COMMUNITY ESSAY

Network priorities for social sustainability research and education: Memorandum of the Integrated Network on Social Sustainability Research Group

Rachelle Hollander¹, Adjo Amekudzi-Kennedy², Sarah Bell³, Frazier Benya¹, Cliff Davidson⁴, Craig Farkos⁵, David Fasenfest⁶, Regina Gayer⁷, Angelique Hjarding⁸, Michael Lizotte⁹, Dianne Quigley⁵, Diana Watts¹⁰, & Kate Whitefoot¹¹

¹ Center for Engineering Ethics and Society, National Academy of Engineering, 500 Fifth Street, NW, Washington, DC 20001 USA (email: rhollander@nae.edu; fbenya@nae.edu)
² Department of Civil and Environmental Engineering, Georgia Institute of Technology, 709 Atlantic Drive, Atlanta, GA 30332 USA (email: adjo.amekudzi@ce.gatech.edu)
³ Department of Civil and Environmental Engineering, University College London, Chadwick 117, Gower Street, London WC1E 6BT, UK (email: s.bell@ucl.ac.uk)
⁴ Department of Civil and Environmental Engineering, Syracuse University, Syracuse, NY 13244 USA (email: davidson@syr.edu)
⁵ American Society of Civil Engineering Task Committee on Sustainability, 9105 Aspenshire Court, Raleigh, NC 27613 USA (email: cfarkos@yahoo.com)
⁶ Sociology Department, Wayne State University, Detroit, MI 48202 USA (email: critical.sociology@gmail.com)
⁷ Energy and Environmental Assistance Office, University of North Carolina Charlotte, EPIC 1150, Charlotte, NC 28223 USA (email: rguyer@uncc.edu)
⁸ Sustainability Office, University of North Carolina Charlotte, 9201 University City Boulevard, Charlotte, NC 28223 USA (email: ahjardin@uncc.edu; mlizotte@uncc.edu)
⁹ Northeast Ethics Education Partnership, Brown University, PO Box 1943, 135 Angell Street, Providence, RI 20017 USA (email: dianne_quigley_1@brown.edu)
¹⁰ Department of Business, Trinity Washington University, 125 Michigan Avenue, NE, Washington, DC 20017 USA (email: wattsdd@trinitydc.edu)
¹¹ Departments of Mechanical Engineering and Engineering and Public Policy, Carnegie Mellon University, Pittsburgh PA 15213 USA (email: kwhitefoot@cmu.edu)

Authors’ Personal Statement:

The Integrated Network for Social Sustainability (INSS) is a research-coordination network supported by the National Science Foundation that is currently in its third year of activities. Individual and institutional members, representing a wide range of fields and interests, are devoted to addressing social sustainability as an important, understudied issue under the broader rubric of sustainability and sustainable development. The INSS has developed a number of affinity groups and a set of activities to facilitate its development. An annual conference draws members together to review and report on their efforts. At the first conference, a group interested in developing a research agenda formed. This Community Essay shares its members’ perspectives about priorities for future research and education on social sustainability, highlighting efforts for greater inclusion of marginalized populations in research.

Background

The notion of “sustainability” includes environmental, economic, and social aspects. Social sustainability in particular is a quality of society that promotes enduring conditions for human welfare, especially for vulnerable persons or groups.¹ Much research on and planning for social sustainability goes by other names. For instance, work on issues of environmental or social justice, examining how the lives and status of susceptible or marginalized populations can be improved, is a research topic for the Integrated Network on Social Sustainability (INSS) (Boström, 2012). Research and innovation to overcome food insecurity is another example of a social justice issue. Scholars of food systems have also identified community innovations that meet requirements for sustainability, although these interventions have limited applicability given the needs and circumstances of human populations around the globe (Marsden, 2013; Hankins & Grasseni, 2014; Arora et al. 2015). Cities with transportation plans that facilitate the access of low-income groups to amenities, education, and jobs provide yet another example of attention to social-justice concerns (Fischer & Amekudzi, 2011).

¹ See https://clas-pages.uncc.edu/inss/what-is-social-sustainability for some definitions. Normativity in a definition does not preclude scientific status—consider “positive” economics and the model of the so-called “rational actor.”
For INSS, this work qualifies as social sustainability research, as does that from numerous social groups that approach the topic with different priorities based on the specific needs and concerns of their constituencies. A recent publication of the National Association for the Advancement of Colored People (NAACP) examines the need for socio-technical systems that are inclusive of vulnerable and marginalized people to achieve community resilience. The report develops a list of measures of vulnerability, adaptation, and resilience in the face of climate change. Patterson (2015) explains that on a local governmental level, “The aim is for city planners, community organizations, elected officials, and others to consider these equity-based indicators of resilience as they design adaptation plans.” Among businesses, corporate social responsibility is a rubric with which firms approach social sustainability. The NAACP and business organizations have developed various measures to evaluate whether projects meet social sustainability goals and how these initiatives achieve them.

The concerns of engineering organizations for sustainable development have influenced their attention to sustainability directives in their codes of practice. For example, in 1993 the American Society of Civil Engineers (ASCE) issued a policy on sustainability and then in 1996 amended its first Code of Ethics Canon to include sustainability as follows:

Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties.

The INSS focus on social aspects of sustainability includes a commitment to inclusion and diversity in research, education, and practice. Including a broad spectrum of disciplines and practitioners will require frameworks and methodologies that align diverse, practice-specific lexicons for social sustainability. Developing these approaches is a key challenge for social sustainability researchers if they are to coalesce into a coherent field.

**Engineering for Sustainability**

Engineers interested in sustainable development should be able to take social sustainability into account in their projects. However, their efforts are often frustrated by the imprecision of the concept, the differences in priorities of project stakeholders, and the lack of appropriate training. For instance, training pays little attention to the influence of engineering and technology on social systems or how those systems interrelate with other sustainability goals (Jones et al. 2015). Differences in priorities raise conflicts over project goals; again, engineers are poorly prepared to cope with such differences. Furthermore, they often lack training and experience to recognize that process rather than outcome measures may be needed to move projects in positive directions. This section highlights the need for engineers to engage with social sustainability through interdisciplinary research and practice.

Many colleges and universities have recognized the need to incorporate sustainability content in engineering education since the late 1980s. However, most of these efforts have been confined to departments of civil and environmental engineering instead of all engineering disciplines, with little systematic integration across institutions (Davidson & Heller, 2014). As professional engineering bodies have begun to emphasize the role of engineering in addressing twenty-first century challenges, engineering education has sought to raise the importance of sustainable development in curricula (Byrne et al. 2010).

Especially in developing communities, technical engineering solutions can fail to meet full design expectations because of inaccurate or incomplete assessment of the social aspects of a project rather than poor technical design. Not least for this reason, engineering training and practical engineering experience needs to include increased exposure to the complex relationships between the technical components and the social and economic circumstances that give rise to them.

Both individual and group behaviors have consequences that make a difference to engineering and policy-making outcomes. Besides problems from disregard for social behavior, failures may arise from

2 The INSS has created a bibliography of assessment tools that can be accessed at https://clas-pages.uncc.edu/inss-projects/wiki/projects/assessment-tools. INSS member Frazier Benya posted a blog on the site about assessment tools that do or can include social sustainability on the Network. It is available at https://clas-pages.uncc.edu/inss/blog/2013/10/04/measuring-social-sustainability.

3 ASCE Policy Statement 418 available at http://www.asce.org/issues-and-advocacy/public-policy/policy-statement-418—the-role-of-the-civil-engineer-in-sustainable-development/ and ASCE Code of Ethics at http://www.asce.org/code_of_ethics.

4 See, for example, http://cspo.org/research/adaptive-pathways-to-climate-change/for a demonstration of the need to incorporate local perspectives and priorities into project planning and implementation.
lack of flexibility as new information becomes available, or when there is no exit strategy for when problems arise. History has shown that many projects do not account for uncertainty in the planning process or the need to monitor and maintain performance, resulting in multiple unintended consequences. Engineering disasters, such as the Hyatt Regency bridge collapse and the Deepwater Horizon oil spill, are two spectacular examples. Considering the best ways to move from prototypes to real-world applications, and examining why previous projects failed, enhance chances of success. National assessments of infrastructure can help make the case for expanding the problem space in engineering to include social sustainability.

A more systemic case for emphasizing social sustainability in planning can be made by examining the Interstate highway system in the United States. Built in the 1960s, it contributed to expeditious movement of goods and ease of access throughout the country. However, the system also contributed to the decay of urban downtown areas, creating physical and psychological barriers between rich and poor neighborhoods. The highways also led to sprawling suburbs and limited options for walking, bicycling, and public transit. However, these problems should be put into the wider context in which redlining, restrictive and poor zoning, and discriminatory housing policies also contributed to socially adverse outcomes. More than fifty years later, Americans still struggle with these problems which hamper efforts across the country to move toward sustainable urban lifestyles (TRB, 1997, 2014).

Because of their behavioral and social aspects, only an integrated approach to engineering for sustainability can address the problems identified above. However, the challenges facing interdisciplinary and policy-relevant academic research also include complexities of funding structures, institutional requirements, and data integration. Some funding sources do not support broad participation—by social scientists, community members or non-academic practitioners—in research projects. Where such participation might be allowed, reward structures for faculty vary greatly within and among institutions and from one discipline to another, making it difficult to collaborate on research or teaching. Universities are often compartmentalized, and cooperation involving different colleges and departments, or with potential community partners, may be difficult to arrange.

Research centers and other institutions may be valuable resources on campuses or in cities, but their funding is often precarious, relying on short duration individual project grants from governmental bodies or foundations. Finally, differences in acceptable data, particularly between the social and natural sciences, can make effective collaboration difficult. Success may require a broader vision and specific means for showing the connections among various types of data. For example, understanding poverty requires both qualitative and quantitative data, and research that gives both big-data overviews and nuanced descriptions can be valuable for creating deeper perspectives. Without interdisciplinary and cross-institutional participation, as well as long-term support, these conditions are unlikely to be met.

The relevance of interdisciplinary efforts to resolve social problems is becoming more apparent to many policy makers, scientists, and engineers who are looking for ways to encourage research and education at the interfaces of different disciplines. For example, a recent issue of *Nature* devotes a special section to the range of challenges researchers face in developing successful interdisciplinary research and interventions (Brown et al. 2015). An article in this issue lists principles for interdisciplinary success, with the need for institutional support, as one of the keys (Brown et al. 2015). Another report issued last year by the publisher Elsevier (2015) examined the status of sustainability science globally and indicated that while the field is highly collaborative it lags somewhat on measures of interdisciplinary. The report indicates that an increasing portion—almost a third—of sustainability research in the United States involves international collaboration. Increasing interdisciplinary effort about sustainability may, then, deserve particular attention in the country. Engineering for sustainability requires broadening the problem space in both education and practice, with attention to the need for interdisciplinary as well as global collaboration.

**Research Needs Identified in the Literature**

Besides discussion of case studies and theoretical approaches to sustainability, we found several research strategies related to social sustainability in the literature. This work can be summarized as follows. First, a new model of prosperity must consider economic development in the context of respect for planetary boundaries and human equity (Bailey, 2011; Ramaswami et al. 2012; Raworth, 2012). In particular, human well-being and other expressions of social welfare over the long term should drive definitions of sustainability. Besides

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5 See ASCE http://www.infrastructurereportcard.org/grades which provides the backdrop for discussion of social sustainability and infrastructure needs for the United States.
recognizing the influence of technological trajectories and phenomena of globalization, the new model will also need to address interactions among science, engineering, and policy and the attachment that people have to ecological, aesthetic, and religious spaces such as waterways and wilderness (Mallik, 2014). Understanding how these spaces are perceived and used is critical to achieving sustainable outcomes from innovation and globalization. Case studies such as Mallik’s about river use in India provide a useful resource for identifying and testing certain principles of social sustainability, and cross-case analysis can be an instructive way to isolate generalizable factors, such as those concerning religious priorities that can promote, or alternatively undermine, aspects of social sustainability (Khan & VanWynsberghe, 2008).

Second, research on sustainable cities indicates the need for a framework involving attention to social, ecological, and infrastructure components, and their interactions. The phrase “sustainable development” can help define such a framework (Bourgeois, 2014). New educational paradigms must allow development and testing of a variety of approaches, including interdisciplinary and cross-cultural learning, and the consideration of distributional, procedural, professional, and cross-cultural ethics (Ramaswami et al. 2014).

Additionally, rebuilding and retrofiting American cities to become more sustainable requires integrating contributions from public and private organizations, including those from federal, state, and local governments. It also requires “connections across social-ecological systems and governance linkages...for successful management of connected systems” (NRC, 2013). DC Solar United Neighborhoods is an example of these connections working to provide solar power to low-income communities in Washington, DC.

Finally, the role of “science” in sustainability needs elucidation. One view conceives of sustainability as requiring communities at various levels to envision their future well-being and to draw from sustainability science to make such visions viable. In this regard, sustainability science and engineering should include the brokering or negotiation of knowledge and pathways to achieve change and enable development of capable social institutions (Miller et al. 2014; Schindler & Hilborn, 2015).

Next Steps for Research and Education

Members of the INSS Research Group have a variety of research interests. Many focus on work that addresses inclusivity or improving the status of less well-off members of society, and on developing perspectives focused on rebuilding infrastructure and undertaking other technical projects. Active members in the northwest, central, southwest, mid-Atlantic, and southern United States and the UK are undertaking research addressing local and global issues for social sustainability. The group has identified needs for interdisciplinary research and shared methodologies and for composite metrics to evaluate projects in terms of their social sustainability. Research is also needed on improved ways to address social sustainability in formal engineering curricula and in informal education, for instance regarding how organizations like Engineers Without Borders address social sustain-ability in their instructional activities and field projects. Attention is also needed regarding the treatment of social sustainability in textbooks for use in engineering classrooms.

We have identified several research questions and areas of exploration as high priority in social sustainability.

1. How can research help the many social welfare organizations in the United States to support social justice and improved conditions for the urban poor? Are results generalizable to social welfare activities outside the country—and vice versa?
2. How can long-term research on the impact of economic drivers on environmental sustainability be extended to explore how they can be harnessed to advance social sustainability?
3. What factors influence how professional organizations view or promote social sustainability? What incentives can encourage professional organizations to engage with their members in the pursuit of social sustainability?
4. What kinds of interdisciplinary research—for instance, research on sustainable cities or on human interaction with new technologies—address issues of social sustainability? How can this effort be strengthened?
5. Which kinds of social sustainability improvements are likely to occur “from the ground up,” on a case-by-case basis, and which can occur from the top down? How can the phenomenon of “citizen science” play a role in improving communication between elites and ordinary citizens?
6. How can developments in our understanding of social movements, human nature and psychology, persuasion and marketing, and the drivers of business enterprises, inform social sustainability innovation and progress? Can social norms evolve to promote socially sustainable systems?
7. Given that it is difficult for individuals to learn about the intimate relationship between their well-being and the state of the planet’s ecosystems, can we identify the attitudes and behaviors necessary to accelerate progress toward socially sustainable systems? What learning and persuasion principles work and are appropriate for attitude and behavior change?

8. Do criteria for social sustainability vary across regions and areas, given social, economic, and political differences? What kinds of conversations need to occur between those living in wealthy regions and those living in poor regions to move toward social sustainability in both?

9. What educational courses, workshops, and materials provide high-quality introductions to social sustainability?

10. What examples of successful courses in science and engineering address social sustainability? What can be done to enhance the adoption of social sustainability material in appropriate courses?

Summary and Conclusion

Of the three components of sustainability, social sustainability is the least studied. Established to make progress in this domain, the INSS Research Group is exploring current knowledge as well as critical questions that merit research priority. Historical lessons from less-than-optimal, or even satisfactory, outcomes demonstrate well the need to consider social sustainability in major public infrastructure projects and complex technological systems. Achieving sustainability will require interdisciplinary studies in which technical personnel and social scientists work together. Long-term research is critically important on issues like ensuring fairness during the redesign of cities and striving for inclusion in access to information on critical social equity issues, particularly those related to the natural environment. Also needed is research on effective and responsible ways to achieve individual and institutional change in coming periods of climate, ecosystem, and societal transition.

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