Awareness and Role of Engineering towards sustainability

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FAC Engineering Fetzer Institute

Fetzer/IEEECASOutreach

Overview of the presentation

- IEEE CAS Outreach & IEEE Humanitarian Engin.
- Fetzer Institute
- Engineering ambitions for society NAE
- Activities reported on internet
- Ambitions and format of the workshop
- Take home messages

  (preliminary version to be augmented by YOU)

IEEE CAS Outreach

- Sponsors initiatives that benefit CASS and the circuits and systems community in general
- Outreach activities for pre-university students and teachers
- Promotional material for CASS or the field
- Workshops and Tutorial Schools on areas related to CASS field of interest

IEEE

IEEE Society on Social Implications of Technology

What is IEEE-SSIT?

IEEE-SSIT is an active, welcoming group deeply concerned with how technology impacts the world, and how the application of technology can improve the world. We have an illustrious history of identifying and examining technology's societal impacts.

Who belongs to SSIT?

For our size, we have an unusually high percentage of members who are present or past members of the IEEE Board of Directors. Of all IEEE technical societies we are perhaps the most interdisciplinary. Our membership spans the range of IEEE disciplines, and is for all those interested in the social impacts of technologists' work. See the list to the right for some examples of the wide spectrum of interests we represent.

What does SSIT do?

SSIT's activities and accomplishments are many, and include:

- The *IEEE Technology and Society Magazine*, an award-winning publication, with both peer-reviewed and general interest articles.
- An annual conference, the International Symposium on Technology and Society (ISTAS) and support and sponsorship of other conferences.
- Thriving and active SSIT Chapters worldwide.
- Substantial cooperation with other activities and groups concerned with the social impact of technology.
- Humanitarian engineering.
- Website: ***ieeessit.org*** and online community: ***ieeecommunities.org/ssit***.
- Support and recognition of engineering ethics, e.g., via the IEEE-SSIT Carl Barus Award for Outstanding Service in the Public Interest

SSIT focuses on a wide range of environmental, economic, political, and social impacts of technology, including:

- Climate change and environment
- International development and poverty alleviation
- Green technologies
- Sustainable design
- Reliable energy
- Privacy and security
- Emerging technologies
- Health and healthcare technologies and impact
- Technology, science and engineering public policy
- Women in technology
- Engineering and science education including K-12
- Ethics in engineering, science, and technology
- Public transportation
- Standards and regulations
- History of technology

Why do we need you?

SSIT's perspective is critical to IEEE and to society as a whole.

We invite you to join us, to participate in the Society and its activities, and to help us shape the impact of technology in the 21st century.

Join us! Visit http://ieeessit.org today and become a member of the IEEE Society on Social Implications of Technology!

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IEEE Society on Social Implications of Technology
IEEE Humanitarian Engineering conference, challenge, award

http://ieeessit.org

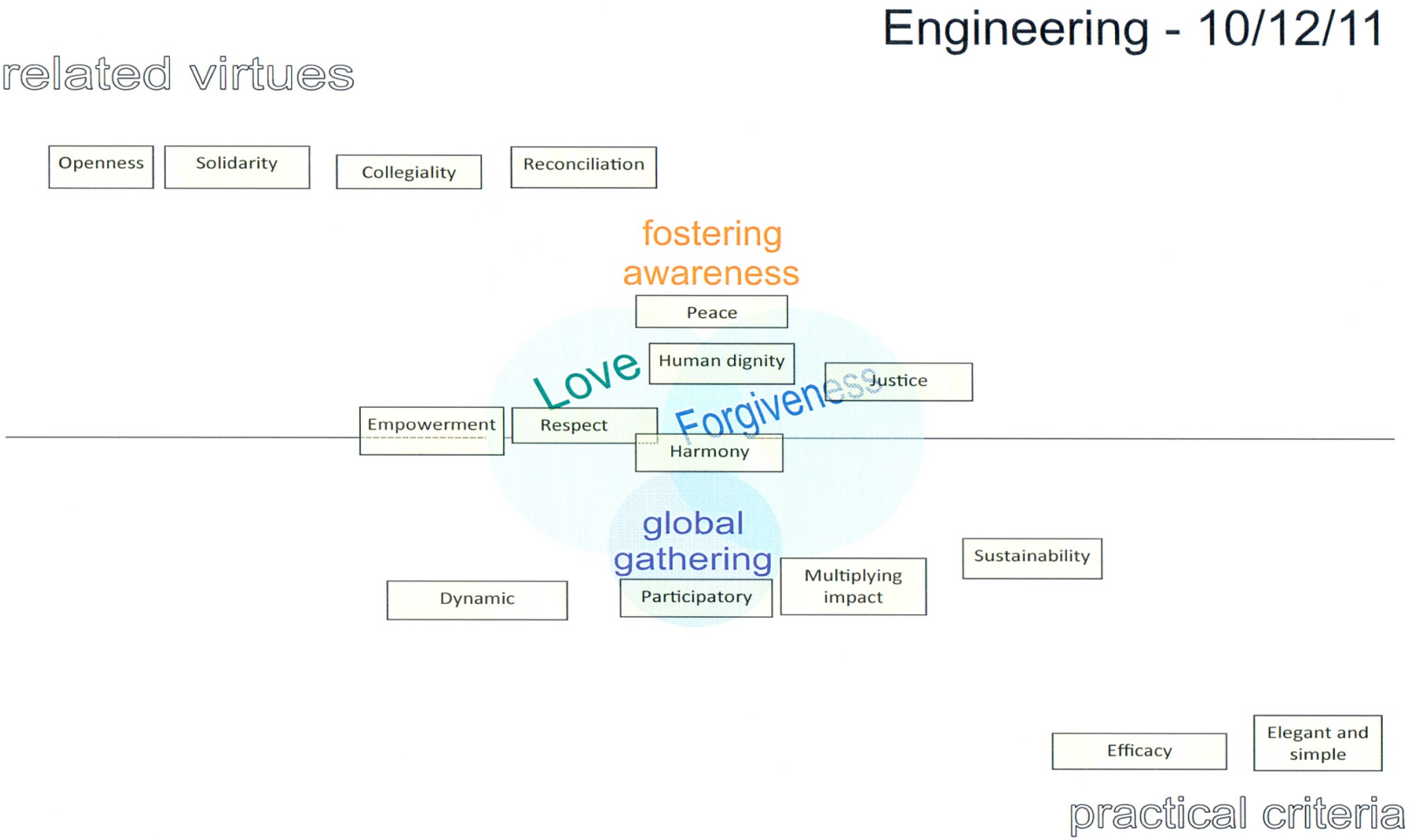
- SOCIAL IMPACT

Environment Case Study Public Policy Morality Policy Surveillance Privacy Conference Entertainment Future Economics Anonymity Potential Abuse Education Ethics Newsletter Society BoG Culture Disaster Best Practices Employee Considerations Events Health Perception Quality Of Life Innovation

- TECHNOLOGIES

Proximity Detection Telecomunications Food Technology 3-D Printing Big Data Smart Cities Face Recognition Online Classrooms Mobile Devices Security Vaccination Ssit BlueTooth Social Media Data Mining Automation Virtual Currency Software Engineering Cell Phones WiFi Internet Cyberwarfare Personalization Geo-Tagging AI Social Networks Cloud Computing Genetic Engineering Augmented Reality Proxemic Privacy Knowledge BioTech Geolocation Web Singularity Location Services Augmented Humanity Cameras Sensors Genome MOOCs Pervasive Computing Robotics Voice Recognition

Fetzer Institute FAC Engineering



Fetzer Institute FAC Engineering

- *We passionately believe that the field of engineering can play an important role in scaffolding, enabling, and supporting the world we inhabit through engineering activities and inventive tools that are rooted in love, forgiveness, and compassion.*
- Members :
  - Ayorkor Korsah
  - Daria Loi, Intel, Chair
  - David Munoz
  - Joos Vandewalle
  - Joseph Geary
  - Kannan M. Krishnan
  - Maciej Ogorzalek
  - Mary Beatrice Dias
  - Pamela Crane
  - Tamas Roska (+2014)
- Creating a sense of belonging through universal design--providing accessibility to as large a share of the global population as possible--is a central tenet of the work of the Fetzer Advisory Council on Engineering.
- Fetzer Advisory Council on Engineering is one of 16 councils seeking awareness of how love and forgiveness are essential to their sector.
- Project: Colinas de Suiza--Love As a Survival Tool
- Project: Universal Design an Expression of Love
- Project: Breadfruit--A Haitian Recipe for Self-Reliance
- Video: Accessing Love and Forgiveness
- Project: Community Service Engineering Programme at KU Leuven
- Project: ICT technologies for visually impaired at Pazmany University Budapest

FAC Engineering first dissemination activity: Participatory Design Conference Namibia 6-10 Oct 2014

- http://www.pdc2014.org
  Daria Loi Intel love and e-waste workshop at PDC14
- Goal "design within and for a multilayered network, such as the on-line world versus off-line interactions, the blurring distinction of designers and users, researchers and artists, design and research 'in the wild', designing for social justice, inclusiveness, and sustainability."
- extensive input reflections and idea during the event itself.
- two of the participants to amplify the impact by writing a reflective paper and by organizing a workshop with a "ewaste-processing community" in Ghana using as prompt the material generated at the workshop.
- results as well as the fantastic connections and new advocates we have created through the experience.

Where's Love in E-Waste?

- How can the notion of love help to explore and define participatory strategies for issues on e-waste.
- discovering how Participatory Design practice can offer ways of transforming people's relationships with e-waste from negative affective relationships into positive ones through engagement, co- creation, and group envisioning.
- focuses particularly on existent e-waste, accepting it as an (unfortunate) outcome of current production strategies in need of change.
- workshop goal to document multiple perspectives, methods, and examples of value-centered and participatory approaches that focus on looking at and utilizing e-waste as key ingredient to create positive transformation and/or outcomes.

  -Can participatory practice transform e-waste into a conduit for community reconciliation?

  -Can reflection on the materiality and aesthetics of e- waste trigger practices to ultimately benefit those directly impacted by e-waste?

  -Can e-waste become something positive if looked at differently via a participatory lens?

  -Can notions of love and participation help us engage e-waste differently, making beauty out of it despite its negative impact on landscapes and society?

  -What is the role of PD practitioners when e-waste is a direct by-product of design engagements?

loveinewaste.wordpress.com

Engineering ambitions for society National Academy of Engineering NAE

- 21 Century's Grand challenges for engineering
  - Make solar energy affordable
  - Provide energy from fusion
  - Develop carbon sequestration methods
  - Manage the nitrogen cycle
  - Provide access to clean water
  - Restore and improve urban infrastructure
  - Advance health informatics
  - Engineer better medicines
  - Reverse-engineer the brain
  - Prevent nuclear terror
  - Secure cyberspace
  - Enhance virtual reality
  - Advance personalized learning
  - Engineer the tools for scientific discovery
- How Engineers Can Make A World of Difference
- Videos on the 4 themes : sustainability, health, security, joy of living.
- Grand Challenges Scholars program stemmed from the NAE's curricular and extra-curricular program designed to prepare students to work on problems whose solutions could dramatically improve quality of life around the world. program employs a number of components, including: research experience, an interdisciplinary curriculum (referred to as Engineering +), entrepreneurship, a global dimension, and service learning.
- National Academy of Engineering (NAE) selects in 2011 14 students for graduating as NAE Grand Challenges Scholars
- 41 Grand Challenges Scholars have programs either operating or in development in the United States.

Internet info

- http://www.renewablerecyclers.org.au/home_ewaste.html
- http://discardstudies.com/2014/08/08/4761/

  Topic areas include, but are not limited to:
  - Social and environmental justice; Environmental & public health issues
  - Business models for managing e-waste; Economics and financial aspects of e-waste
  - Reverse logistics; e-waste supply chain issues
  - Transboundary e-waste flows
  - International e-waste governance; Multilateral environmental agreements
  - Legislation review, policy & regulatory approaches & tools; standards
  - Design for Re-use and Recycling (DfR) / Eco-design
  - Corporate social responsibility (CSR); Extended producer responsibility (EPR)
  - Consumer behaviour; consumer awareness campaign design and communication; marketing
  - E-waste recycling and recovery technology
  - Formal and informal recycling of e-waste;
  - Critical raw materials in e-waste
  - Modelling and forecasting methodologies

WHEN ALL THAT IS HIGH-TECH TURNS INTO WASTE

- http://eventful.com/events/all-hightech-turns-into-waste-researching-ewaste-seminar-/E0-001-065784467-6
- progress, innovation and technology strongly linked in our collective imaginaries about what desirable futures should be. Technological devices, particularly in ICT gadgets and systems, are seen as promising solutions for our everyday lives, social problems and public issues, such as education, healthcare, sustainability or public participation.
- global market of electrical and electronic equipment then, "has grown exponentially, while the lifespan of these products has become increasingly shorter" (Khurrum, Bhutta, Omar and Yang, 2011).
- progressive material fallout from these apparently immaterial and yet ubiquitous electronic technologies; focus on technological, social and health damages related with illegal exportation and inappropriate treatments of e-waste.
- e-waste is an entangled and controversial theme and a still emergent topic that deserves much more attention through interdisciplinary approaches, critical and empowering analysis, and inventive methods.
- scholars working on e-waste from different backgrounds, including human geography and anthropology, science and technology studies, sociology and environmental psychology, law and political economy, engineering and design, history and arts, among others, collectively debate about the limits and possibilities of our own conceptual and methodological tools for understanding and addressing e-waste.
- How do we interrogate and research e-waste, through fieldwork, analysis of technologies or study of waste flows?
- How is e-waste commodified, recycled, reused or repaired?
- What does e-waste explain to us about contemporary societies and material cultures?
- What inventive methods, practices and approaches might be developed to address e-waste that go beyond the usual waste management discourses?
- What does critical and ethical research mean in such a controversial issue?

Webpage Greenpeace

- What is E-Waste?

- amount of electronic products discarded globally has skyrocketed recently, with 20-50 million tons per year.
  =if estimated amount of e-waste of one year is put into containers on a train, it would go once around the world

- Electronic waste (e-waste) =five percent of all municipal solid waste worldwide=nearly same amount as all plastic packaging, but much more hazardous. Not only developed countries generate e-waste; Asia discards an estimated 12 million tons each year.

- E-waste is now the fastest growing component of the municipal solid waste stream because people are upgrading their mobile phones, computers, televisions, audio equipment and printers more frequently than ever before. Mobile phones and computers are causing the biggest problem because they are replaced most often.

- Did you know?
  - average lifespan of computers in developed countries dropped from six years in 1997 to just two years in 2005.
  - Mobile phones have a lifecycle of less than two years in developed countries.
  - 183 million computers were sold worldwide in 2004 - 11.6 percent more than in 2003.
  - 674 million mobile phones were sold worldwide in 2004 - 30 percent more than in 2003.
  - By 2010, there will be 716 million new computers in use. There will be 178 million new computer users in China, 80 million new users in India.

ROSE Relevance of Science Education

International comparative project 15 year old population March 2010

- Children in most countries agree strongly that science and technology are important for society
- Students in most countries see more benefits than harmful effects in science, but In Japan, the scepticism towards science is considerable
- Many young people, mainly girls, and also in rich countries, think that they can personally make a difference! More pessimism in some (English speaking) countries
- Many boys have a very strong belief that science and technology can solve nearly all kinds of problems, while girls are more skeptical (and realistic?)

The environment and sustainable development?

- Important for all, but mainly for girls
- Boys think problems are exaggerated and trust experts to sort out the problems
- Girls believe that each individual makes a difference
- Girls are willing to ‘pay the price’,

  Boys are reluctant
- Japanese youth are more concerned about the environment than in other modern societies

The ambitions of the workshop

- During last decade human life has become deeply linked and influenced by electronics-related technologies. This brings fantastic new applications for facilitating and improving our lives but unfortunately also includes extremely bad impacts on the environment, human health and social impacts. mainly end of their life cycle. Every year tons of computer boards, cell phones, casings, keyboards, tv sets and other electronic devices are disposed of. Many of these devices contain poisonous substances that are dumped in remote areas of Africa or Asia. Often children are employed to disassemble them, resulting in many negative humanitarian, labour, environmental issues associated with this "end of circuits and systems" lifecycle.
- Many organizations, companies and universities world-wide are undertaking efforts toward alleviating these issues.
- These efforts include, better utilization of resources, improvement of designs towards reuse of materials, and creating curricula for graduate studies directed to better educate a new generation of engineers aware of the above-mentioned problems and capable of bringing efficient new solutions.
- Our workshop will provide an overview of current problems and solutions offered in our domain of interest - circuits and systems technologies.
- What can we do as a circuits and systems engineering community to increase the awareness, and prepare actions and recommendations for different actors ?

PROGRAM SCHEDULE - CAS Outreach Workshop

Saturday, October 25, 2014 Room 5

- 8:15-8:30 **Opening of Workshop -** Maciej J. Ogorzalek
- 8:30-9:15 The Awareness and the Role of Engineering for Sustainability - Joos Vandewalle
- 9:15-10:00 Giving a New Life to End of Life Electronic Equipment in a Sustainable and Responsible Way - Egbert Lox
- 10:00-10:45 From Waste to Gold: Cradle to Cradle Material Recycling of Waste Electrical and Electronic Equipment - Joost Duflou
- 10:45-11:00 **COFFEE BREAK - Room 5**
- 11:00-11:45 Green IC Manufacturing -Marc Heyns
- 11:45-12:30 Need for Circuits and Systems for Future Electricity Power Distribution -Mario Paolone
- 12:30-2:00 **LUNCH - Room 5**
- 2:00-3:15 Panel Discussion - Maciej J. Ogorzalek
- 3:15-3:30 **Closing Remarks and Action Plan -** Joos Vandewalle

Take home messages

Outcome will be further augmented in a separate document

- Awareness: size of the problem, urgency, media involvement, ..
- Informing: who, which message ?
- Addressing attitudes and behaviour: who, what action ?..
- Educating and training: who, what, when ?
- Approaches: to deal with the problem..
- Did you learn something ? Positive ? Negative ?
- **Action Plan: positive actions !! We are collectively responsible for ewaste, but we as human beings are capable to handle I**
- **Three suggested actions:**
  - Fill out the form/questionnaire 1 page today
  - Write a reflective paper and/or organize a workshop
  - Participate/Contribute in the 2-day Fetzer conference
    "Engineering 4 Society" Leuven, Thursday 18-Friday 19 June 2015.