

## **EHR/MPS Working Group on the Interplay of Research-Embedded Activities with Curriculum and Informal Science Education**

**Introduction.** This report is based on several meetings of the working group during the past several months. We began by identifying representative examples of collaborations across the many existing activities of each directorate. These are quite varied and indicate a rich set of interactions that integrate education and research efforts. The nature of these collaborations ranges from the small to the large. In some cases the activity involves a focused outreach component of an individual project supported by a small supplement. In other cases a large facilities project (e.g. LIGO) may be implementing an integrated educational outreach capability. At the programmatic level there is direct co-funding of projects within a program, and other examples feature programs that draw their core funding from “up front” directorate commitments and include co-management. Informal interactions exist as well, often taking the form of program directors seeking cross-directorate advice from colleagues. These different examples provided useful context to enable us to consider areas where enhanced or possibly new collaborations could be facilitated. We found it useful to categorize possible activity along several axes: internal and external; short-term and long-term; and potential degree of resource intensiveness. Finally, we found the meetings themselves productive in helping us to learn more about other programs and to establish contacts.

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### **General observations.**

1. Organizational and structural conditions make cross-directorate activities challenging. For example, projects seeking funding from EHR often include activities that may cut across several MPS disciplines and subjects within the disciplines, if not also featuring an explicit interdisciplinary slant. Likewise, projects seeking support from MPS often include activities that span educational levels or combine curriculum development with general outreach or teacher enhancement programs, but are set within a specific discipline. In both situations, to whom do program directors go to find additional, specialized expertise in relevant science or educational areas if needed? Harmonizing the vertical organization of MPS by discipline with the horizontal organization of EHR by educational level or broad educational setting poses a challenge for the program director seeking advice.
2. In general disciplines across directorates are different enough that, instead of expanding specific programs, we should maintain flexibility and an open mind to respond to ideas and opportunities when they arise. To date this has enabled numerous and varied collaborations to be supported, and we can further develop mechanisms to foster exchange and knowledge of each other’s programs.

3. The most effective collaborations emanate from interactions at the Program Director level. These are difficult to maintain with rotators, retirements, and other staff changes. But we offer below some possible short-term actions to ameliorate this situation.
4. Talking across directorates at early stages in a program, and bringing in the broad expertise as the program develops rather than when it is defined is characteristic of the examples where there is active collaboration within a program. Help does not always take the form of dollars, rather it lies in obtaining advice on reviewers, determining how to build assessment and evaluation into a project or over a program, or ensuring the right balance of expertise on a project team.
5. The timing of funding decisions and the budget cycle among different programs can limit the amount of co-funding done. Funds are often not available when the decision needs to be made, even if there is a desire to co-fund meritorious proposals.

**Recommendations.** We have separated this section into a discussion of opportunities for enhancing collaborations both internally and externally.

#### INTERNAL:

- To foster collaboration and understanding of programs, small groups might be formed of one or two individuals from each Directorate who serve to “broker” proposals and ideas that might be of interest across programs. These people would stay familiarized with each Directorate’s programs, and would either meet occasionally to keep informed (and maybe exchange proposals), or serve as a resource within their Directorate for program directorates trying to find the right contact in program areas they are not familiar with. [short term, but with resource constraints in the form of program director time]
- To enable synchronization of co-funding when program deadlines do not match up well, funds could be identified, perhaps in the form of an opportunity pool, to provide flexibility over a finite period. If not used by a certain time, funds would become available for other purposes. [medium term, contingent on senior staff policy decisions]
- Identify opportunities to provide advice as programs are being developed (not necessarily co-funded or co-managed). For example, the Communicating Research to Public Audiences (CRPA) in ISE is under consideration for revision or possible reconstitution. Program directors in MPS could provide input to the development and writing of the solicitation to make clear the perspectives of their respective scientific communities with regard to the current key issues, advances, and open questions. [variable term, depending on program solicitation development schedule]

- Maintain a running listing of examples of collaboration with brief annotation. [short term]
- Set up a rudimentary internal web site to post information. This would be of particular value to rotators and could perhaps be incorporated into orientation activities for new IPAs. This information would also be useful to the “brokering” activity described above. [short to medium term, with maintenance needs and implications on staff time resources]

#### EXTERNAL:

- Facilitate communication and other interaction among our PI communities. Candidates include: REU site coordinators meetings, Physics Frontiers Centers, MRSEC and STC education outreach coordinators, PIs of large facility projects; PIs in other programs, e.g. ISE, NSDL, and ATE. These cohort candidates should be associated with a cognizant program director. This information would be posted on the internal web site. [short term]

##### *Example:*

- Ask a set of leading PIs in different MPS areas of research to help identify the significant new trends expected that would define new areas of advanced technology development. [medium term]
- Identify a calendar of PI meetings in relevant programs and initiatives. Meeting organizers and cognizant program director(s) for the program holding the meeting would work with interested collaborating program directors to identify prospective attendees. Fence off a small amount of travel support at the OAD levels for these opportunities. As above, this information would be posted on the internal web site. [short to medium term initially]

##### *Example:*

- The education and public outreach coordinators from MPS major facilities, centers, or projects could attend upcoming PI meetings in ISE. Alternatively, PIs of major ISE or DUE projects could attend MPS PI meetings, such as the recent Physics Frontiers Centers meeting. [medium term]
- Encourage professional societies or other institutions to sponsor web sites with links to successful NSF-sponsored projects and programs, and provide mechanisms for exchange of information or other communication. [medium to long term]