

Group B3 Instrumentation and Synergy

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We viewed our charge as one to investigate ways in which instrumentation needs bridge across different experiments and disciplines. Merely listing instrumentation that will be needed for the many experiments at Homestake would be better done by each "A" group experimental cluster. The group was at a decided disadvantage in preparing for our session since we only had one white paper (very detailed) submitted in advance. As it happened we lost half of the audience depending on whether the report was presented by physicists or engineers. Very quickly we were left with a gang of five.

We recognized that our goal of enhancing the multidisciplinary scope of the Homestake program, exploiting the strengths of the communities in instrumentation and diverse fields of science and engineering, is presently limited by a lack of communication among its different segments. The different groups do not have the opportunity to learn about fields outside of their own. In fact it would not be stretching the state of affairs to say that "none" of the scientists or engineers have been interested in what the other studies and enjoys. The particle physicists have not had a chance to develop an understanding of the practice of geology or geo-engineering, while the specialized domain of large high energy physics experiments has not been opened up to researchers in other fields. We believe that it is imperative to address this problem.

The context of large assemblies like the Town Meeting does not foster the mode of trans-disciplinary communication needed for synergy to evolve between science and engineering. A very different environment is needed to cultivate in-depth personal and professional interactions. We are not proposing bass fishing expeditions, but an experience much like a two or three day NSF review panel. The manner in which particle physicists work in large groups appears strange until it is experienced. Small groups of physicists might be given an opportunity to spend a day in a working mine where they can experience how an underground structure feels and acts, hearing the groaning and snapping of rock at great depth, while a day visit to a large experiment during the measurement or shutdown period can be made available to the geoscientists. This will provide more meaning to the reader of papers on particle physics for a general scientific audience. Another model are "Snowmass" -type meetings where the different groups are put together in a less harried environment, with sessions where they obliged to work towards understanding the scientific needs of all the Homestake stakeholders and their own assets, fostering mutual understanding. These models of interaction require funding and, most importantly, planning (i.e. time).

Perhaps another model can be identified as the "buddy system." This appears a light-hearted name, but perhaps a bit of lightened heart is what is needed. In this system interested scientists and engineers are each assigned their opposite, ideally in specialties of mutual interest. They will communicate by email, telephone, and through visits. This will require both parties to devote an appreciable amount of time and effort; the goal is for the pair to become colleagues in the academic sense. The pair are both highly intelligent and curious, who love to solve problems which their joint interests will provide – now you have synergy. Rather than money, this approach requires participants to feel an imperative for this synergy to happen. It is proposed that an

entail a cohort of six each from physics and geoscience/engineering, ideally put together by the Homestake P.I.s. When the community sees the benefits, both to the individual and to the science, we hope this will lead to a groundswell of volunteers; it does not take many to make a difference.

We are sure that the highly developed techniques of sensors and electronics developed for particle detection would find good application in all the fields in the Homestake community, and surely the particle physicists would benefit from the best possible understanding of the science their Homestake colleagues are studying, and the special environment in which they are working. The step to create the links that would allow these opportunities to develop is one that happens very rarely without favorable intervention. The author for one is extremely excited about applying the sensing and electronics expertise developed by the high energy physics world.

The Homestake project will certainly have many scientific and engineer successes regardless of synergies fostered or not. But it will be through these synergies that the undertaking will be spoken of as the Manhattan project is today.