# Developing HPC in Resource Constrained Environments

Birds-of-a-Feather Session at the ACM/IEEE International Conference on High Performance Networking and Computing (SC14).

**Session leader**: Hensley Omorodion, University of Benin

Participants:
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Hensley opened the session with an overview describing the challenges and opportunities available for applying high performance computational science to important national interests, including agriculture, energy, and transportation. He described a path forward, proposing the formation of a "special interest group (SIG)", named HiReConSIG. Hensley then opened the floor for discussion.

Ekow described how he has participated in a similar effort in South Africa, and emphasized the importance of a coordinated effort among a breadth and depth of organizations.

- He discussed his experiences at the Lawrence Berkeley National Laboratory (LBNL) and interactions with the U.S. National Science Foundation (NSF). He described some activities of the CHPC group, especially as related to improving student preparation and training (e.g. OpenMP, MPI, shmem), and the critical

importance of developing strong mathematical foundations for students as a requirement for developing strong computer science foundations. Quality and consistency.

- He emphasized the importance of developing business plans for creating, maintaining, and extending cyber-infrastructures.
- He described his work in data analytics, discussing the importance and time required for organizing the data before attempting to mine it for meaningful information.
- It is important to separate political issues from academic activities.
- Ghana Center of Excellence, including an HPC cluster.

Elizabeth Leake described her experiences in bringing a cyber-infrastructure to rural farming communities in Illinois.

- The struggles of "the last mile." That is, the "buy-in" from the individuals who would directly benefit from the technology.
- She has experiences these sorts of efforts as part of the US TeraGrid, Northern Illinois University, and now with STEM-Trek.
- Industry and communities must become partners, and must each see a value to their concerns.
- She pointed to the SC14 BOF, "Challenges of Managing Small HPC Centers"

Discussion of how to obtain computing resources. Large computer users buy new systems regularly, and offer the old ones under "re-purposing" programs. FaceBook, National Labs, etc. Computer vendors also have business development programs targeting Africa and other areas. Must find the appropriate people within these very large organizations. Elizabeth described "invisible economies", companies that are not as publicly visible but who may also offer similar programs. It is also important to have an organized and formal organizational means for soliciting, receiving, managing, supporting, and maintaining donations.

Rachel discussed the importance of workforce development, strongly supporting Ekow's claim that mathematical foundations are critical to developing strong computational and computer science foundations. University curriculum must reflect and support national priorities, e.g. agriculture and energy.

The session ended with enthusiasm for carrying this work forward. Some action items include:

- Sidafa offered to help connect Hensley with web development resources, such as GitHub.
- Hensley will contact Jeff Hollingsworth in order to pursue making HiReConSIG a chapter of SIGHPC.
- These notes and Hensley's slides will be distributed to the participants of this BOF