Engineers in Humanitarian and Sustainable Community Development: Perspectives, Critical Inquiry, and Action

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The answers below consider engineers in humanitarian and sustainable community development (SCD) only. I do not attempt to address circumstances related to social justice since I have not reviewed that literature or researched engineers engaged in those specific circumstances. The ideas here are product of collaborative work with colleagues at CSM under the sponsorship of NSF Grant titled "Enhancing Engineering Responsibility with Humanitarian Ethics: Theory and Practice of Humanitarian Ethics in Graduate Engineering Education" (NSF Grant # EEC-0529777). However, the articulation of these ideas in this presentation is my sole responsibility.

What unique skills and talents have engineers and engineering education brought to circumstances of humanitarian conflicts, human rights interference, and unsustainable development?

By virtue of their historical involvement in development projects [1], their knowledge and skills, and their societal position at the nexus of private and public interests, engineers bring unique perspectives to these circumstances. Yet engineers need to have a deeper understanding of their perspective, including the elements of perspectives -location, knowledge, and desires - and how these elements might be deeply connected to engineers' activities in humanitarianism and sustainable development. Understanding one's *location* as an engineer requires knowing the history of how engineers became expected to serve society beyond private interests, how the nature of that service changes with time and geographical location, and how engineers became involved in humanitarian and sustainable development through key institutions (state agencies; development organizations; multinational corporations; NGOs)and often under the auspices of foreign policy. Understanding one's *knowledge* as an engineer requires assessing the strengths and limitations of key elements of engineering curricula and practice (e.g., engineering problem knowledge (EPS); design methodologies; life-cycle analysis; liberal arts; communications, etc.). Understanding one's *desires* as an engineer requires critical questioning of one's desires to help people in need, including questioning the assumptions behind this desire (e.g., what are the dangers in assuming that those who do not live like me have a deficiency that must be met?), what a human need is (e.g., what are the dangers in assuming that human needs fit Maslow's hierarchy of needs? [2]What are the dangers in reducing humans to a set of physiological needs? Might Maslow's hierarchy of needs represent mid-twentieth century U.S. middle class values while ignoring significant cultural variation? [3]). Engineers under these circumstances should also question the assumption that their action or intervention is wanted and welcomed. As a community leader from Chiapas reminded CSM engineering students contemplating work in SCD: "Don't come here to help. Come here to listen, to see if our struggles are your struggles. Then and only then we can sit and discuss how, if at all, we can work together." Engineers' assumptions of 'need' and 'help' fit the identity of the engineer as problem solver but might not fit communities desires.

One encouraging example of this kind of critical questioning can be found in the life and work the engineer Fred Cuny. When confronted with humanitarian crises, Cuny questioned the limitations of his own engineering skills and traditional modes of international assistance, proposing the 'Cuny method' for humanitarian assistance. Furthermore, by making pre-existing conditions of poverty and vulnerability visible, Cuny redefined humanitarian problems from reactions after a crisis to prevention before a crisis.[4, 5]

What major messages and forms of assistance need to reach engineers and their societies in order to assist them to promote effective engineering research and practice in these circumstances?

Engineering students and professionals should understand the historical and ideological dimensions of humanitarianism and sustainable community development (SCD). These activities are rooted in a complex, and often unpleasant, history at the intersection of foreign policy (e.g., Cold War), the ideologies of modernization (e.g., all underdeveloped societies will achieve the progress of developed societies if set in the proper path) and technological determinism, and the emergence of engineers as 'development technocrats.'[6, 7] Wanting to do good by 'helping those in need', and acting of that desire, does not erase that history. It actually locates engineers as actors within this historical and ideological current. This entrance into the history of development comes both with dangers and opportunities. The danger comes from entering as an uncritical passive actor. The opportunities come from entering as a critical and active agent willing to redefine traditional engineering roles. For example, engineers can redefine their roles and identity from problem-solvers to problem definers by learning to understand, value and engage perspectives other than their own, [8, 9] including those of stakeholders in the communities that they are supposed to serve. [10] Key elements of this redefinition include learning the ability and skills to listen, [11] reconsidering client-engineer relationship to one of partner with community citizens,[12] learning to understand and value non-expert knowledge, shifting loyalty from method to community, and questioning assumptions behind desires to help people in need.

More specifically, engineers involved in humanitarian activities might consider asking key questions about their work and themselves. For example, we challenged engineering students considering humanitarian work with the following questions:[13]

A. Does this engineering work **promote the good of all humans** independent of their nationality, religion, class, age, or sex? [Justification: Humanitarianism as an ethical tradition historically rejects the significance of such distinctions.]

B. How might this engineering project be related to the **protection and promotion of human rights**? [Justification: Humanitarianism has been repeatedly linked with the emergence of human rights especially as recognized in such documents as the Universal Declaration of Human Rights (1948).]

C. Is the product, process, or system being engineered any likely to benefit **solving humanitarian crises** such as those typically associated with war or natural disasters? [Justification: Humanitarianism is often exemplified with humanitarian aid during such crises.]

D. Is this engineering work addressed especially to **meet fundamental human needs** (such as food, water, and shelter)? [Justification: Humanitarianism regularly argues the priority of fundamental needs over needs associated with affluence.]

E. Is this engineering work oriented toward providing **benefits for those otherwise underserved by engineering** either in the advanced or the developing regions of the world? [Justification: Humanitarianism typically manifests what is known as the "preferential option for the poor."]

F. In what ways might the engineering work be **more compatible with not for profit enterprises** than for profit enterprises? How might such engineering and construction work that did seem more compatible with the pursuit of economic profit be either supported by alternative means or recast so as to be compatible with economic motives? [Justification: Humanitarianism has often been practiced in tension with corporate economic interests.]

G. What is the likelihood that this engineering product, process, or system will be **sustainable**? [Justification: Humanitarianism is often thought to be supportive of and appropriately pursued in synthesis with sustainable development.]

H. Does engineering work **factor in the cultural exigencies of multiple stakeholders**? [Justification: The outcomes of engineering work are only be effective and accepted if they are culturally appropriate, especially in humanitarian crises]

Similarly, those engineers hoping to achieve sustainable community development through their practices and technologies might want to consider the following key distinctions: [10]

- *Technology Transfer vs. Technology Porting*—Engineers should question assumptions about technology as "universal", i.e., that it can be transferred from one context to any other without regard for socio-cultural, political, economic, and other dimensions that inform and are informed by community identity, values, and aspirations. Also, engineers should be able to critique existing definitions of appropriate technology (AT) and the notion that simply because a technology is "small" or environmentally sound, it will be uncritically adopted by a community.
- *Community Deficiencies vs. Community Capacities*—Engineers should be able to assess what capabilities, resources and knowledges are already present in a community (capacity mindset) instead of focusing on the elements that a community lacks (deficiency mindset).
- *Community as Atomistic vs. Holistic*—Engineers should treat community not as if it were composed of discrete components but as if it is composed of interrelated and interdependent dimensions—economic, technological, social, cultural—which no single person has the capacity to understand hence requiring an interdisciplinary and multi-partner approach to inquiry and practice.
- *Community Charity vs. Community Ownership*—Engineers should consider the inverse relationship that often takes place between what is given away (charity) and the success of a development project. Thus, engineers should examine why community ownership and buy-in are vital elements in SCD project success.

How can or does engineering ethics relate to these goals?

Traditional forms of engineering ethics education and existing codes of ethics do not explicitly address these issues, questions and distinctions. Most codes of ethics in the US were developed under certain assumptions of employment in the private sector while serving a larger public good. Humanitarian and SCD situations have not been the preambles in the development of professional codes of ethics. While codes and engineering ethics education recognize conflicts that arise between private vs. public interests, and in some cases might help engineers navigate these conflicts, they do not address new challenges and conflicts that emerge from engineers' participation in humanitarian and SCD work.[13] Some key steps might be taken in order to address these shortcomings. For example, those involved in developing codes of ethics or engineering programs with humanitarian and/or SCD goals might want to consider the humanitarian-related questions or SCD-related distinctions above when updating future versions of the codes or making decisions about curricular content. A non-discipline specific society, like the National Society of Professional Engineers (NSPE), might want to develop new codes of ethics altogether for engineers working in humanitarian and SCD circumstances.

A more effective, and perhaps responsible, approach would be to develop and implement an ABET criterion specific to HE and SCD programs. For example, when accrediting discipline-specific engineering programs with HE and SCD activities, ABET could expect students from these programs "to demonstrate the knowledge, skills, and predisposition to treat the different members of a community as people who have both knowledge and value, may be likely to hold different worldviews than they do, and may be likely to bring these different perspectives to the definition and solution of their problems." Furthermore, employers of engineers in HE and SCD areas could also include the above criterion in their hiring practices and decisions.[14]

What practical steps can be taken, by whom, to promote these goals?

Engineering societies could revise their codes, maybe institute new ones, for those members engaged in humanitarian and SCD activities using the questions and distinctions above as guides. Engineering educators involved in HE and SCD programs and activities could revise curriculum content, design-project criteria, and service-learning outcomes in similar ways. These activities could be done individually, specific to each institution and program, and jointly through existing venues such as the annual conferences of Engineers Without Borders (EWB), Engineers for a Sustainable World (ESW), Engineering Projects in Community Service (EPICS), and ASEE (engineering ethics division).

More specifically, those in charge of engineering design projects, either at the undergraduate or professional levels, could begin assessing the effectiveness of community development projects. As we have learned, most projects are rarely assessed after first implemented, perhaps due to a mistaken assumption that communities will embrace and maintain projects into the future. Design projects could be assessed using criteria for success derived from the questions and distinctions above.

NSF could implement similar criteria when deciding on funding related programs. It could also develop a new program for faculty development in these areas since re-evaluating and re-designing educational programs along the lines proposed above will require significant amount of time, energy and new pedagogical approaches.

References

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