

## NUE: BRIDGING THE NANO GAP DATA MANAGEMENT PLAN

### **What data will be generated?**

This project is designed primarily as an educational intervention rather than a research project *per se*. However because the goal is to provide a foundation for future research studies, the data will be managed as for a research project. The measures and approaches will likely qualify for exemption from IRB review under 45 CFR 46.101(b)(2), and the research plan will be submitted for review as appropriate by the Colorado School of Mines Office of Research Administration.

Data will consist of notes and transcriptions of discussions, audio recordings and transcriptions of focus groups, reports and reviews, summaries, curricular materials, assessment instruments, and both quantitative and qualitative evaluations of the impact of the educational intervention on the students. Materials will all be created *de novo* or transcribed into standard Microsoft Office applications (Word, Excel, and PowerPoint). For the purpose of wider, long-term access, primary documents will be converted at regular intervals into pdf documents.

More specifically, data for each phase of the project will include:

**Phase I (Advisory Committee Discussions):** Notes of discussions with project Advisory Committee, list of elements for course content, assessment and pedagogical approaches, measurable outcomes

**Phase II (Curriculum Development):** Draft, revised, and final version of curriculum (syllabus, PowerPoint slides, laboratory procedures, course project descriptions); Reviews of curriculum by Advisory Committee; Notes and/or transcriptions of focus group reviews of curriculum; Content analysis of focus group discussions

**Phase III (Outcome Assessments):** Assessment instruments (pre- and post- course surveys, focus group protocols) and reports that summarize, analyze and discuss quantitative and qualitative data collected for evaluation of the impact of the educational intervention.

### **What is your plan for managing the data?**

**Audience for Data:** The course curriculum will be of primary **educational** interest to those with an interest in nanotechnology and/or humanitarian engineering undergraduate education. It is anticipated that individuals with an ongoing interest in these areas will download and use the curricular materials to deliver courses at their own institutions. The assessment instruments, proposed measurable outcomes, and other data will be of primary **research** interest to those who wish to study the effectiveness of nanotechnology and/or humanitarian engineering education interventions.

**Access and Sharing:** The educational and research data resulting from this project will be made available for use by both educators and researchers as soon as completed and no later than the conclusion of the project. These materials, available as standard Microsoft Office files, pdf documents, and tab-delimited files, will be widely and freely disseminated minimally via:

Colorado School of Mines institutional repository at the Digital Collections of Colorado website (<http://digitool.library.colostate.edu>); National Science Digital Library ([www.nsdlib.org](http://www.nsdlib.org)); and "NanoHUB" website ([www.nanohub.org](http://www.nanohub.org)).

**Format: Submission:** Primary data will all be created *de novo* or transcribed into standard Microsoft Office (Word, Excel, and PowerPoint) files. **Storage and Access:** Files will be stored and available both in original format and as pdf documents. In the case of answers to forced-choice and open-ended survey questions, data will be stored both in pdf and tab-delimited formats for the purpose of subsequent statistical analyses.

**Ethics and Privacy:** Whether or not required as a condition of IRB approval, an informed consent process will include language to ensure that all participants understand that these data are being generated for the purpose of sharing with the research community. Data from this project are unlikely to

pose a risk for disclosure; however, to further protect participants, data will be de-identified before long-term storage. Focus groups will be audio recorded and then transcribed verbatim; however, the participants will be assigned pseudonyms to protect their identity. The original audio recordings will be destroyed directly following the transcription process.

**Intellectual Property Rights:** During the conduct of this project, all ownership rights rest with the institution (Colorado School of Mines). The sharing of research results will be consistent with institutional policies governing intellectual property, copyright and the dissemination of research products. On completion of the project, the intention is that all data and materials should be freely available for use by the research community.

**Storage and Backup:** To ensure ongoing and long-term security of the data generated by this project, a complete copy of materials will be generated and stored independently on primary and backup sources for both the PI and Co-PI (as data are generated) and with all members of the Advisory Committee (every 6 months).

**Archiving and Preservation:** On completion of the project, the PI and Co-PI, in consultation with the Advisory Committee, will identify which project materials are of probable long-term interest for archiving and preservation. Materials will be anonymized or de-identified as appropriate, converted to searchable pdf document format, stored locally on Colorado School of Mines computers (institutional repository) and copied and distributed to all members of the Advisory Committee. Further archiving is available by submitting appropriate materials and metadata to NanoHUB. For additional discovery to a broader audience descriptive metadata will be submitted to the National Science Digital Library, a repository serving science, technology, engineering and mathematics education. Because this project is not a primary research project, it is less important that data be retained indefinitely; however, it is reasonable to assume that these baseline data will inform future research sufficiently soon that secure and complete retention will be needed for up to three years.