Colorado School of Mines has a worldwide reputation for its history of training engineers to work in the extractive industries of mining, oil, and gas. It also has the distinction of offering the first humanitarian engineering minor in the United States. Yet for too long, these two strengths remained disconnected, with little if any overlap between students and curriculum in those two areas. A generous gift from 1961 alum Chuck Shultz and his family is mending that rift. The Shultz Family Leadership in Humanitarian Engineering Fund allows the HE program to engage its faculty and students in teaching, learning, and researching on how communities and extractive industries can coexist in socially just and sustainable arrangements, raising the profile of both HE and Corporate Social Responsibility (CSR) in the CSM community.

First, the Shultz Fund allows the HE program to host campus lectures by top notch industry practitioners and scholars working in corporate social responsibility. Chris Anderson, Americas Director, Communities & Social Performance at Rio Tinto, made the strongest case for why working with and for the welfare of communities is in the best interest of extractive industries: caring about community welfare is good for the bottom line. Mike Dougherty, Assistant Professor of Sociology at Illinois State, presented his research in gold mining communities in Guatemala, showing the importance of understanding institutional and relational trust with communities for shaping how engineers working in extractive industries bring about substantive empowerment of host community residents. In Fall 2014, Elaine Dorward-King, Executive Vice President of Sustainability and External Relations at Newmont, explains how engineers contribute to creating shared value between companies and communities—a crucial and innovative new approach for businesses managing their relationships with society. Finally, Nicole Smith will share her research analyzing the opportunities to connect CSR with artisanal and small-scale mining, one of the biggest challenges facing major corporations operating in the developing world.

In addition to hosting lectures, the Shultz Fund also allowed Prof. Jessica Rolston to develop and offer the course Corporate Social Responsibility, providing a focus on oil, gas and mining operations for the first time in the course’s history at CSM. With enrollment filled to capacity, students are analyzing how and why firms, industries, and academics sometimes define CSR in different ways; identifying relevant international standards for business conduct and applying them to extractive industry activities; conducting stakeholder identification, analysis and prioritization; and creating a community engagement strategy for a real world extractive industry project in the US or in the developing world. They are learning from guest speakers from oil, gas, and mining firms, a broad array of case studies from around the world, and their classmates’ own experiences working for the industry.

Continued on page 5
Part of the Shultz Family Leadership in Humanitarian Engineering Fund goes to scholarships for students who are committed to exploring the connection between HE and the extractive industries, particularly around the concept of Corporate Social Responsibility. After the announcement in mid Spring 2014, we received very strong applicants competing for the scholarship. The Humanitarian Engineering (HE) committee had since decided on four recipients of this scholarship all from the College of Engineering and Computational Science (CECS): Katherine (Katie) Herrera (CE’15), Frances Marlin (EV’16), Raul Tackie (ME’16) and Nicholas (Nick) Yuan (ME 16).

We had a chance to interview all four recipients, and unravel their aspirations, drive and commitment to being part of the first cohort of students receiving this scholarship. Each and every one of these students clearly displays enthusiasm and aptitude in their disciplines and an eagerness to practice humanitarian engineering in different ways. For instance, as Mechanical Engineering is his major, Raul says, “I am very interested in electric propulsion and its environmental and socioeconomic implications”. In a different approach to applying his studies, Nick mentions his career aspirations, saying, “I’m currently thinking about becoming a social entrepreneur, starting companies that sell products that are designed to make an impact.”

As an overall observation, each of these scholars are also pioneers in their own right. Frances helped with the development of the Introduction to Design and Engineering Applications (IDEA) Program in Red Rocks Community College, where she began her college career. Katie was one of the few engineering students who started an internship with International Development Enterprise (iDE) — one of HE’s major collaborators.

Our scholars have gained a fundamental understanding of community development from being in the HE program. Nick says, “I used to think community development was something done by someone fortunate to someone less fortunate. As it turns out, it’s not like that at all. It’s about working WITH a community, as equals.” Further commenting about a successful relationship between extractive industries, engineers and the community, Nick says, “... (it) starts with open communication, a willingness to make changes, and an understanding of how each group can help the others.”

To address the Shultz Family’s vision, Frances says: “I want to further the sponsor’s vision of integrating HE in the extractive industries by improving the corporate-to-community relationship.” So far as practical advice on how this may happen — especially on the role of engineers, Raul says, “To be effective, engineers must listen to the communities they are engaging and be extra perceptive to cultural differences.”

Frances Marlin EV’16

Nick Yuan

Katie Herrera

Continued in page 7
The HE lecture series in Spring 2014 kicked off with Jeff Walter’s presentation, *A System Dynamics Based Methodology for Sustainable Rural Water Services in Developing Countries*. A doctoral candidate in Civil Systems Engineering at CU-Boulder, Jeff’s research showcased how complex engineering methods can be used to show how and why water systems fail so often in resource-poor countries. His modeling would allow us to understand the interactions between different elements of water socio-technical systems, from local regulations and politics to rainfall to available technologies.

In April, Dr. Andres Valderrama (Aalborg University in Copenhagen, Denmark) offered a week-long series of lectures to celebrate Human-Centered Design. This first lecture was about *Transportation Systems, Engineers, and Social Justice* where he showed how technical assumptions built in models that engineers use to design and build public transportation systems can exacerbate social injustices, particularly against marginalized groups like the poor and the disabled. Using examples from transportation systems in Colombia, he challenged our engineering students to reconsider the notion that technical models are value neutral and free of politics and to critically assess how engineering assumptions can enhance or hinder social justice. Next, in HE’s new course EGGN 301 Human-Centered Problem Definition, Valderrama lectured on the difference between good design for people and good design with people. Valderrama finished his series with a lecture on the history of environmental engineering in Denmark for CSM’s Environmental Engineering Graduate Seminar and one on programmatic innovations on sustainable design delivered to CSM’s senior design class.

Closing the HE lecture series in Spring, Dr. Mark Reiner (Post-Doc at Humphrey School of Public Affairs, University of Minnesota) presented one of the most exciting challenges in the future of humanitarian engineering: the sustainability of URBAN engineering systems that are supposed to deliver basic services to the urban poor (but often don’t). Using his experiences in designing infrastructure systems in Kigali (Rwanda), Reiner showed how engineers in the global north have much to learn about design of sustainable infrastructure from places like Kigali where limited resources, different cultural norms, and local politics came into play in new designs of water delivery and treatment for low-income households.

In this year’s lecture series we strive to deliver scholars who are the best in their field. Let us know if you have any suggestions to improve our efforts in showcasing the various focal points of Humanitarian Engineering.

### Want to be a Shultz Family Scholar?

The main goal of these scholarships is to reward Humanitarian Engineering (HE) students who are committed to exploring the connection between HE and the extractive industries, particularly around the concept of CSR.

Up to five scholarships will be awarded for the Fall 2015 semester. Each scholarship will be approximately $8,420 (equivalent to the cost of one semester in-state tuition and fees).

Stay tuned for more information on this exciting opportunity. Please contact us at humanitarian@mines.edu for further questions.
Join Our Logo and Slogan Competition!

Deadline: October 17th, 2014

In this past year, the Humanitarian Engineering Program has successfully updated its curriculum, mission and vision. Hence we would like to celebrate this milestone with competitions for our program's logo and slogan.

Our current mission is “to teach students how engineering can contribute to co-creating just and sustainable solutions for communities.” Our current vision is "Engineers Serving Communities." Therefore, it would be our honor to have your creative ideas incorporated in our image, branding and promotion tools as the program continues to strive to be at the forefront of this kind of programs in the US and abroad.

We would like to offer you the opportunity to compete and win:

1. $100 gift card to the CSM bookstore for the winning logo
2. $100 gift card to the CSM bookstore for the winning slogan

More background information about our program can be found on our website (scan the QR code below, or simply click on the link)

Please be as creative as possible and send the final jpeg image for the logo with your contact information to: humanitarian@mines.edu with the subject line: HE LOGO COMPETITION

Please send the slogan and context of this slogan with your contact information to: humanitarian@mines.edu with the subject line: HE SLOGAN COMPETITION

Thank you for your participation!

General Rules:
1. Only members of the CSM community can enter the competitions. Deadline for submission via email is 10/17/14 at 5 pm.
2. The logo/slogan shall best represent the program's name, mission and vision.
3. The logo/slogan must be original work of the author and cannot utilize copyrighted material.
4. The logo/slogan shall not use offensive language/symbols/characters.
5. Individuals may submit only one entry for each competition (logo and slogan respectively). Hence it is possible for an individual to win both competitions.
6. The logo/slogan you have submitted, along with its original file and trademark will belong to the HE program.
7. Winners will be announced by the HE committee by mid-November.
8. Rules are subject to change, but will be announced to the general public should there be any changes.
The HE program has also begun to identify CSR projects where HE students can work as agents of positive change, articulating solutions that can benefit both corporations and communities. Led by CSM alum and community-relations specialist Ben Teschner (Geological Engineering 2008; MIPER 2011), these projects include a village relocation project, currently being done by students in our HE class EGGN 401 Projects for People. We are also exploring a project to develop technologies to enable AngloGold Ashanti to sustainably engage with artisanal miners.

Additionally, the HE program awarded four Shultz Scholarships for HE students interested in integrating humanitarian engineering and CSR (see on interview p. 2).

Finally, the HE program is in the process of planning a HE/CSR Summer institute for May 2015 where we plan to engage academics, students, corporate officials and NGO representatives in answering the following questions: How can engineers be agents for the kind of CSR that leads to social justice and community welfare? And how can we institutionalize these lessons throughout engineering education?

Thank you to the Shultz family and to the committed faculty and students that help us build the bridges between HE and extractive industries.

“Humanitarian Engineers have the ability to bridge the gap between extraction companies and local population groups. These individuals have the training to both assess the needs of a community, and the desired goals of an extraction company, and then align them to where both parties benefit. These engineers can find solutions that are viable, sustainable, desirable, and feasible, for all parties affected in the natural resource extraction process. Students in Humanitarian Engineering are the extractive industry’s biggest asset for a profitable, and sustainable, future.”

Katie Herrera CE ’15

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**Students Designing a Relocation Plan for Community Displaced by Mining**

*by Ben Teschner, CSR Project Manager - Humanitarian Engineering*

“What will happen to the drinking water sources when they build the mine?”

“What will happen to the drinking water sources when they build the mine?”

“Do the people in this village like the mining company?”

“If we build the new village here, will it change their relationship with this nearby village?”

These are some of the questions being asked by a design team in EGGN 401, Projects for People. The team of six has been charged with developing a plan to relocate a village in Ghana that is about to be displaced by the development of a gold mine. The team studies a 36x48 inch map of the mining area, then one member scribbles the words “What crops are grown currently?” on a yellow sticky note and turns to his teammate. “Do you think you can take care of this one?”, he asks as he places the note on a whiteboard with a collection of other sticky notes under a column labeled “Don’t Know”.

Although the project is hypothetical (the mine and the village are not real), the project takes a real-world approach. Omar Contreras, a senior CSR practitioner formerly with Gold Fields Exploration, is acting as the team’s client. Two international students from Ghana are providing the team with a local perspective. The project also uses actual data and studies from a recent village relocation in Ghana.

Students are not only grappling with traditional engineering problems but also social variables. The new village will need potable water, roads, homes and public buildings, but it will also need to be culturally appropriate, meet international best practices and be designed in ways which secure the mining company’s social license to operate. The team is considering these problems through the lens of Human Centered Design, an engineering approach which puts the emphasis of design solutions on the needs of the project’s stakeholders.

“What are we going to do with the graves of their ancestors?”

Over the course of this semester, the team will research these questions and incorporate the answers into a community-focused relocation plan. We will update you on what happens in our next newsletter!
An Interview with Leslie Light and Sue Anderson, Human-Centered Problem Definition Class Instructor and Guest Lecturer

By Mirna Mattjik, HE Program Coordinator

The Human Centered Problem Definition (HCPD/EGGN301) class was offered last Spring 2014 for the first time. This is one of our fundamental courses in our program, which solidifies students’ ability to: identify, define, and begin solving real problems for real people, within the technical/social ambiguity that surrounds all engineering problems. The instructor for this class was Leslie Light, who is currently the director for the EPICS program (now evolving into problem solving classes offered to first years and sophomores). Leslie was accompanied by Sue Anderson as guest lecturer, a product design engineer turned Emergency Medical Services (EMS) instructor who understands and practices real problems for real people on a daily basis. Additionally, since this was a pilot class for HE, I was fortunate to observe these classes and also provide support for the students in my role as HE Program Coordinator.

We started out the class with an example of a real world problem, “ORWALD” (Our Real World) problem. Students spent the first few weeks working on a well defined problem definition of the ORWALD. The photo (right corner) shows students’ brainstorming session using methods akin to human-centered design, and of course, using Post-it® sticky notes!

At the end of this class, I had a chance to interview Leslie and Sue, wondering whether they had thought this pilot class was successful, since I certainly felt that way. Sure enough, as a result from students’ feedback, I learned from Leslie that one of the most perceived difficult and abstract objectives of this class, was ranked the highest: recognize the ambiguity and requirement conflicts of existing real world problem definitions, and identify alternative appropriate definitions and solutions.

Moreover, I had personally asked for a quote from one of their students, Laura Brigham (ME ‘14). Laura beamingly says: “I absolutely love the learning atmosphere that the HCPD class offers! We are taught principles and then given the opportunity to apply them in the real world–allowing us to really internalize what’s been taught. I would highly recommend this course to anyone interested in better understanding the steps to good design.”

As an instructor, Leslie was also very pleased with the pedagogy practiced in the class. Leslie says, “I enjoyed most the combination of instruction and hands-on experimenting we encouraged through the semester. It was ‘learn – apply – repeat’ and it was a very effective way to deliver the course.”

Finally, for future improvements of the class, Sue says, “Having the students engaged in an in-class activity during which they discover a learning point for themselves is so much more powerful than me standing in front of them and just telling them that learning point.”

I ask the question, other than Project for People (PFP/EGGN401), which is the subsequent class, what other classes would be supported by HCPD? The answer was “This course would support Senior Design (in CECS) well. It will help students think critically about the problem definition they are handed, and will help them deal professionally and effectively with clients and other “stakeholders” of their design problem.”
Interviews with the Shultz Family Leadership in Humanitarian Engineering Fund Scholarship Recipients (continued from page 2)

In addition, genuinely starting from within, Katie says, “I just want to make a positive difference in my workplace.” And as Frances specifies, “Many of the communities I’m learning about through the HE minor are communities that are directly impacted by the mining industry.”

Raul recommends joining the HE minor because “It gives students many different tools or lenses through which to view the world. Not only do these tools greatly improve one’s understanding of humanitarian engineering, but they also improve one’s view of engineering as a whole.”

We are lucky to have four dedicated scholars who are consistent in their commitment to HE and its relation with the extractive industries through Corporate Social Responsibility.

Congratulations and good luck to Katie, Frances, Raul and Nick!

The HCPD and PFP classes have inspired us so much that a group of faculty (some are shown in pictures below*) took an online course on Human-Centered Design for Social Innovation conducted by +ACUMEN and developed by IDEO, follow this link or scan the QR code for further information:

http://plusacumen.org/courses/hcd-for-social-innovation/

The following are pictures from our human-centered design classes

Improbable Design Challenge in HCPD

Jeremy Beard* (L) and Jered Dean *(R)

First Design Challenge in HCPD

Juan Lucena*
Acknowledgement

This edition of our Humanitarian Engineering newsletter is to celebrate the generous gift donated by our sponsor, the Shultz Family.

Thank you!

Please send your comments, suggestions and questions to:

humanitarian@mines.edu

or

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