrades to existing projects and future projects.

Q3. Might targeted resources be established at each of the five national laboratories in order to specifically support particular needs of individual researchers at the universities and the laboratories? This could be in several forms: engineering design time and specific resources for small-scale collaboration among and between university and laboratory scientists. How might such a program be administered and funded?

Overview

The Task Force evaluated the need for a standing body to promote and assist in the coordination of the detector R&D supported by the Department of Energy and the National Science Foundation – the national detector R&D program. The Task Force makes the follow recommendation:

Recommendation 1

A standing body – Detector R&D Coordinating Panel - should be formed to promote and stimulate the national instrumentation and detector R&D program.

Possible roles for the Detector R&D Coordinating Panel (DRDCP) are described and discussed later in this report. We also include summaries of comparable activities in Europe and Asia.

The Task Force also evaluated different means for establishing and operating the DRDCP. We conclude that the primary role of the DRDCP to promote and assist the national detector R&D program is consistent with a standing body that is largely self-organized but fully representative of the high energy physics national laboratories and universities supported by the DOE and NSF. We note that the national laboratories and the Executive Committee of the Division of Particles and Fields of the American Physical Society could have important roles in the organization of the DRDCP.

Recommendation 2

The Detector R&D Coordinating Panel should be largely self-organized and consist of representatives from the national high energy physics laboratories and the university community to form a representative Panel of outstanding capability in detector and instrumentation R&D.

Possible ways to organize and operate the DRDCP are described later.

The Task Force also considered the appropriate role of a standing panel such as the DRDCP in upgrades to existing or future large projects.

Recommendation 3

The primary role of a standing body such as a Detector R&D Coordinating Panel should be to promote and assist in generic detector R&D

However, we note in making this recommendation that there are and will be many areas of overlap between generic R&D and future detector upgrades or projects. In this context, the DRDCP efforts may support instrumentation R&D programs organized in the established context of upgrades to existing projects or future large projects.

Role of a Standing Body

In this section we describe possible roles of a standing body such as the Detector R&D Coordinating Panel (DRDCP) and summarize related activities in Europe and Asia. We also comment on activities that we do not consider appropriate for a body such as the DRDCP.

The principal role of a Detector R&D Coordinating Panel would be to promote national detector R&D and stimulate new ideas in instrumentation development. Improved coordination among the national HEP laboratories and university groups engaged in detector R&D is also a key goal. In this regard, the DRDCP could also help facilitate utilization of targeted resources at the national laboratories (see below for more discussion). The DRDCP could also act as a resource for the funding agencies, in a limited role, as described below.

The specific roles of the Detector R&D Coordinating Panel could be to:

- Make available up-to-date information on elements of the national detector R&D program and what kind of detector development is going on in the community, to improve efficiency, reduce duplication, and optimize the use of limited resources for maximum effect;
- Expand coordination among the national laboratories, leading to improved resource utilization;
- Provide a forum (and information) for enhanced access to selected resources at the national laboratories for university groups;
- Stimulate detector R&D through workshops and studies in a coordinated way;
- Stimulate new ideas, especially of the scale requiring substantial collaboration, particularly among laboratories and universities;
- Instigate a concerted effort to involve industry in workshops and studies with the intent of later involvement in R&D;
- Provide a coordinating function for joint educational activities related to instrumentation (schools and other events);
- Act as a resource for the funding agencies e.g. in establishing SBIR categories, improving the response to program solicitations and other opportunities.

Roles of a standing body that we do not consider to be appropriate include:

- Acting as a Program Advisory Committee for any of the national laboratories ;
- Acting as a standing review body for proposals to the funding agencies or for peer review of proposals;
- Providing a “roadmap” for the national detector R&D program.

The DRDCP will be expected to be cognizant of the overall national HEP scientific roadmap as determined by the agencies, HEPAP and its subpanels. The activities of the DRDCP to support generic detector R&D would be aligned with the scientific directions of the field.

Coordination of instrumentation resources at national laboratories

The five national laboratories each pursue generic instrumentation R&D, as well as directed upgrade R&D for existing programs and proposal-based project-specific development efforts for future experiments. The generic R&D activities are supported by efforts ranging in size from specialized fabrication facilities and engineering capabilities, to broader sensor and detector fabrication facilities, electronics design and test capabilities, DAQ design and engineering, and test beam facilities. The upgrade and project-development R&D is usually short term and based on specific program goals. Generic R&D is targeted towards long-term and often transformational development of new capabilities. Both forms of R&D effort are usually pursued in collaboration with University groups and easily saturate the current capabilities of existing core engineering and instrumentation manpower.

In recent years, the national laboratories have moved to designate a manager as a point of contact (POC) for their generic R&D programs. This person establishes priorities for manpower and facilities within the generic R&D program, and usually coordinates these efforts with other project-specific laboratory R&D efforts. The R&D POC represents a natural point of entry for coordinating University-laboratory collaboration on future R&D efforts and for optimal use of instrumentation facilities. Our expectation is the R&D POC will be designated as the laboratory representative on the DRDCP, bringing a greater degree of coordination between the laboratories in the use of facilities and instrumentation capabilities, and making the nature of these facilities and capabilities more widely known and accessible. We believe these measures will enhance access and future University-laboratory collaboration in generic instrumentation R&D.

Experience in Europe (to be completed)

Experience in Asia (to be completed)

Formation and Operation of the DRDCP

The Task Force recommends that the DRDCP be largely self-organized. The DRDCP would not be managed by any national laboratory, the DPF or the funding agencies. However, the DRDCP would inform the laboratories, the DPF Executive Committee (or designated individuals), the funding agencies and the community at large of its work on a regular basis.

A possible model for membership of the DRDCP is the following:

- One representative from each of the five HEP national laboratories (ANL, BNL, FNAL, LBNL and SLAC);
- At least an equal number of representatives from the university community .

The DRDCP may wish to consider if observers from outside the U.S. would be appropriate.

It would be the responsibility of the management at each of the national laboratories to appoint the appropriate representative. In this regard, we note that the laboratories typically have an individual that is responsible for HEP generic R&D (KA-15 supported work) as a POC. It may be that these individuals are the most appropriate as the laboratory representatives but in any case the person appointed should be able to represent the laboratory and be active in detector R&D.

Membership from the university community is critical to the success of the DRDCP. The DPF Executive Committee could act to select university representatives for the DRDCP (as was done for this Task Force). It is essential that the university representatives be active in detector R&D. It is also essential that there be a balanced representation, taking into account support from both the NSF and DOE.

Although the DRDCP would be largely self-organized, the laboratories and university community (through the DPF Executive Committee) may wish to provide an initial direction to the Panel through, for example, a mission statement or equivalent.

The term of service on the DRDCP should be at least two years. A mechanism to rotate the university membership should be developed but could continue to involve the DPF Executive Committee.

Role of the DRDCP in Upgrades to Existing Projects and in Future Projects

The Task Force considers that detector upgrade activities that are under the direct management (funding) of specific projects to not be a significant aspect of the work of the DRDCP. The DRDCP may take note of the technical achievements or promise of such activities but it is not the role of the DRDCP to promote or coordinate established and funded upgrade programs or programs in the future that are directly managed as projects. However, we recognize there may be substantial technical overlap between such projects and more generic detector R&D. The DRDCP, once formed, will need to consider their appropriate involvement in specific R&D related to projects on a case-by-case basis.

We note that the DOE has recently established, but not yet funded, a generic collider detector research and development program.¹ Since this is a generic program and one that involves many U.S. scientists, we consider it to be of substantial interest and relevant to the future role of the DRDCP.

¹ <http://science.energy.gov/hep/funding-opportunities/collider-detection-research-and-development/>