Infrastructure Matrices

Revision 1.0
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Introduction

The attached infrastructure matrices document possible science and engineering activities at a Deep Underground Science and Engineering Laboratory. These matrices are part of NSF Solicitation S1, and were developed to document infrastructure requirements, site requirements, common facilities and modules necessary to conduct the science and engineering research program.

The information contained in these matrices, when finished, will be used to evaluate the demand for DUSEL research facilities, to group DUSEL activities into modules and to identify the required timelines. **All information currently in the matrices is in draft form, and should be carefully reviewed, and amended, as appropriate.**

Description of the Matrices and the Actions Requested

Four matrices are included (the numbers in the following list correspond to the worksheet names):

1. *Physics Infrastructure Requirements*—Matrix #1 comprises specific physics experiments in its rows, with the columns defining both general information on the experiments and the physical plant requirements necessary to conduct the experiments. Currently, only nine specific solar neutrino and double beta decay experiments are listed. Still needed are data entries for approximate costs, schedule and collaboration size. Infrastructure needs include depth, space, occupancy, radon limits, hazardous materials, ventilation, electrical power and clean space needs. Special or additional facilities may be added as comments in the rightmost column.

   The working groups need to expand the experiment list to include physics experiments from all categories. New columns should also be added if experiments have major physical plant requirements not listed.

2. *Earth Science & Engineering Infrastructure Requirements & Site Requirements*—Two matrices are necessary to capture the requirements for Earth sciences and engineering (ES&E). Matrices #2 and #3 have identical rows that represent individual experiment categories. Matrix #2 contains both general information on the experiments and the physical plant requirements necessary to conduct the experiments (column headings are identical to Matrix #1). Matrix #3 has column headings focused on site requirements. Matrix #3 is necessary because the Earth science and engineering activities do have specific site requirements.

   The list of specific ES&E activities, and their grouping into modules, has been developed from the EarthLab Report, and from discussions at the Berkeley, Blacksburg, and Boulder workshops. Working groups should first identify whether their proposed experiments fit into the generic experiment descriptions (e.g. Shaft Access, Large Block Experiments, etc.). If so, they should then complete the row of entries for anticipated infrastructure needs. If separate experiments are proposed that do not fit into this categorization, then the working groups should complete a new line entry for each proposed experiment and associated infrastructure requirements.

3. *Earth Science & Engineering Site Requirements*—See item 2 — The Matrix #3 columns identify anticipated site requirements for the different experimental modules, including size, depth, and lithology, etc. The working groups should check the existing row entries for experiments they have endorsed in Matrix #2, supply missing components, and complete new row entries for any additional experiments that they have added [concordant with Matrix #2].

4. *Modules*—Matrix #4 is a preliminary assessment of DUSEL modules. Its rows are eighteen major module characteristics, and its columns are eleven modules. In this context, modules are groupings of experimental functions with common or at least compatible infrastructure requirements and design criteria. Some physics experiment commonalities are obvious (e.g. amount of shielding, radon control and clean conditions), but determining commonalities and incompatibilities across all science and engineering disciplines requires a structured approach.

   In Matrix #4, several of the module characteristics have more than one sub-characteristic (e.g. the Depth characteristic includes Shallow, Intermediate and Deep sub characteristics). The eleven modules include common facilities modules, physics modules, Earth science and engineering modules, shaft modules and combined modules.

   Please review and comment on the module characteristics (rows), modules (columns), and the information in the matrix entries. Finally, add new information to better define the modules.