

Programme ESJP 2010

Programme at a glance

Wednesday

11am-noon Registration outside the Tavern room at the RSA

12-1 Engineering, social justice and peace: the basics and the beginnings (workshop)

1-2 Access to Engineering Education (panel)

2-3 Engineering Education 1: Critical lenses, thinking and reflection (panel)

3-3.30 Break

3.30-4.30 The Earth as Communion of Subjects (workshop)

4.30-5.30 Towards a critical praxis of engineering, social justice and peace (workshop)

5.30-6.00 Garden discussion

6.00-7.00 Transformative social justice workshops for engineering educators (workshop)

7.00 Dinner accompanied by Pete Christie, singer songwriter

Thursday

9.30-10.30 Service learning: in the service of social justice? (panel)

10.30-11.00 Break

11.00-12.00 Engineering Education 2: Sustainability and social responsibility: Assessing engineering students' consideration of context (workshop)

12-00-1.00 Lunch

1.00-2.00 Reconceptualising engineers and engineering practice (panel)

2-3 Visualising our future (workshop)

3-3.30 Tea and garden discussion

3.30-5.30 Approaches to an engineering practice which is socially just (panel)

6-8.30 RSA Fellows networking event with special guest Phil Ball

Friday

9-10 Dealing with racism (workshop)

10-11 A historical reflection of engineering practice in the lens of social justice (panel)

11-11.30 Coffee and garden discussion

11.30-12.30 Moving into the Cosmos (workshop)

12.30-1 Summing up

Overview of sessions

Wednesday

Session Engineering, social justice and peace: the basics and the beginnings

Format: Workshop (noon-1pm)

Name: Caroline Baillie and Jane Pritchard

Affiliation: University of Western Australia and London School of Economics, UK

Session Access to engineering education

Format: Panel discussion (1-2pm), chair Katy Haralampides

1. Name: Matthew Harrison

Affiliation: The Royal Academy of Engineering, UK

Title: Tackling under-representation in engineering

2. Name: Lisa McLoughlin

Affiliation: Greenfield Community College, US

Title: "I thought engineering was building stuff..."

Session Engineering Education 1: Critical lenses, Critical thinking and Critical reflection

Format: Panel discussion (2-3pm), chair Dean Nieuwma

1. Name: Jon A. Leydens

Affiliation: Colorado School of Mines, US

Title: A View of Engineering and Social Justice through Two Theoretical Lenses: Structural-Functional and Social-Conflict Perspectives

2. Name: Jens Kabo

Affiliation: Queen's University, Canada [formerly]

Title: Seeing Through the Lens of Social Justice: Seeing Through the Eyes of Other Students

3. Name: Nora Siewiorek, Larry J. Shuman and Mary Besterfield-Sacre

Affiliation: University of Pittsburgh

Title: Title: Reflection as a means to introduce engineering students to ethics and social justice concepts

Session Earth as Communion of Subjects

Format: Workshop (3.30-4.30pm)

Name: George Catalano

Affiliation: Binghamton University

Session Toward a Critical Praxis for Engineering, Social Justice, and Peace

Format: Workshop (4.30-5.30pm)

Name: Donna Riley and Katy Haralampides

Affiliation: Smith College, US and University of New Brunswick, Canada

Session Transformative social justice workshops for engineering educators

Format: Workshop (6-7pm)

Name: Jon A. Leydens, Juan Lucena, and Jen Schneider

Affiliation: Colorado School of Mines, US

Dinner accompanied by Pete Christie, singer songwriter

7pm-

Thursday

Session Service Learning: in the service of social justice?

Format: Panel discussion (9.30-10.30am), chair Caroline Baillie

1. Name: Dean Nieuwma

Affiliation: Rensselaer Polytechnic, US

Title: Public Participation in Engineering Design Practice

2. Name: Craig Titus and Carla Zoltowski

Affiliation: Purdue University, US

Title: Toward the Socially Just Engineer: Ethics Pedagogy and the Problems of Service-Learning Engineering

3. Name: Richard Arias, Astrid Bejarano, Maria C. Ramirez, Juan C. Silva, Andres Valderrama

Affiliation: Ingenieros Sin Fronteras, Colombia

Title: The Engineering and the Social in EWB

4. Name: Lizzie Brown

Affiliation: Engineers Without Borders Australia

Title: Elements of The EWB Challenge and The EWB Journey

Session Engineering Education 2: Sustainability and social responsibility: Assessing engineering students' consideration of context

Format: Workshop (11am-noon)

Name: Cynthia J. Atman, Deborah Kilgore, and Ken Yasuhara

Affiliation: Center for Engineering Learning & Teaching University of Washington, US

Session Re-conceptualising engineers and engineering practice

Format: Panel discussion (1-2pm), chair Jane Pritchard

1. Name: Usman Mushtaq and Amir Hossein Nosrat

Affiliation: Queen's University, Canada

Title: Engineers as Ethical Artisans

2. Name: Doug Foster

Affiliation: University of Surrey, UK

Title: Socially Useful Production and Beyond as an Answer to a Question Concerning Technology

3. Name: Usman Mushtaq

Affiliation: Queen's University, Canada

Title: Anti-oppressive engineering

Session Visualising our Future

Format: Workshop (2-3pm)

Name: Chris Rose

Affiliation: Rhode Island School of Design, US

Session Approaches to an engineering practice which is socially just

Format: Panel discussion followed by action planning (3.30-5-30pm), chair Donna Riley

1. Name: Sue Cavill

Affiliation: Engineers Against Poverty

Title: Toilets and sanitation

2. Name: Darko Matovic

Affiliation: Queens University

Title: Composites plastics production by locally made machines: a hotpress challenge

3. Name: Ebou Faye Njie and Andrew Fox

Affiliation: Concern Universal/University of Plymouth

Title: Promoting social equity for disabled people in Gambia

4. Name: Jaime Arturo Bastidas Legarda

Affiliation: Universidad de los Andes

Title: "The creation of a National System of Attendance the Victims of Organized Armed Groups operating Outside the Law"

RSA Fellows networking event with special guest Phil Ball

Format: Networking event with special guest (6-8.30pm)

Speaker: Phil Ball

Title: "Gain or white noise? Exploring the ethics of applied sciences in contemporary fiction"

Friday

Session: Dealing with Racism

Format: Workshop (9-10am)

Name: Usman Mushtaq

Affiliation: Queen's University, Canada

Session A historical reflection of engineering practice in the lens of social justice

Format: Panel discussion (10-11am), chair George Catalano

1. Name: Jen Schneider

Affiliation: Colorado School of Mines, US

Title: Blood, Energy, Justice: Engineering, Energy Extraction, and Social Justice

2. Name: Juan Lucena

Affiliation: Colorado School of Mines

Title: Engineers and Social Justice in the Progressive Era (1870 – 1930)

Session Moving into the Cosmos

Format: Workshop (11.30am-12.30pm)

Name: Caroline Baillie and Jane Pritchard

Affiliation: University of Western Australia and London School of Economics

Compilation of abstracts

Wednesday

Session Engineering, social justice and peace: the basics and the beginnings

Format: Workshop

Name: Caroline Baillie and Jane Pritchard

Affiliation: University of Western Australia and London School of Economics, UK

In this session we will welcome newcomers, run through the history of our organization and share where we have got to with our thinking. This session was requested in previous years to help newcomers get up to speed with others in the community. It will be a round table discussion and old timers as well as newcomers will be invited to share their views, questions and hopes for the conference.

Session Access to engineering education

Format: Panel discussion

1. Name: Matthew Harrison

Affiliation: The Royal Academy of Engineering, UK

Title: Tackling under-representation in engineering

In the UK there is renewed interest in improving social mobility amongst those in the lower half of the socio-economic scale. The UK Government has looked to the professions, including engineering, to lead on this work. Whilst engineering has a good reputation for creating many routes into the profession (higher education, further education and vocational routes) it has not made as much progress on recruiting from under-represented groups: women and those from lower socio-economic groups in particular. However, there are evaluated initiatives underway which suggest some potential solutions to under-representation in engineering. These are reviewed and in the context of what is known about how people choose their careers and the subjects they study along the way.

2. Name: Lisa McLoughlin

Affiliation: Greenfield Community College, US

Title: "I thought engineering was building stuff..."

Ideally engineering design involves a combination of abstract and practical skills, but as currently taught in the United States, it involves much more academic abstraction than practical ability. My research explores the relationship between these two areas of expertise, their relative emphasis in the undergraduate engineering curriculum, and their instantiation within engineering student identity.

Engineering students who enter the field through community college pathways evince a different balance between academic and practical skills than traditional four-year school students. They have often attended vocational or deficient college-preparatory high schools, or have worked in the trades before returning to school as nontraditional students. This leaves community college students with more academic deficiencies at the start of their engineering education than traditional 4-year college students, but also with strengths in practical technical competencies.

Community colleges offer these students, who are generally from under-privileged socioeconomic classes, a way into the engineering education pathway, but little research has been done on their experiences in engineering programs. Experiences detailed during this discussion will offer some beginning insights into how these students are challenged by engineering in a design-based introductory class, and what strengths they bring to the processes of problem solving and design, along with suggestions for recruiting, retaining, and transferring students to and from the community college into 4-year engineering programs.

Session Engineering Education 1: Critical lenses, Critical thinking and Critical reflection

Format: Panel discussion

1. Name: Jon A. Leydens

Affiliation: Colorado School of Mines, US

Title: A View of Engineering and Social Justice through Two Theoretical Lenses: Structural-Functional and Social-Conflict Perspectives

Multiple tensions exist between engineering and social justice (SJ) as fields of practice. One tension involves engineering professionals viewing SJ with both aversion and attraction: seeing SJ as both a potential threat to and as a promising part of the broader field of engineering practice. To better understand and characterize this tension, as well as to understand opportunities and challenges for linking engineering and SJ in general, I conducted rhetorical analyses of select engineering and SJ texts. After initial readings of texts such as *The Engineer of 2020*, the emergent goal involved situating influential engineering education organizational statements that relate to SJ as well as prominent SJ statements within relevant theoretical perspectives. From this process, two prominent sociological perspectives surfaced: the structural-functional and the social-conflict. While the structural-functional perspective envisions society as a system composed of interrelated and interdependent parts that help maintain social order, the social-conflict perspective views society in terms of inequalities that lead to social change. Viewing such statements through these two theoretical lenses raises important questions that this study will address. What can we learn about the root causes of the aforementioned tension? What can we learn about the challenges and opportunities of integrating social justice activities or dialogues in engineering education contexts?

2. Name: Jens Kabo

Affiliation: Queen's University, Canada [formerly]

Title: Seeing Through the Lens of Social Justice: Seeing Through the Eyes of Other Students

In my doctoral work it was recognised that problem solving is a central activity to engineering. However, it was also recognised that the conditions for doing engineering are changing, especially in light of pressing issues of poverty and environmental sustainability that humanity currently faces, and as a consequence, engineering education needs to emphasise *problem definition* to a greater extent. One mechanism for achieving this, which has been adopted by some engineering educators in recent years, is through courses that explicitly relate engineering to social justice. However, creating this relationship requires critical interdisciplinary thinking that is alien to most engineering students. In my dissertation it was suggested that for engineering students, and more generally, engineers, looking at their practice and profession through a social justice lens might be seen as a *threshold* that needs to be crossed. By studying the variation present among students in three different courses at three different North American universities, the intention was to understand how students approach and internalise social justice as a perspective on engineering and/or develop their abilities to think critically.

In a previous publication (Kabo & Baillie, 2009a), my co-author and I suggested drawing on the outcome of that study as an exercise intended to help students move across the proposed social justice threshold. A version of that exercise was implemented in the 2009 iteration of the course *Engineering and Social Justice*, created and taught by Caroline Baillie and Richard Day at Queen's University. The exercise has also been used by Caroline Baillie in a similar course at the University of Western Australia. The main idea was at an early stage of the course the instructors would expand the students' understanding of social justice by having them see it through the eyes of other students. This was done by having them work in their project groups and read through a selection of quotes about social justice from the interviews with the previous year's students. The rationale, drawing on the variation theory of learning (Marton & Tsui, 2004) was to expose the students to variation in how social justice is understood by someone in a similar context as the students themselves and because this would help students know what the critical aspects are which in turn would help them develop a more complex understanding of social justice. In this presentation reflections on this approach will be discussed.

3. Name: Nora Siewiorek, Larry J. Shuman and Mary Besterfield-Sacre

Affiliation: University of Pittsburgh

Title: Title: Reflection as a means to introduce engineering students to ethics and social justice concepts

Model Eliciting Activities (MEAs) are a methodology for bringing realistic and open-ended client driven problems to students, as well as introducing broader skills and concepts as described in ABET criteria 3, including ethics and engineering in a global context. Student teams provide written solutions that are both specific and generalizeable, which helps improve problem solving skills. MEAs were used in two engineering courses, and after each activity students completed a reflection exercise. Using Kabo's and Baillie's threshold approach for social justice concepts, a series of reflection responses were analyzed for individual evolution and progress in thinking about ethics and societal impact issues represented in the MEAs. There seems to be a relationship between the quality of response between modelling skills and social awareness, as engineering students learn to think "beyond themselves". MEAs and reflection tool exercises can easily be incorporated into any engineering classroom to introduce, integrate or reinforce both engineering concepts and professional skills.

Session The Earth as Communion of Subjects

Format: Workshop

Name: George Catalano

Affiliation: Binghamton University

Can we look to the Earth for hope and inspiration as we wrestle with the issues that face us in engineering moving forward into the 21st century? I think we can. The fundamental principles which guide the unfolding of the Earth are differentiation, subjectivity and communion. These principles can serve equally as markers for us in our efforts to redefine the role of engineering with respect to powerless, and the voiceless-- those whose hopes and aspirations are far too easily ignored.

Session Toward a Critical Praxis for Engineering, Social Justice, and Peace

Format: Workshop

Name: Donna Riley and Katy Haralampides

Affiliation: Smith College, US and University of New Brunswick, Canada

How can a small, loosely organized, widely distributed group take action on engineering, social justice and peace? This interactive workshop will draw on the expertise within our community to share collective and individual strategies for action, and plan future actions that might connect us more strongly with existing social justice movements while making visible our concerns at the intersection of engineering and social justice. We will explore collective and individual participation in actions organized by other groups whose aims we support as well as actions or work trips we might undertake as ESJP. We will develop mechanisms for mutual support for struggles with which we engage individually in our local settings in academe, government, industry, or other locales, and brainstorm avenues for amplifying these efforts.

Session Transformative social justice workshops for engineering educators

Format: Workshop

Name: Jon A. Leydens, Juan Lucena, and Jen Schneider

Affiliation: Colorado School of Mines, US

This hour-long workshop is designed to engage participants in resolving a complex problem: how do we encourage engineering faculty to *understand, value, enact and perform* social justice within the contexts of their courses and curricula? If social justice is to be more than an intellectual construct, it needs to be put into action or practice inside the engineering curriculum. But how?

Unlike workshops wherein the presenters come with a set of stock responses, we would like to describe our institutional context and then ask participants to brainstorm ideas for our—and their own—contexts. In short, this is a workshop about how to design a social justice workshop for engineering faculty. Resting underneath the larger question of creating *performative social justice workshops* are important questions of engagement:

- In a safe and nonthreatening manner, how do we enable engineering faculty to become aware of their own privileged status?
- How do we foster experiences of empathy for others whose perspectives have typically been marginalized from mainstream society, including engineering education? And how do we help such faculty see how engineered products and services can liberate or oppress—from the perspective of marginalized others?
- How can we foster richer understandings of what precludes or promotes the realization and enactment of our own whole, multi-dimensional selves, as well as the selves of our students, colleagues, and others in engineering education?
- What are best practices for enabling engineering faculty to more fully recognize the interconnected nature of the technical and nontechnical in engineering and actually teach it in their own courses?
- What incentives can we provide to faculty for incorporating critical pedagogy or other social justice micro- or macro-interventions in their technical courses?
- How might we best showcase social justice interventions currently occurring in the engineering curriculum? (e.g., those of Caroline Baillie, George Catalano, Donna Riley, etc.).

We hope one outcome of this workshop will be to better understand social justice dimensions, implicit and otherwise, that exist in engineering work, curricula, and professional identities. But more practically, we hope to develop characteristics of transformative social justice workshops that each participant can then adapt and use to create such workshops in their own contexts. Such workshops would be designed to

encourage faculty to incorporate social justice dimensions more explicitly in their own course work—that is, to create social justice across the engineering curriculum.

Such transformative workshops are full of promise and peril. The potential benefits and risks engineering faculty run by being involved in such workshops are significant. The ethical dimensions of such work are currently only at a conceptual level but need to be better characterized. Please come join us as we explore together how to create a transformative social justice workshop for engineering faculty.

Evening entertainment by Pete Christie

From Pete's website: <http://www.petechristie.co.uk/>:

Pete Christie is a powerfully melodic and intelligent, lyrically diverse and thought-provoking singer-songwriter, and an extremely accomplished and versatile acoustic guitarist.

From his first professional group, The Skavengers, a dynamic 3-piece ska/rock outfit that began life in 1979, through to his stunning and critically acclaimed new album Frank – probably the epitome of his current solo acoustic work, Pete has proved to be a consummate songwriter, singer, performer, and entertainer.

These days, Pete is quoted as saying, “I limit “pub gigs” to the ones that have a reputation for promoting quality music, and concentrate on the venues that suit my songs; where the audience are there to actually listen, without me having to beat them into submission!! I do tend to be a bit picky in that respect. I've done more than my fair share of the “spit and sawdust” places, all good experience and I learned a lot of stagecraft from it – a great apprenticeship.

I've now moved on to bigger venues and festivals – Although I've supported a diverse array of acts such as Nick Harper, Jeff Lang, Glenn Tillbrook, Ezio, Ruby Turner, Derrin Nauendorf, Hugh Cornwell, Bob Brozman, Martin Harley, etc. etc... I quite enjoy being “under the radar” (great expression).

I get a massive amount of fun walking on stage for the first time at a new venue knowing that not everyone is aware of what I do. And then watching their reaction!! That's all part of the fun of touring and being an itinerant balladeer! It's what keeps me on the road – it always has!”

Pete's latest newsletter:

<http://us1.campaign-archive.com/?u=861231917d1d0ba62e31cd9d1&id=71b30783e6&e>

Thursday

Session Service Learning: in the service of social justice?

Format: Panel discussion

1. Name: Dean Nieuwma

Affiliation: Rensselaer Polytechnic, US

Title: Public Participation in Engineering Design Practice

This paper categorizes and analyzes different approaches to public participation in engineering design practice and applies insights gained to potential classroom applications. The different approaches are identified based on review of relevant literatures and empirical case material. The literature review includes relevant works primarily from the fields of development engineering, engineering education, and science and technology studies (STS). In STS, scholarship on public participation in expert decision making is well established, but more attention is paid to challenges of citizen participation in matters of science than in matters of technology making. In engineering education and development engineering literatures, particularly those dealing with design in context, community/user participation is often included as part of the narrative but is not always systematically addressed and is rarely opened to theoretical analysis. And rarely is participation of stakeholders beyond the immediately targeted user-group considered. The empirical case data for this analysis is derived mostly from appropriate technology design projects in developing countries, including both service learning projects and those sponsored by professional development workers. By drawing connections across these literatures and the case material, the paper provides a spectrum of “modes of participation” and identifies the major conceptual and pragmatic challenges to each. It then considers potential classroom applications of these modes of participation, and connects them to reform efforts in engineering education—particularly in interdisciplinary engineering design education. Are engineering students being educated for the challenges confronting real-world design practice that effectively responds to—or even invites—public participation in their work? And if not, how can they be? These questions reverse the typical framing of “(public) technological literacy” problems and direct attention to the preparedness of (and strategies for) engineers to engage user groups and other members of the public in effective ways.

2. Name: Craig Titus and Carla Zoltowski

Affiliation: Purdue University, US

Title: Toward the Socially Just Engineer: Ethics Pedagogy and the Problems of Service-Learning Engineering

It is our belief that students participating in service-learning engineering design courses carry an increased responsibility to engage in sound moral reasoning, but our own empirical research has shown that students often lack the skills they need in order to do so. Engineering students often operate with extremely limited understandings of social justice, fairness, and properly inclusive design, and they often find it difficult to understand the wider social implications of how their work affects others outside of their own design team, such as the communities for which they design.

In the context of a large, multi-section, interdisciplinary service-learning design course—with students from nearly 40 different majors and all four grade levels—we have designed measures to integrate the instruction and assessment of moral decision making into the regular curriculum.

We have aimed at an effective intersection of philosophical and ethical grounding with technical engineering design. To this end we have so far created a large-scale lecture, small-group workshops, and an assessment instrument to measure moral decision making within this particular context. This paper will outline the research that initiated our development, and the philosophy motivating our pedagogical approach. Our short presentation will include data showing our effectiveness.

3. Name: Richard Arias, Astrid Bejarano, Maria C. Ramirez, Juan C. Silva, Andres Valderrama

Affiliation: Ingenieros Sin Fronteras, Colombia

Title: The Engineering and the Social in EWB

This paper analyzes the engineering and social aspects of the work carried out by EWB organisations. It criticizes approaches to intervention and technology implementation in vulnerable communities based on paternalist methodologies and states the benefits of adopting methodologies based on a “capacity building” approach to actively involve a community, promoting the use of local knowledge, avoiding dependency and strengthening the sustainability of the technological solutions. A focus based on a social aspect is adopted, one which takes into account environmental sustainability, economic performance and social justice and highlights the importance of considering the natural and social systems as well as the technical ones to develop coherent philosophies and practices. We present the experience of EWB-Colombia as a case study to discuss good and bad practices.

This case study allows for a further reflection on the various frontiers that consciously or unconsciously activists enact when conducting cooperation projects. These are:

- The financial frontier, when only the contribution of one side –the activists– is counted, often because it includes a support from a private firm or company.
- The epistemic frontier, when researches only take into account the activists version in order to build knowledge of the experience.
- The engineering school frontier, when these types of experiences are viewed by academic administrators as a diversion of teachers and students from “real” engineering training.
- The knowledge frontier, when the knowledge deployed and the one gathered during the process is considered non-scientific or sub-scientific.
- The credit frontier, when is only the activists who get into the airplane and into the pictures, and the community members don’t.

Most importantly, through this case analysis this paper discusses future developments in engineering knowledge and education based on field practices that truly pave the way to and engineering without borders.

4. Name: Lizzie Brown

Affiliation: Engineers Without Borders Australia

Title: Elements of The EWB Challenge and The EWB Journey

The EWB Challenge: Curriculum that Promote Socially Just Engineering in Australasia

The Engineers Without Borders Australia Challenge (EWB Challenge) is an Australasian design program for first-year university students. It is a unique Australasian example of a national-scale initiative focused on the development of graduate attributes related to the social, cross cultural and ethical responsibilities of engineers in a global context. The EWB Challenge was established by EWB in 2007 with support from Engineers Australia, The Australian Council of Engineering Deans and the Australasian Association for Engineering Education. Since then, the EWB Challenge has involved 18,000 students at thirty-one universities in Australia and New Zealand. A large proportion of the participating students are undertaking a Bachelor of Engineering degree. Each year, the EWB Challenge design brief invites students to develop conceptual designs for a new range of projects identified by EWB in conjunction with its community development program partners. Projects range from water supply and quality to sanitation, waste management, energy supply, transport, permaculture and infrastructure development.

This paper provides an overview of the development and implementation of EWB Challenge. In particular, it will demonstrate how a partnership between the non-profit sector, universities and engineering industry can be used to introduce and support curriculum which promotes socially just engineering.

The EWB Journey: Engaging the Australian Engineering Sector in Meaningful Volunteer Opportunities

Engineers Without Borders Australia (EWB) works both within Australia and abroad to improve the knowledge and physical resources of people in need through grassroots engineering programs. Our focus is on capacity building within communities, sharing technology and expertise to improve the livelihood of our community partners. We also aim to educate Australian engineering students, professionals and the wider community on issues of sustainable development, appropriate technology, poverty and the plight of disadvantaged people around the world. In Australia, our activities include workshops, lectures, fundraisers, discussion groups, seminars and a national conference.

This paper describes how EWB engages individuals and engineering companies in learning opportunities and projects with communities and complimentary development organisations to achieve environmentally sustainable, socially responsible and economically viable solutions. It will provide an overview of the EWB Journey starting with community service learning projects for university students and mentored volunteer placements for young professionals through to collaborative partnerships with engineering companies that are stimulating a pro-bono culture with the Australian engineering sector.

Session Engineering Education 2: Sustainability and social responsibility: Assessing engineering students' consideration of context

Format: Workshop

Name: Cynthia J. Atman, Deborah Kilgore, and Ken Yasuhara

Affiliation: Center for Engineering Learning & Teaching University of Washington, US

Today's engineering challenges are global in scope and consequence, and require a broad vision that includes not only application of technical and logistical knowledge, but also an understanding of the complexities, obstacles, and opportunities presented on the world stage. Natural environments, economies, cultures and sociopolitical structures, the needs and interests of individuals and communities, and other contextual factors all must be taken into account in designing for a better world.

The Center for Engineering Learning & Teaching at the University of Washington has been engaged in a long program of research and practice on considering context. We have examined how students consider context in engineering and have translated some findings into pedagogical approaches to curriculum and program development. Toward our overarching goal of helping students grow as engineers who are contextually aware and socially responsible, we are currently developing techniques to assess student learning with respect to sustainability and societal context.

We propose to conduct an interactive workshop in which participants engage in an assessment problem, discuss research findings about students who responded to the same problem, and provide concrete suggestions for evaluating contextual competence in engineering for a better, more just world in the years to come.

Session Re-conceptualising engineers and engineering practice

Format: Panel discussion

1. Name: Usman Mushtaq & Amir Hossein Nosrat

Affiliation: Queen's University, Canada

Title: Engineers as Ethical Artisans

Until the industrial revolution of Europe and the subsequent colonization of much of the world by post-industrial European countries, artisanship or the creation of a quality-focused and context-dependent product by a skilled creator was the norm of production. Creative control of the product by the artisan allowed them to treat their creation as a whole. Products created by an artisan were not only a piece of technology but an expression of the will, dreams, and contexts of the creator. Technology added to the culture of its creator as opposed to replacing it. This ethics of artisanship regulated the technology that was produced and the way in which it was produced. However with the coming of mechanization and industrialization, artisanship was replaced by a division of labour that shifted the role of human beings from creators to workers. Workers were no longer connected to their creations. These creations, in turn, were no longer an extension of their creators leading to the disruption of culture and human life. Similarly, engineers have often been more workers than artisans. This has led to many of the technology crisis we face today from climate change, to rampant high civilization, to the unintended consequences of technology. The value of the ethics of artisanship has been completely forgotten. This paper proposes that engineers should reapply the ethics of artisanship to their work. To that end, this paper first identifies the ethics of artisanship before arguing for the lack of this ethics in current engineering work. The value of applying such an ethics to engineering is then discussed. Finally, some potential examples of how engineers may apply the ethics of artisanship are illustrated in order to provide a clear way towards an ethics of artisanship in engineering.

2. Name: Doug Foster

Affiliation: University of Surrey, UK

Title: Socially Useful Production and Beyond as an Answer to a Question Concerning Technology

The moral philosopher Alasdair MacIntyre suggests that one of what he calls *characters* in 19th century Britain was the *Engineer* (MacIntyre, 1985, p. 28). This is not to be confused with the idea of leadership, at least in its narrower sense. Such characters, so conceived, are not only a psychological match for their social role in terms of their values, but are 'objects of regard' within their culture or at least an aspect of it. Yet the history of technological 'advance' has so often featured the development of systems and re-constructed materials of mass destruction either within naive values of neutrality (what Arendt, 1963, called the 'banality of evil' – e.g. engineers being entirely focused on a job, making the product as excellent for its purpose as possible – whilst unfortunately that purpose is as a Concentration Camp) or even blatantly belligerent ethics (more recent claims have suggested that many Nazi engineers, rather than 'banal were enthusiastic Jew eliminators and revellers in the destructive capacity of their work – Cesarani, 2005; Sennett, 2009 – exhibiting, perhaps, the 'creativity of evil'). This paper will explore whether Heidegger's questioning in respect of technology will help us re-think engineering practice (Heidegger, 1977), but also note that at times, and for some while, engineers own version of questioning as practitioners has attempted to re-invent technology towards social purpose (Collective Design/Projects, 1985). Such activity has the potential to challenge mainstream engineering with ever growing conviction. Following the recent development of the *Social Entrepreneur* (Leadbeater, 1997; Nicholls, 2008) then, the possibility of the *Social Engineer* as a character seems evident. This is not social engineering in the former sense of state and corporate bureaucrats manipulating from above, but those of a more libertarian philosophy on the ground. Further, the development of socially purposeful engineering and the Social Engineer may help create a counter-culture Gramsci (1971) that not only promotes new distinctly committed engineering firms, but that combats socially inconsiderate or destructive engineering.

3. Name: Usman Mushtaq

Affiliation: Queen's University, Canada

Title: Anti-oppressive engineering

While engineers and their funders have always claimed that technology has advanced the common good, more often than not engineers have been mercenaries for those at the core of knowledge and power: the rich, the powerful, and the well-connected. Engineers have designed technology that has marginalized certain types of knowledge, people, and culture in favour of those at the core. This has happened not only at the level of impact but also in the way technology is designed. Far from being a common good, engineered systems have advanced social and environmental inequity by being designed within exploitative social, political, and economic systems. In response to the negative impacts of engineered systems, the engineering profession through various professional bodies has committed to being much more socially and environmentally responsible. However, the discourse of responsibility adopted by the profession is narrow in scope as it does not recognize the context in which technology is designed, the methods through which it is designed, nor how technology may be used in oppressive systems such as neoliberal capitalism or settler nation-states. In addition, the responsibility is to minimize the damage caused by engineered systems as opposed to using technology to create more equitable power and knowledge relations. To counter this discourse, a framework of design is proposed, in which the technology produced by engineers not only minimizes damage but seeks to create more equity in our communities through valuing complexity, participation, anti-capitalism, contextualization/localization, culture, decentralization, and humility. This paper will explore this framework drawing from various sources such as anarchist theory, ecofeminism, and STS to propose a method of engineering, which values non-oppression both in process and as an end.

Session Visualising our Future

Format: Workshop

Name: Chris Rose

Affiliation: Rhode Island School of Design, US

Chris Rose is a furniture designer and senior lecturer in 3 d design. He has worked concurrently at the University of Brighton teaching visual thinking and design, as well as RISD, Providence for over 20 years. He was recently Graduate Dean at RISD. He is continuously crossing disciplines with his approaches to thinking and often works at the art/science border. Chris will create a workshop using visual thinking and knowledge building techniques to help us reflect on engineering and social justice.

Session Approaches to an engineering practice which is socially just

Format: Panel discussion followed by action planning

1. Name: Sue Cavill

Affiliation: Engineers Against Poverty

Title: Toilets and sanitation

Toilets are fundamental to a peaceful and just society. Ghandi said that sanitation is one of the important things which reformers must tackle, more so than independence. Yet in 2006 it was estimated that 2.5 billion people did not have basic sanitation. Why isn't there greater accountability to these people and faster progress to overcome such highly unequal access to sanitation? The panel will discuss:

- How toilets contribute to social justice and peace;
- The scale of the problem;
- Ways to achieve sanitation for all;
- The accountability of engineers, national governments and the international communities to the people they serve

2. Name: Jaime Arturo Bastidas Legarda

Affiliation: Universidad de los Andes

Title: "The creation of a National System of Attendance the Victims of Organized Armed Groups operating Outside the Law"

The Colombian conflict is the oldest conflict in Latin America and has caused more than 2 million internal displacements. The goal of the research was to determine the actual assistance that victims received and make a contribution to this assistance. This was possible using an Information System tool like Soft System Methodology. The key actors were members of: social organizations, institutions, political parties.

The proposal of this research is that the assistance of victims should be integrated into a national system victim of organized armed groups operating outside the law and two programs that could complement it. The first program would be an Integrated Care Center: this could offer victim care in cities with greater population densities. The Second would be an information system that would make access to all programs easier for victim's witch would be offered

3. Name: Darko Matovic

Affiliation: Queens University

Title: Composites plastics production by locally made machines: a hotpress challenge

Efforts to establish composite plastics production by local cooperatives are underway at several communities across the globe: in Argentina, Lesotho, Lebanon, India. The raw materials for such production are abundant everywhere: waste plastics and natural fibers (either recycled cardboard, paper, agricultural residues or other plant material, e.g. agave fibers). A common challenge in establishing sustainable production is in access to production machines. A key piece of equipment necessary for board-type products is a hotpress, capable of melting the composite under pressure, sufficient to bond plastics and fiber into a homogenized, mechanically resilient material. Such devices, commonly available in industrial facilities, are beyond the reach of the communities that subsist on waste recovery, the ones to benefit most from this value-added production. A Kingston hotpress, designed at Queen's University, seems to fill that need successfully. This high-performance piece of equipment can be made at almost any locality around the world that has access to common structural steel profiles (“C” channels, “I” beams, round and square tubings) and simple welding, drilling and cutting tools. It can be built at cost of \$1000 to \$2000. The challenges of designing a rigid structure capable of supplying up to 200 tonnes of pressing force over the 60x60 cm work area, yet operated manually, are discussed. Successful tests on the prototype at Queen's are followed by similar machines built in Buenos Aires (Argentina), Rhode Island (US), Maseru (Lesotho) and Perth (Australia).

4. Name: Ebou Faye Njie and Andrew Fox

Affiliation: Concern Universal/University of Plymouth

Title: Promoting social equity for disabled people in Gambia

The Gambia is one of the most densely populated countries in Africa and also one of the poorest. It has a largely rural society with much of its population engaged in subsistence farming. Within the country there is very little welfare or support for people with disabilities, but there has been notable improvements within the legal and institutional framework of the country in recent years. This paper will chart the progress made in promoting social equity for disabled people in Gambia and highlight some of the most significant barriers that still remain to be overcome. The paper also provides an analysis of the extent to which the engineering community in Gambia has been involved in the process of changing attitudes towards the disabled. It concludes by developing a set of guidelines that the engineering community could use to extend and enhance the achievements made to-date in promoting equity for the disabled population of Gambia.

RSA Fellows networking event with special guest Phil Ball

Format: Networking event with special guest

Speaker: Phil Ball

Title: "Gain or white noise? Exploring the ethics of applied sciences in contemporary fiction"

Phil Ball, award winning Science writer and freelance journalist and editor for Nature magazine will present "*Gain or white noise? Exploring the ethics of applied sciences in contemporary fiction*".

Contemporary literary novels rarely examine the impact of industrial engineering on our lives. But two works that do so - Richard Powers' *Gain* and Don DeLillo's *White Noise*, both of which consider the effects of industrial chemistry - reveal that the ethical and societal issues raised by applied science can potentially be handled with more subtlety and sophistication than is usual in journalistic treatments. I will look at how these two books do that, and will lead a discussion of other examples - please be prepared to nominate your favourites!

More details on Phil Ball and his latest publications can be found at:
<http://www.philipball.co.uk/>

Friday

Session: Dealing with Racism

Format: Workshop

Name: Usman Mushtaq

Affiliation: Queen's University, Canada

As professionals, educators, students, academics, and human beings dedicated to justice in our communities, we must be aware of our role in structures of privilege and domination. Only through this awareness can we meaningfully move forward in confronting oppression in our communities to create spaces where oppressive structures are exposed and deconstructed. The goal of this workshop will be to make participants aware of the importance of the three Ps (power, privilege, and positionality) in creating anti-oppressive spaces. This workshop will be a place for confronting issues of privilege, identity and accountability; developing and learning concrete strategies for ally work; and stepping towards the stronger communities we must maintain in order to create non-oppressive spaces around us. The goal of this workshop is not to impose the “guilt of privilege” but to show how we can only move towards justice in our communities by recognizing our own role in it.

Session A historical reflection of engineering practice in the lens of social justice

Format: Panel discussion

1. Name: Jen Schneider

Affiliation: Colorado School of Mines, US

Title: Blood, Energy, Justice: Engineering, Energy Extraction, and Social Justice

Focusing on a case study of a small former mining town in western Colorado in the United States, this presentation attempts to situate current geothermal exploration projects within the larger history of energy and resource extraction. The town, Rico, is home to only 250 year-round residents. It has no industry; some small-scale tourism; and no grocery store. Its public school recently reopened after being closed for decades, enrolling 18 students, which is considered by Rico's mayor to be evidence of a "baby boom." In terms of large-scale energy policy in the United States, Rico doesn't matter—its role in large-scale energy production and consumption is negligible. Yet there is an experiment occurring in Rico, involving energy extraction, community development, and social justice, which deserves our attention and which may hold lessons for engineers, scientists, community developers, and citizens interested in alternatives to the business-as-usual model of energy extraction. Using the recent films *There Will Be Blood* and *Gasland* as metaphors for historic and contemporary modes of extraction, this paper attempts to tell the story of a young, small geothermal development project in Rico, the engineers and scientists involved in the project, and the impact of the project on the residents of the town. We cannot generalize or extrapolate Rico's experiment to energy production on a large scale, yet what is happening in Rico must be placed within the larger context of energy politics, which is both the politics of progress and the politics of blood.

2. Name: Juan Lucena

Affiliation: Colorado School of Mines

Title: Engineers and Social Justice in the Progressive Era (1870 – 1930)

This paper situates different groups of engineers of the Progressive Era with respect to social justice issues of the time. First, it outlines how the rise of industrial capitalism brought the expansion of urban industrial centers, creating deteriorating conditions for immigrants, working children, and others involved in wage labor. Within this context, different groups of engineers responded differently to these social challenges. Inventor/engineers like Tesla and Sperry did not become active in social justice, showing that perhaps inventive autonomy was not a pre-condition to be involved in social justice. In contrast, another group of “self-made” engineers like Tom Johnson (1854-1911) and Jacob Sechler Coxey (1854-1951) became active in equal access to public transportation, unfair labor practices, and industrial hygiene. In federal and state governments, other engineers show a mixed history of activism in social justice, from unjust practices, like depriving flood victims from food rations unless they performed work as done by the US Army Corps of Engineers, to working for improving urban sanitary conditions. This analysis stands in contrast with historical accounts of engineering (such as Layton’s and Noble’s) that show how the autonomy of engineers was co-opted by the interests of corporations. The examples presented here will shed new light on how socio-political dimensions and actor’s perspective and agency come together to create the circumstances for activism of engineering in social justice.

Session Moving into the Cosmos

Format: Workshop

Name: Caroline Baillie and Jane Pritchard

Affiliation: University of Western Australia and London School of Economics

This will be an interactive workshop using creative thinking techniques to develop an ideal final result mapping for our community, drawing on the work of Deleuze and Guatarri and Jens Kabo's recent thesis. We will consider where we are and where we want to get to by creating our own liminal spaces. It will be a summing up of the conference as well as a future planning session and theorization of our current status.

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