Engineering for the Developing World Summit
Report

MARCH 16–17, 2010
NATIONAL ACADEMY OF SCIENCES
WASHINGTON, DC

ASME
SETTING THE STANDARD

The ASME Engineering for the Developing World Summit was supported by a partnership between the Office of Breakthrough Innovation and the Strategic Issues Committee.

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Introduction

Engineering enables human progress. This is not hyperbole; by employing education, technology and experience to the challenges of energy, water, food production and healthcare, engineers have improved the lives of billions of people. ASME's vision and mission advances the goal of applying engineering knowledge to improve the quality of life with solutions that benefit humankind. An even greater challenge, however, lies ahead.

Although the industrialization and globalization of the 20th century has brought social and economic benefits to many, it has left behind a majority of the world's population. We stand at the beginning of the second decade of the 21st century with over half of the world's population in desperate poverty. One billion people lack access to dependable, safe drinking water; 2.4 billion lack adequate sanitation; and 1.2 billion do not have adequate housing. Half of the world's 2.2 billion children live in poverty, and more than 1 million die every year from diarrhea.

These shocking numbers represent a staggering challenge. How can the billions of people left behind have access to safe and sustainable engineering solutions that enable them to fulfill their potential as human beings? The challenge is an enormous opportunity for engineers to positively impact the future of the planet and its people. For engineering to continue to play a role in enabling human progress, it is this population that will require an increasing percentage of engineering talent and will demand the products and services offered by engineering solutions.

Recognizing that more and more of the work of engineers will shift to the developing world, ASME leadership began exploring how an engineering association could play a role in this vast undertaking. In the fall of 2008 ASME commissioned Engineering Solutions for the Base of the Pyramid, a scan that surveyed the challenges and opportunities in the Base of the Pyramid (BoP), a term used to describe the 4 billion people currently living on less than $4 a day (in terms of purchase power parity). The report identified a strong congruence between ASME's vision, mission and strategic priorities, and the engineering opportunities and needs in the BoP. Using the organization's assets and capabilities as a framework, the report suggested twelve potential ways ASME could participate in fostering engineering solutions for the BoP. This introductory scan and strategy document served its purpose of mapping the BoP landscape and the possibilities available to ASME.

For the organization to move forward, however, its volunteer and staff leadership needed a deeper understanding of the opportunities and best practices that exist in the BoP. The ASME Office of Breakthrough Innovation, in partnership with the Strategic Issues Committee, commissioned a BoP Project Team made up of staff and volunteers, to learn more deeply about the BoP and design a summit that brought external experts together with ASME to explore ways that the organization and the broader engineering community can better serve people and communities in the developing world. The project team partnered with AndSpace Inc. to help design the program and curate the speakers for the Summit. This report documents that summit, as well as the design decisions made by the project team and potential next steps.

"We have existed 130 years as an organization, so that we could be here now to respond to this challenge."

Tom Loughlin,
Executive Director, ASME

Summit Overview

On March 16-17, 2010 ASME held the Engineering for the Developing World Summit, a conference that brought 17 external experts together with over 40 ASME volunteers, staff, and invited guests. The purpose of the summit was to help the organization understand the needs and opportunities for engineering solutions in the developing world, and investigate the role that an engineering society could play in delivering engineering solutions with sustainable impact and scale.

ASME PROJECT TEAM

In October of 2009, ASME assembled a project team composed of volunteers and staff tasked with designing the summit. Over the next six months, the team educated themselves more deeply on the opportunities, needs, and organizations successfully serving those needs. They used this knowledge to define the focus of inquiry of the summit and its scope. As defined by the project team, the mission was:

"The Engineering for the Developing World Summit will focus on how ASME can create sustainable impact and scale in the geographic regions of Africa and Mexico/ Central America/Caribbean, and the Energy, Water, and Food/Agriculture sectors."

PROGRAM DESIGN

The summit focus dictated its design, with sessions on those geographic regions and technology sectors, followed by sessions exploring best practices in creating partnerships, business and financing models that enable sustainable impact and scale. The last session of the summit concentrated on how engineers can be engaged to participate in solutions.

The project team then identified and invited internationally renowned speakers for these sessions. A detailed summary of each speaker's presentation follows in the next section; the summit agenda and speaker profiles are available in the Appendix.

KEY INSIGHTS

While each speaker had unique and important viewpoints, common themes arose throughout the presentations and dialogue:

+ The developing world will be the source of significant engineering intensity and innovation over the next 20 years.
+ Engineering must play a vital role in improving the lives of people in the developing world.
+ Engineers, however, need to be aware of the social, political and cultural context in which these solutions must work.
+ Partnering with experienced organizations can decrease the time needed to understand the context of local issues and allow engineers to deliver appropriate solutions.
+ There is a need, whether formal or informal, for an objective third party to develop criteria/standards/ certification guidelines for engineering for global development products.
+ Engineering for the developing world is of great interest to many students and young engineers entering the field.

While university programs such as MIT's D-Lab and Stanford's D-School are successful, there are more students than spaces, and a shortage of academic career tracks in this field. There is concern about the need to retain talented people who might otherwise leave engineering to pursue other ways of making a difference.

NEXT STEPS

The ASME Project Team met immediately following the conclusion of the summit to identify potential opportunities for the organization to explore further. Towards that end, the team recommended that an Engineering for Global Development Team be established to work across all elements of the organization to develop and implement strategies to engage the organization in engineering solutions for the developing world.

Engineering For Global Development Strategic Roadmap ASME BoP Strategy Project Team

To further the organization's understanding of the engineering opportunities and challenges of the Base of the Pyramid (BoP), ASME created a BoP Project Team to design the Engineering for the Developing World Summit and make strategy recommendations to ASME leadership on next steps in engaging this market.

The Engineering for the Developing World Summit was held on March 16-17, 2010, and brought together 17 global BoP experts with ASME staff, volunteers, and invited guests. The ASME BoP Project Team then met immediately following its conclusion to develop a BoP strategy for the organization from the knowledge gained at the summit. For the strategy session itself, the project team agreed to the goal of developing a vision to guide ASME's efforts in the BoP, and develop 3-5 objectives based on that vision for the organization to move forward in a coordinated fashion.

RECOMMENDATIONS

The following strategy document reflects the work by the BoP Project Team, which included weekly conference calls to learn about BoP regions and needs, participation in the summit, and strategic dialogue held on March 17-18, 2010. The team agreed on the following elements of a BoP strategy that will serve as a jump-start to the Engineering for Global Development Team (EGDT) to be established to advance ASME's activities in engineering for the developing world.

Draft Vision

Empowering individuals and communities through engineering to improve lives.

Draft Mission

To advance the art and science of engineering for global development, create a call to action for engineers around the world, and foster collaboration between the engineering community and partners in the global development field.

STRATEGIC FRAMEWORK

The team identified four key strategic objectives:

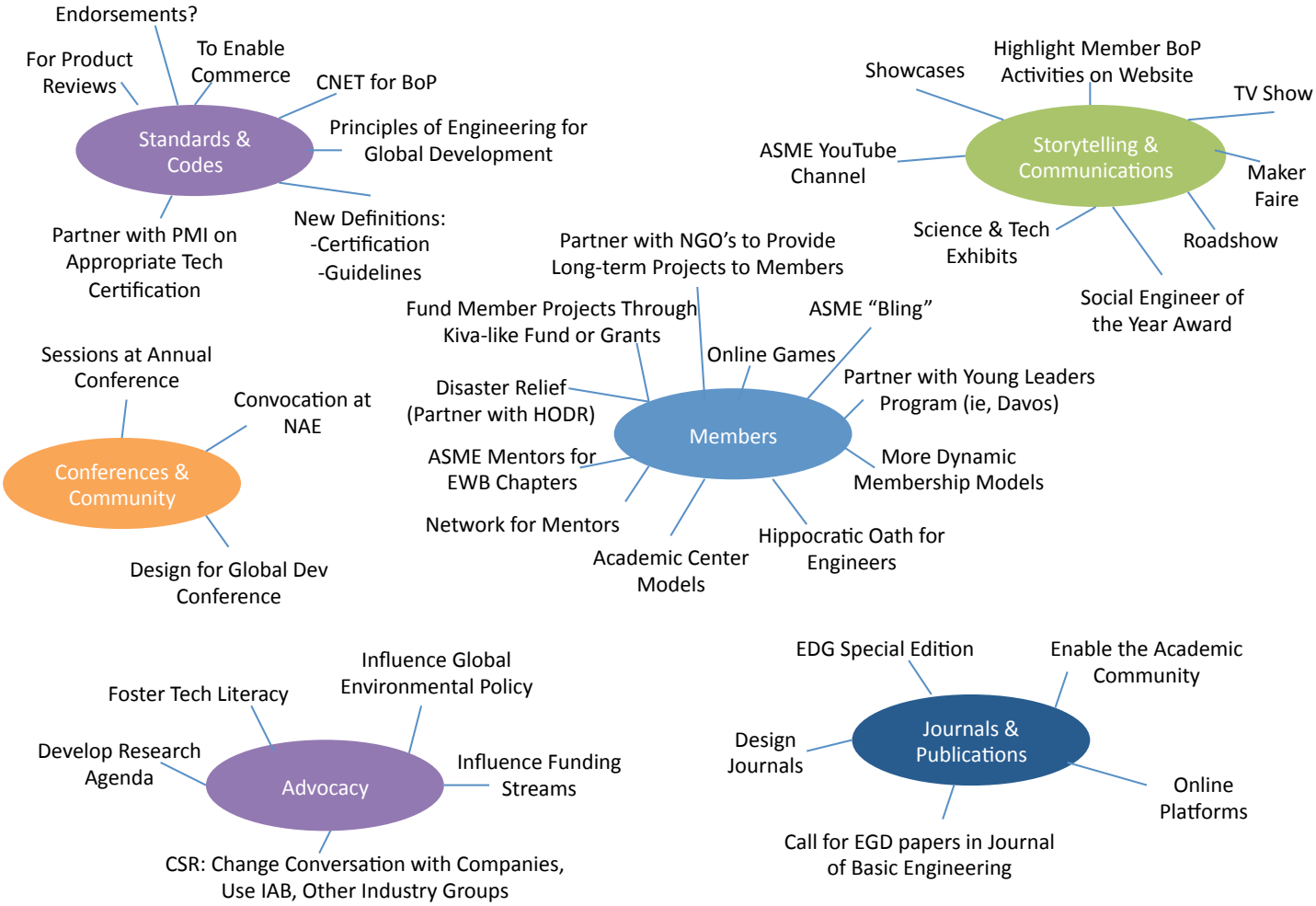
1. **Engage Individuals:** Offer activities such as on-the-ground projects, training, certification programs or business ventures that enable engineers at all stages of their careers, as well as social entrepreneurs and people in developing countries, to participate in engineering solutions.
2. **Build Community:** Create platforms, programs, and events that nurture a broad community of engineers, partners, and local residents to develop a large pool of resources for engineering solutions for the developing world.
3. **Build Content:** Develop a base of engineering knowledge and solutions to energy, water, and food/agricultural production and eventually standards or certifications that will foster appropriate and sustainable technology solutions.
4. **Educate and Advocate:** Develop university and public policy programs that support engineering for the developing world academic careers, student coursework, and curriculum development, as well as advocacy programs highlighting the critical role of engineering in global development to create funding and partnering channels with government and other contributing organizations.

Across these objectives, specific activities are placed along a life cycle of engagement: increased awareness, casual engagement, active participation, advocacy, and leadership. This creates a strategic framework that the Engineering for Global Development Team can use to map its proposed activities.

Engage Individuals					
Build Community					
Build Content					
Educate and Advocate					
	Increased Awareness	Casual Engagement	Active Participation	Advocacy	Leadership

A Universe of Opportunities

The project team identified a large number of potential opportunities during several brainstorming sessions. The EGDT will need to evaluate each against the resources it has available and the current operations of the organization.



In addition, the team brainstormed a list of specific actions against the strategic framework, ranging from easy wins (in blue) to more ambitious actions. EGDT can pare and prioritize this list and other opportunities to develop a comprehensive portfolio.

ENGAGE INDIVIDUALS

+ Conduct feasibility study on a Fellows program.
+ Partner with a non-governmental organization (NGO) to provide opportunities for long-term engagement.
+ Partner with Hand-On Disaster Response to provide individuals with opportunities to work on the ground.

BUILD COMMUNITY

+ Liaison with E4C.
+ Profiles of volunteers and change agents in ASME news and other media.
+ Hold an Engineering for Global Development conference.
+ Identify potential partners.

BUILD CONTENT

+ Call for papers and stories.
+ Create a project template for people to post engineering for the developing world projects quickly.

EDUCATE AND ADVOCATE

+ Convene academic community to explore academic links to emerging engineering for global development field.
+ Meet with representatives from design programs at MIT and Stanford.
+ E-Week exposure.
+ Leverage industry connections to identify resources for strapped labs.
+ Build an engineering for global development communications plan.

NEXT STEPS

The project team agreed that an Engineering for Global Development Team should be chartered and staffed by May 1st, 2010. This team will be responsible for forming the communication and engagement plan for sharing the results of the project with the Board of Governors at the June meeting. In addition, the team will communicate to all attendees of the Engineering for the Developing World Summit, thanking them for their participation and asking for feedback on the summit report.

Speaker Presentations

IQBAL Z. QUADIR

What Can Engineers and Entrepreneurs Do for the Developing World?

Professor Iqbal Quadir is the Founder and Director of the Legatum Center for Development and Entrepreneurship at the Massachusetts Institute of Technology (MIT). The Legatum Center supports MIT students in creating technology-based, for-profit enterprises in low-income countries. The Center administers programs and convenes events that promote and shape discourse on bottom-up development, including a highly competitive fellowship program for MIT graduate students who intend to launch enterprises in low-income countries.

OVERVIEW

+ Poor countries face significant headwinds. In particular, three things prevent poor countries from moving forward: lack of capital, lack of education and lack of good leadership.
+ Historically commerce and innovations, combined with a shortage of funds, led to the devolution of authorities and gave rise to empowerment of citizens.
+ Governments become responsive to citizens when citizens make economic contributions to governments. Entrepreneurs create jobs, products and services – and economically empower citizens. Therefore, entrepreneurs create tailwinds.
+ Four myths about poor countries:
  - Myth #1: Poor countries are under-resourced. Truth: Poor countries are extremely wasteful.
  - Myth #2: Poor people lack buying power. Truth: Productivity tools (such as cell phones) can create buying power.
  - Myth #3: You need to start with money to make money. Truth: Shared-access models can break that cycle.
  - Myth #4: Poor people lack the ability to meet their primary needs. Truth: Income is the ability.
+ How a cell phone became a cow: the Grameenphone story:
  - Primary problem: a lack of infrastructure. In Bangladesh in 1993, there was only 1 phone for every 500 people and virtually no phones in rural areas, where over 100 million people lived.
  - Solution: In 1994, Gonofone ("phones for the masses") partnered with microcredit lender Grameen Bank to provide low-cost loans for customers to purchase cell phones, which could then be used to provide a service to help repay the loan.
  - By 2005, Grameenphone had 250,000 retailers in 70,000 villages throughout India, supporting 22 million subscribers and providing 100 million people with cell phone access.
+ Connectivity is productivity: mobile phones are the key empowering technology in poor countries. Mobile phones increase individual productivity and improve lives; increase purchasing power and economic clout; and provide entrepreneurial opportunities.
+ Engineers and entrepreneurs are key: people + technologies = empowered people, which results in democracy and capitalism.

LINKS

Legatum Center for Development and Entrepreneurship
www.legatum.mit.edu

EMEKA OKAFOR

Rethinking Africa

Emeka Okafor is a venture capitalist, entrepreneur and writer passionately committed to sharing the issues and ideas that are guiding Africa's future. He is a Principal at the Makeda Fund, a private equity fund focused on the development of women-owned and managed Small and Medium Enterprises (SMEs) in Africa. In 2007, Emeka directed the TED-Global Conference held in Tanzania, and is a co-founder of MakerFaire Africa.

OVERVIEW

+ The perception of Africa needs to change.
  - While poverty continues to be a persistent challenge throughout Africa, it is also home to 900 million consumers. Poverty rates are on a steep decline in parts of the continent and innovation is growing.
  - Robust clusters of technology development are emerging in cities such as Nairobi, Lagos and Accra.
+ Ushahidi, an African tech success story.
  - Started as a website created by a group of Kenyan bloggers after the post-election violence in 2008.
  - Ushahidi allows anyone with a cell phone to text or email in reports of violence (or peacekeeping). Reports are geo-tagged on an online map, creating a real-time, collaborative map of crisis situations.
  - Since 2008 Ushahidi has been deployed in crisis situations and to monitor elections around the world.
  - NY Times article called Ushahidi "Africa's gift to Silicon Valley" – a great example of "trickle up innovation."
+ A rising phenomenon of "un-conferences" such as Bar Camps and other informal groups are proliferating to solve problems that we used to think only governments could solve.
  - MakerFaire Africa (MFA) brings together inventors and innovators to sharpen focus on the growing "maker" culture on the continent, specifically highlighting locally-generated, bottom-up prototypes of technologies that solve immediate challenges.
+ Engineering in the BOP is different.
  - Education in the BOP is bi-directional – formal educational structures interact with informal structures.
  - The focus is on making and designing things that are immediately relevant.
  - Need to rethink the definition of an engineer; "formally" trained engineers are rare, but the tinkerers and makers are everywhere.
  - Entrepreneurship is the key; we need to create capacity and opportunities – not "jobs."
+ Final thoughts.
  - Celebrate the makers – they are the precursors to economic growth.
  - Stem the brain drain by engaging.
+ Engineering needs to be grounded in real problems.
  - Don't help us – join us, partner with us!

LINKS

MakerFaire Africa
www.makerfaireafrica.com

Timbuktu Chronicles
www.timbuktuchronicles.blogspot.com

Africa Unchained
www.africaunchained.blogspot.com

LOURDES GALLARDO

Investing in Underserved Markets

Lourdes Gallardo is an Investment Officer at the Inter-American Development Bank (IDB) Opportunities for the Majority project, which promotes and finances market-based, sustainable business models that engage private sector companies, local governments and communities in the development and delivery of quality products and services for the majority of the population of Latin America and the Caribbean.

OVERVIEW

+ Background: Inter-American Development Bank (IDB) is the oldest regional multilateral development bank in the world, and the largest funds provider for the development of Latin America and the Caribbean. Founded in 1959, IDB has 48 member countries; 26 of which are borrowers.
+ The "Majority Market" in Latin America
  - 360 million people—70 percent of the population—that live on less than US$300 (PPP) per month.
  - The size of the market is $500 billion per year and has huge unmet demands for goods, basic services, housing and productive jobs.
+ The majority of people suffer multiple forms of the "Poverty Penalty": lack of access to essential goods and services and higher prices for as well as poor quality of goods and services.
+ The highest expenditure growth in BOP markets is in the financial services, information and communication technology sectors.
+ Opportunities for the Majority – key accomplishments
  - Opportunities for the Majority created a database with information on 521 large and medium private companies, including data about business strategies for low-income segments, entry barriers by sector and interest in working with the IDB.
  - Launched a multi-donor trust fund to channel technical expertise necessary to make investments at the BOP more effective.
  - Created MajorityMarkets.org, an online clearinghouse where potential partners may find inspiration, guidance, and practical advice from others who are already finding success serving the BoP.
+ Lessons learned
  - There exists a large untapped potential to leverage partnerships among public, private, academic and civil society sectors.
  - Need to rethink multilaterals structure in order to adequately serve BoP models (e.g., credit scores, legal structures, etc.).
  - Technical cooperation is needed to support strong BoP business plans and to bridge the gap between engineering schools and social entrepreneurship.
+ Moving forward: food for thought
  - How to reach millions instead of thousands?
  - How do we mainstream social and technological innovation into engineering, particularly in programs where private sector engagement is clearly linked to innovation as it relates to high-end consumers?
  - How do we start a BoP fever within the engineering community?

LINKS

Majority Market
www.majoritymarkets.org

CATHERINE LAINÉ

Twelve Lessons in Design for the BOP

Catherine Lainé is the Deputy Director of the Appropriate Infrastructure Development Group (AIDG) which helps individuals and communities get affordable and environmentally sound access to electricity, sanitation and clean water. Through a combination of business incubation, education and outreach, AIDG helps people get technology that will better their health and improve their lives.

OVERVIEW

+ Background: AIDG helps entrepreneurs in developing countries start small and medium-sized businesses that manufacture, install and repair green technologies for people living between US $2-4 a day.
+ Sample of AIDG projects and technologies
  - AIDG and XeloTeco reconditioned a micro-hydro-electric system in Guatemala that was damaged after Hurricane Stan; the 75KW system serves 110 families and will save the community at least $4000 in electricity and diesel bills for this season.
  - AIDG's Rocket Box Stove is a low-cost, pre-fabricated wood-burning cook stove that can be manufactured entirely off-site and costs 50% less than traditional stoves. It offers a flexible solution for poor communities where people are living in temporary housing.
+ 12 Lessons in designing for the BoP
  - Lesson #1: Don't get caught up in the buzzwords. There is nothing fundamentally different about engineering for poor people. "User-centered design" follows the same sets of rules - just a different set of constraints and knowledge base.
  - Lesson #2: Know what you know. What underlying assumptions are you bringing to the project?
  - Lesson #3: Know what you don't know. Partner with the right people who know the culture and the community; otherwise you end up making an expensive paperweight.
  - Lesson #4: Work with local partners. Make sure you work with the end-users. KPFF engineers partnered with Haitian diaspora engineers for structural building evaluations in Haiti.
  - Lesson #5: Recruit your peers from the culture. Locals may not push back on ideas, but peers will tell you when something won't work.
  - Lesson #6: Collaborate, collaborate, collaborate. Let others help you in areas not in your core competencies (translations, technical providers, fixers, etc). Humanitarian responses are far more chaotic then you would ever believe and logisticians are totally under-appreciated. There's a lot of work – find your niche and partner for other things.
  - Lesson #7: Put yourself out of job. The fact that you are necessary says there's been a failure. Focus on building capacity and tech transfer so that in the future you're not needed.
  - Lesson #8: Design so it can be made or repaired locally. Invest in the local ecosystem: local talent, local materials, local communities and local economies.
  - Lesson #9: Design with end of life in mind. In many communities there is no such thing as "throwing away."
  - Lesson #10: Do follow-up. Things fail – follow-up to see if it worked and if you need to take it away.
  - Lesson #11: Build lasting relationships. You will make mistakes, but you can learn from them in a continuous way.
  - Lesson #12: If you think, "Oh, it's better then what they had before", you're wrong. If you think this is charity work, don't do it. Successful work in the BoP requires thinking of communities and customers as clients, not charities.

LINKS

Appropriate Infrastructure Development Group
www.aidg.org

ANIL CABRAAL

Lighting Africa: Catalyzing Markets for Modern Lighting

Anil Cabrall is a Lead Energy Specialist at the World Bank and co-founder of Lighting Africa, a World Bank Group initiative which supports the private sector to develop, accelerate, and sustain the market for modern off-grid lighting technologies tailored to the needs of African consumers.

OVERVIEW

+ Thomas Edison said, "We will make electricity so cheap that only the rich will burn candles." But there are more non-electrified households today than the total number of households in Edison's time.
+ Nearly 1.6 billion people, upwards of 30% of the global population, are without access to electricity.
+ One in three people obtain lighting from fuel-based sources. Fuel-based lighting has significant financial, environmental and health care costs: it is often most expensive energy item in household; it limits small-scale productive activities and educational access; indoor pollution leads to serious health problems and creates significant safety and fire issues.
+ Lighting Africa is a World Bank Group initiative aimed at providing up to 250 million people in Sub-Saharan Africa with access to non-fossil fuel based, low cost, safe, and reliable lighting products with associated basic energy services by the year 2030.
+ Lighting and development are intricately linked. Modern lighting can:
  - Extend the working day for small and medium enterprises (SMEs) thus expanding production, enriching income opportunities, improving working conditions, and increasing customers;
  - Enhance safety and security via outdoor lighting for personal, business, and community activities;
  - Create conditions to attract teachers, retain students, expand time for student reading and studying both in the classroom and at home;
  - Extend productive time in the home, providing opportunities for income-generating activities;
  - Increase gender equality for women;
  - Improve health services delivery and reduce productivity loss due to illnesses.
+ The arrival of new lighting technologies can disrupt the old energy paradigm. LED and CFL Lighting offer substantially higher quality lighting than what people are using now.
+ The Lighting Africa 2010 Conference and Off-grid Lighting Trade Exhibition will take place May 2010, Nairobi, Kenya: http://www.lightingafricaconference.org/

LINKS

Lighting Africa
www.lightingafrica.org

DR. BERNARD AMADEI

Engineering for the Developing World: Opportunities and Challenges

Dr. Bernard Amadei is the Director of the Mortenson Center in Engineering for Developing Communities at University of Colorado, Boulder and Founder of Engineers Without Borders – USA. EWB-USA helps create a more stable and prosperous world by addressing people's basic human needs by providing necessities such as clean water, power, sanitation and education with over 350 projects in over 45 developing countries around the world.

OVERVIEW

+ Why Engineering for the Developing World?
  - 1.2 billion lack clean water
  - 2.4 billion lack adequate sanitation
  - 29,000 children die from hunger daily
  - 1.2 billion lack adequate housing
  - 1.3 billion are illiterate
+ Engineers Without Borders – USA: partners with disadvantaged communities to improve quality of life; implements environmentally and economically sustainable engineering projects; develops internationally responsible engineers and engineering students; and involves 12,000 members, 295 chapters, 365 projects in 48 countries.
+ The problems that communities face are social problems, not technical problems – but engineering can help to solve them. However, engineering in the developing world must be done with a systemic approach. It is small-scale engineering - with a human face - but requires the same quality assurance and quality control as any other.
+ The Mortenson Center in Engineering for Developing Countries (MC-EDC) is developing a new generation of engineers for the 21st century that requires that engineers be facilitators of sustainable development, social and economic change, capacity building and appropriate technology.
+ There is a strong enthusiasm among young engineers for development engineering – they want meaningful work.
+ Key challenges:
  - Engineering societies need to respond to the needs of young engineers and engage them or they will go somewhere else.
  - Recruitment of engineers and scientists - there is less than one scientist or engineer for every 10,000 people in Africa – compared to 2 to 5 per 1000 in Europe and USA.
  - Education of engineers and scientists who: have the skills and tools appropriate to address critical world issues (hard and soft); are flexible and resourceful enough to deal with unfamiliar equipment and community problems; are system thinkers who are able to consider the unintended consequences of their "solutions".
+ Bottom line: stop pretending as engineers that we are at the bottom of the food chain – we need to be involved in financial, business, and political decisions.

LINKS

Engineers Without Borders-USA
www.ewb-usa.org

Mortenson Center in Engineering for Developing Communities
www.ceae.colorado.edu/mc-edc/

ROBERT HAUCK

Growth in Developing Nations: GE Healthcare

Robert Hauck is the General Manager in the Office of the Chief Engineer at GE Healthcare Surgery. GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care.

OVERVIEW

+ When do you decide to enter a developing country?
  - Bet on stability: does the country have the following criteria:
    - *A rising GDP per capita income
    - *Lots of well-educated people
    - *Maturing supply base
    - *Stable politics
    - *Low corruption
+ GE Healthcare entered China and India 25 years ago with a goal of moving toward "ICFC" – In Country For Country, then expanding to "ICFW" – In Country For the World.
+ GE's early presence allowed the company to take advantage of a large expansion of middle-class consumers in those countries.
+ High investment allowed GE to leverage a growing class of engineers.
  - Last 5 years in China exhibited 500% increase in qualified engineers.
  - GE Healthcare in India now has the largest lab in the division (50,000 sq.ft)
+ Case Studies: One failure and one success
  - MR Table: Failure
    - *Gave Indian engineers the spec to see how it would go. They produced it to spec, but since they didn't know the user or the application it was unusable in real world situations.
  - Surgery System: Success
    - *Beijing team worked in concert with engineers in Salt Lake City. Training for engineers in China allowed them to understand the context and know-how of designing a product.
+ Engineers in developing countries need to be partnered with experienced leaders who can help with the critical intangibles of product development, such as verifying all aspects of the spec and relying on their intuition to improve the product.
+ Final thoughts - it takes a long time, it's a hard road but you can have success by:
  - Choosing where to invest;
  - Following a cautious process from identifying country opportunities to creating capacity in country to develop and export;
  - Partnering with engineers in developed countries to ensure experience with all aspects of product development.

LINKS

GE Healthcare
www.gehealthcare.com

ELISABETH RHYNE

Making Microfinance Work

Elisabeth Rhyne is the Managing Director of the Center for Financial Inclusion at ACCION International, a private, nonprofit organization with the mission of giving people the financial tools they need to work their way out of poverty. Established in 1961, ACCION has over 45 years of experience in the field of international economic development.

OVERVIEW

+ Microfinance has become a viable business model for providing financial services to the poor in ways that allow for both social responsibility and profit.
+ Private-sector players are now moving into the industry at an unprecedented pace, bringing with them enormous resources and potential for growth.
+ ACCION's Center for Financial Inclusion works on behalf of the microfinance industry as a whole, bringing the best minds and expertise to collaborate on industry problems.
+ Microfinance success case study: Banco Azteca illustrates the power of the private sector when it decides to put effort behind something.
  - Grupo Eletra, the "Wal-Mart of Mexico" created a bank. After only 5 years it became the biggest distributor of remittance payments in the country, with $8 million in outstanding loans, $8 million in savings accounts, $10 million in insurance policies.
+ Microfinance success case study: Vodaphone and Safaricom partnership to create an innovative cell phone banking program (M-Pesa) illustrates the power of scale. Tremendous scale achieved through existing customer base; after 2 years had more than 5 million M-Pesa users.
+ The microfinance "gamechangers" haven't been banks. They've been retail outlets, telecoms, etc. – challenging the traditional definition of a bank.
+ How can microfinance support private sector projects?
  - Start with the market, do your research.
  - Partner when possible.
  - Be in it for the long term, not short term profit.
  - Be a broker to fill the gaps in the supply chain.

LINKS

Accion International Center for Financial Inclusion
www.centerforfinancialinclusion.org

CATHERINE CASEY

Patient Capital for an Impatient World

Catherine Casey is the Innovation Manager at Acumen Fund, a non-profit global venture fund that uses entrepreneurial approaches to solve the problems of global poverty. Acumen's investments focus on delivering affordable, critical goods and services – like health, water, housing and energy – through innovative, market-oriented approaches.

OVERVIEW

+ Acumen Fund's focus is on "Patient Capital" - a debt or equity investment in an early-stage enterprise providing low-income consumers with access to healthcare, water, housing, alternative energy, or agricultural inputs.
+ The Patient Capital model creates dignity, rather than dependence, allowing entrepreneurs to try, fail, and try again.
+ Typical commitments of patient capital for an enterprise range from $300,000 to $2,500,000 in equity or debt with payback or exit in roughly five to seven years, accompanied by management support services to nurture the company to scale.
+ Acumen's investments equal over $40 million globally: primary markets are Pakistan ($7.7 mil); East Africa ($10.6 mil); and India ($18.6 mil).
+ Acumen success story: "1298", the first private ambulance service in Mumbai.
  - Operates on a sliding scale payment system, depending on what hospital the patient is transported.
  - Utilizes leading technology like Google Earth to efficiently locate customers.
  - Started with 10 ambulances; now operates over 100.
+ Acumen success story: Water Health International (WHI), a community water system providing access to clean, safe water in rural India.
  - Unique business model – a combination of social marketing, deep commitment in local markets, and world-class technology for purifying surface water using local materials.
  - WHI has established 285 new water systems to date – creating a water market and proving that local customers are willing to pay for clean, safe water.
+ Acumen success story: Sustainable Healthcare Foundation (SHF), a micro-finance drug distribution clinic in Kenya.
  - SHF's franchising model enables qualified community health workers and nurses to own and operate combination drug and consumer goods shops and medical clinics in underserved areas.
  - Franchises benefit from branding, training and financing; a transparent fee-for-service pricing model elicits community trust.
  - Currently has 82 clinics and 500,000 visits.
+ Lessons learned
  - Focus on sustainability before you think about scale.
  - Partnerships are increasingly important – especially unusual or non-obvious partnerships.

LINKS

Acumen Fund
www.acumenfund.org

DANIEL RUNDE

Daniel Runde is the Head of Partnership Development for the International Finance Corporation (IFC). IFC fosters sustainable economic growth in developing countries by financing private sector investment, mobilizing capital in the international financial markets, and providing advisory services to businesses and governments.

OVERVIEW

+ "The Next 4 Billion" report published by IFC and the World Resource Institute highlights differences between traditional development approach — focused on the very poor, less than $1/day — and market-based approach focused on the entire BoP.
+ The base of the pyramid is business, but it's not business as usual. The BoP is not a market that allows for traditional (high) margins. Like the Internet space, the game is about volume and capital efficiency.
+ A BoP business model needs to be commercially viable. This means improving access to goods, services, and livelihoods by selling to and/or procuring from those at the BoP in a sustainable manner.
+ Multinationals in emerging countries can either redeploy their existing capabilities or develop new capabilities to create successful business models. Mainstreaming low-income projects and bringing them to a larger scale is one of the main challenges facing companies today.
+ The BoP field is crowded and often fragmented with a range of diverse stakeholders, including: catalysts and enablers; social entrepreneurs; multilaterals and development agencies; advocates; corporate philanthropy; transnational networks and corporations.
+ The IFC approach to BoP markets is to:
  - Increase the number of commercially viable and inclusive business models operating at scale;
  - Bring access to goods, services, livelihoods to millions of people at the BoP
+ In 2009 IFC's outstanding portfolio included $4.1B in Investment and Advisory Services to firms doing business with the BoP.
+ IFC cases study: KickStart, example of a smart use of "soft funds."
  - Key to success was the development of an integrated and self-sustaining supply chain.
  - KickStart surveyed farmers in Africa; developed and tested a prototype water pump; set up a supply chain to manufacture pumps in volume at a low cost; and sold pumps to local entrepreneurs.
  - Donor funds allowed KickStart to skip the early, low-volume phase of a product introduction, when prices are their highest, and jumped directly into a high-volume phase, when prices are at their lowest.
+ Proctor & Gamble's PUR water filters - Turning commercial failure into philanthropic success.
  - The product was a technological and public health success, but a commercial market failure.
  - P&G re-positioned the initiative as a Corporate Social Responsibilty venture. Since 2004, P&G has sold the product at cost and worked in partnership with NGOs that distribute the product through their development and humanitarian relief networks.
+ To find the real business case for sustainable development, companies need to find ways to link opportunity with responsibility. They need to move beyond eliminating "non-value" to creating "new value" and not just look for market-based solutions, but see the market itself as a solution.
+ Final Thoughts: Scaling Up
  - Once proof of concept is achieved, it is much easier to secure the necessary resources for expansion.
  - Scaling without having a good estimation of the effect of your actions is both, irresponsible and counterproductive.
  - Achieving scale takes time.

AMY BANZAERT

D-Lab: Development through Dialogue, Design, and Dissemination

Amy Banzaert is a Ph.D candidate and Instructor at D-Lab Energy, a program at the Massachusetts Institute of Technology (MIT) that fosters the development of appropriate technologies and sustainable solutions within the framework of international development. D-Lab's mission is to improve the quality of life of low-income households through the creation and implementation of low cost technologies.

OVERVIEW

+ MIT's D-Lab is creating a new kind of engineer by enabling students to become passionate about engineering when they see how they can use it to have a deep impact.
+ For some students, taking a class in D-Lab and traveling to a developing country transforms their lives, so that they take a more radical, entrepreneurial, and humanitarian engineering career path. Other students in D-Lab may pursue more traditional engineering positions, but with a better understanding of how to truly make an impact in the world using technology.
+ D-Lab classes are dominated by women, unlike most other engineering classes at MIT.
+ Started in 2002 by Amy Smith, D-Lab started with just 2 classes, 20 students and projects in one country. This year, D-Lab offers 10 classes to over 200 students and operates projects in 20 countries worldwide.
+ There are currently 11 different academic offerings that make up the suite of D-Lab classes, falling into the broad categories of Development, Design and Dissemination.
+ Graduate research projects are highly focused on creating appropriate, applicable technologies. For instance, the Fuels from the Field (FftF) project created biomass charcoal, made from bagasse and corn stalks which burns as cleanly as wood charcoal, but with far fewer environmental and health side effects. FftF charcoal is currently being used at over 60 ateliers in Haiti, and trainings to create the charcoal have been provided for over 1000 people.
+ How can ASME have more of an impact on shaping engineering for developing countries? Some ideas:
  - Inspire and Legitimize. All too often, mechanical engineers are pushed toward relatively mundane efforts with little vision for a bigger impact. ASME can help publicize efforts to show the impact engineers can have on the developing world.
  - Address the implications of inspiration. ASME could provide career mentoring and documentation of opportunities for development engineering with a greater emphasis on funding for projects, through competitions, grants, and fellowships.
  - Develop Codes. Create standards for appropriate technology (AT), analysis and codes for AT field testing, as well as a "consumer reports/CNET" review of AT solutions.
+ Final thoughts: ASME needs to step up to the challenge and help young engineers experience work in developing countries, and then help ensure that this type of work can be at least a part of their careers.

LINKS

MIT D-Lab
www.d-lab.mit.edu

NOHA EL-GHOBASHY

E4C: Empowering Communities Through the Power of Engineering

Noha El-Ghobashy is the President of Engineering for Change, LLC, an online environment bringing together engineers and other problem solvers with NGOs and local communities to address basic quality of life issues such as access to clean water, electricity and proper sanitation.

OVERVIEW

+ Designed for engineers, other problem solvers, socially responsible organizations, and the local communities, Engineering for Change (E4C) is a unique online/virtual environment that enhances connectivity, knowledge-sharing, learning, and problem solving for a humanitarian purpose.
+ The E4C vision is to serve as a "network" that brings engineers and problem solvers across professions together to work as virtual teams with local organizations and communities.
+ E4C will aggregate content and be an open knowledge source for a range of workable solutions, as well as a resource guide for developing effective solutions that could be re-purposed in other communities.
+ The E4C platform will allow users to: post challenges and problems; search the open source knowledgebase for solutions; utilize visualization tools to contextualize information; work collaboratively and virtually with peers; and engage in the conversation and movement.
+ E4C adds value in the social innovation space by acting as a platform and catalyst, connecting the engineering community with a variety of stakeholders including project funders, implementers and community advocates.
+ ASME's role in E4C:
  - Originated idea/concept for Engineering for Change; E4C is a wholly-owned subsidiary of ASME.
  - A natural outgrowth and extension of ASME's mission and strategic objectives.
  - To date, ASME has committed over $1 million in seed funding for research, site development, marketing and legal services.
+ The public launch for E4C is scheduled for late 2010. In the meantime, the E4C Interim Site is being used to generate a community of followers and provide current highlights of what engineers are doing in the social innovation space.

LINKS

Engineering for Change
www.engineeringforchange.org

HEATHER FLEMING

CEO and Co-Founder, Catapult Design

Heather Fleming is CEO and Co-Founder of Catapult Design, a non-profit design firm providing engineering and implementation support to the thousands of organizations in need of technologies or products capable of igniting social change. Catapult's multidisciplinary team of engineers, designers, implementers, and educators designs products, introduces technologies, and fosters trends that are appropriate, self-sustaining, environmentally friendly, socially responsible and culturally sensitive.

OVERVIEW

- What good is a water filtration product if no one wants it, uses it, or will pay for it? And if low-cost water filtration products exist, why does the majority of the world's population still drink dirty water? Catapult Design operates on the philosophy that successful products aren't defined by technological feats, but are rooted in a holistic perspective of the development process that is centered on the needs of the end-user.
- Catapult's mission statement: "The majority of our world's population lacks access to life's basic needs. We design and implement human-centered products to help them thrive."
- Catapult Design started as a design initiative of Engineers Without Borders, when co-founder Heather Fleming began first working on the development of a low-cost wind turbine in Guatemala.
- Other projects include the Hippo Roller, a water transport device introduced throughout Africa; low-cost LED lamps in Tanzania; and the design of photovoltaic systems to power health clinics in Rwanda.
- No matter how sophisticated the design of a technology is, it is a failed technology if:
  - Consumers are perceived as charity recipients
  - A sustainable business model isn't conceived
  - Solutions aren't evaluated on a systems level
- Catapult's four-phased design approach includes ensuring that the right needs are addressed; a product is designed with the end-user in mind; a strategy for implementation is defined; and the impact the product has on a community is measurable.

LINKS

Catapult Design
www.catapultdesign.org

Innovation Spotlights

In addition to the session speakers, EDWS also featured "on-the-ground" accounts of innovators who are implementing engineering-based solutions in the developing world. These short talks familiarized the participants with the challenges of working in the BoP and showcased the creative ways these innovators have responded to improve lives in poor communities.

MARK BENT

CEO and President, SunNight Solar Enterprises

SunNight Solar Enterprises designs and sells inexpensive LED solar flashlights that last for 750 -1000 nights of use (6-8 hrs per night) compared to traditional flashlights that only last 15 hours before needing replacement batteries, which can be expensive or difficult to find in developing regions. As a result, these flashlights create a significant economic benefit. The World Bank has found that an average family in the developing world spends a disproportionately high percentage of family income on current lighting options – kerosene, candles and conventional flashlights – in some cases, 20 to 30 percent of disposable income. Having a sun powered renewable light removes this expense from families who live on $1 or $2 per day. This provides fresh capital - money to buy an extra chicken or goat to produce eggs, milk and cheese as part of income generation. Or they use the extra income for education, medicine, buying a plot of land for tomatoes or other crops. A lack of capital restricts upward economic mobility in the developing world and the SunNight Solar light provides a long term gain in disposal income to the BoP consumer.

LINKS

SunNight Solar
www.bogolight.com

AMOS WINTER

Founder and Director, MIT Mobility Lab

The MIT Mobility Lab designs and markets the Leveraged Freedom Chair (LFC), a mobility aid designed specifically for developing countries, where the diverse, unpredictable and often changing terrains render traditional wheelchairs at best insufficient and at worst not functional. 20 million people in developing countries require wheelchairs and it is believed that 70 percent of those individuals reside in rural areas where traditional wheelchairs simply do not work. The LFC has a variable mechanical advantage lever drivetrain that enables its user to travel 10-20% faster on tarmac than a conventional wheelchair, and off road like no other mobility aid available. The user effectively changes gears by simply moving his hands on the levers; grasping high increases torque while grasping low increases angular velocity. Human upper body force and power outputs were used to optimize the drivetrain geometry for optimal performance on a wide range of terrains. All moving parts on the LFC are made from bicycle components, making the chair manufacturable and repairable anywhere in the developing world.

LINKS

MIT D-Lab
www.d-lab.mit.edu

Amos Winter
www.amoswinter.com

DAVID CAMPBELL

Executive Director, Hands On Disaster Response

David Campbell founded Hands On Disaster Response, a US-based, 501(c)3 non-profit organization, that provides hands-on assistance to survivors of natural disasters around the world, with maximum impact and minimum bureaucracy. By supporting volunteers with housing, meals, tools, and organized work at no charge, HODR is able to provide free and effective response services to communities in need. Programs are directed by the needs of each community, ensuring a timely, relevant, and culturally sensitive response. HODR is currently helping residents in Leogane, Haiti recover from the January 12, 2010 earthquake, and Sungai Geringging in Indonesia recover from the earthquake of September 30, 2009.

LINKS

Hands on Disaster Relief

www.hodr.org

DR. ERIC GREEN

Founder, Respira Design

Respira Design develops novel devices to improve the treatment of asthma worldwide. Their patent-pending devices are efficient and effective in delivering medication, yet affordable to produce and distribute in underserved communities. Devices are produced from inexpensive materials as a single flat sheet that can be easily assembled by the user.

LINKS

Respira Design

www.respiradesign.org

Appendix

SUMMIT AGENDA

REGISTRATION LIST

SPEAKER BIOS

Engineering for the Developing World Summit • March 16-17, 2010

National Academy of Sciences – Washington, D.C.

ASME SETTING THE STANDARD

Agenda

Tuesday, March 16th

8am	Registration Open, Lecture Room Lobby Continental breakfast served.
8:30am	Welcome & Introduction A brief introduction to ASME and the goals of the Summit. Robert T. Simmons, President Elect, ASME Thomas G. Loughlin, Executive Director, ASME
	Day One Facilitator: Reginald I. Vachon, Past President, ASME and Member, Strategic Issues Committee, ASME
9am	**Session 1 • The Base of the Pyramid: Global Overview and Regional Snapshots** A broad, contextual view of the BoP followed by regional discussions. Iqbal Quadir, Founder, Grameenphone, and Executive Director, Legatum Center at MIT Emeka Okafor, Maker Faire Africa/TED Africa Director Lourdes Gallardo, Investment Officer, Inter-American Development Bank ***Innovator Spotlight:*** Mark Bent, CEO and President, SunNight Solar Enterprises
10:45am	Break
11am	***Innovator Spotlight:*** Evan Thomas, Executive Vice President, Manna Energy Limited **Session 2 • Challenges & Opportunities** A closer look at challenges and innovative technologies affecting energy, water, and agricultural production. Catherine Lainé, Deputy Director, AIDG Paul Faeth, Executive Director, Global Water Challenge Anil Cabraal, Lead Energy Specialist, The World Bank
12:30pm	Lunch and Table Talks
1:30pm	***Innovator Spotlight:*** Amos Winter, Founder & Director, MIT Mobility Lab **Session 3 • Business Models and Partnerships** An exploration of business models and approaches serving emerging markets from a variety of stakeholders. Bernard Amadei, Professor of Civil Engineering, University of Colorado at Boulder, and Founding President, Engineers Without Borders - USA Robert B. Hauck, Global General Manager of the Office of Chief Engineer, GE Healthcare
3:15pm	Break
3:30pm	**Session 4 • Bringing Sustainable Solutions to Scale** Exploring what it takes to bring sustainable solutions to scale with a focus on funding businesses and projects in the BoP. Elisabeth Rhyne, Managing Director, Center for Financial Inclusion, ACCION International Catherine Casey, Innovation Manager, Acumen Fund Dan Runde, Head of Partnership Development, International Finance Corporation
4:45pm	Wrap Up A facilitated group discussion highlighting key take-aways of the day.
5:30pm	Reception, Great Hall
6:30pm	Adjourn, Day One

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ASME SETTING THE STANDARD

Agenda

Wednesday, March 17th

8am	Continental breakfast served.
8:30am	Welcome & Check-In
	Day Two Facilitator: Harry Armen, Past President, ASME and Member, Strategic Issues Committee, ASME
9am	***Innovator Spotlight:*** Eric Green, Founder, Respira Design
	Session 5 • Case Study: D-Lab MIT's D-Lab is a program that fosters the development of appropriate technologies and sustainable solutions within the framework of international development. Amy Banzaert, MIT D-Lab: Energy
9:45am	Break
10am	**Session 6 • Case Study: Engineering and Technology's Role** Presentations and moderated panel discussion on ways the engineering community can engage in solutions. Noha El-Ghobashy, President, Engineering for Change, LLC Heather Fleming, CEO and Co-Founder, Catapult Design Charlie Brown, Executive Director, Ashoka Foundation ChangeMakers
11:45am	Reflections and Conclusions A facilitated plenary conversation to surface key insights and develop next steps
12:30pm	Summit Adjourns Box lunches will be served.

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Registration List as of 3/10/10

Brett Alistair
Consultant
The World Bank

Bernard Amadei
Professor of Civil Engineering, University of Colorado at Boulder, and Founding President, Engineers Without Borders USA

Iana Aranda
Engineering Technical Program Manager
ASME

Harry Armen
Past President, ASME
Member, Strategic Issues Committee, ASME

Amy Banzaert
Instructor
MIT D-Lab: Energy

Mark Bent
CEO and President
SunNight Solar Enterprises

Michele Bowman
Principal
AndSpace Consulting

Charlie Brown
Executive Director
Ashoka Foundation ChangeMakers

Anil Cabraal
Lead Energy Specialist
The World Bank

David Campbell
Executive Director
Hands On Disaster Response

Lydia Carson
Member, Innovation Committee
ASME

Catherine Casey
Innovation Manager
Acumen Fund

Shekhar Chandrashekhar
Director, Portfolio Development
ASME

Christian Crews
Principal
AndSpace Consulting

Noha El-Ghobashy
President, Engineering for Change, LLC
Director, Technical Programming & Development, ASME

Paul Faeth
Executive Director
Global Water Challenge

John Falcioni
Editorial Director
ME Magazine/ASME

Sara Farley
Chief Operating Officer
Global Knowledge Initiative

Nina V. Ferderoff
Special Adviser, Science & Technology
U.S. Department of State

Heather Fleming
CEO and Co-Founder
Catapult Design

Lourdes Gallardo
Investment Officer
Inter-American Development Bank

Robert Goodier
Engineering for Change Reporter
ASME/Engineering for Change

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ASME
SETTING THE STANDARD

Registration List as of 3/10/10

Richard Gowen
President
IEEE Foundation

Eric Green
Founder
Respira Design

Phil Hamilton
Associate Executive Director, Strategy & Outreach
ASME

Robert B. Hauck
Global General Manager, Office of Chief Engineer
GE Healthcare

Mark Henderson
Director, GlobalResolve
Arizona State University Polytechnic

Peter Hess
Director of Marketing
ASME

Karin Hillhouse
Director, ChangeMakers Partnerships
Ashoka Foundation

Crispian Kirk
President and CEO
OIC International

Elizabeth C. Kisenwether
Member, Board on Strategic Management
ASME

Madiha Kotb
Governor
ASME

Catherine Lainé
Deputy Director
AIDG

Cathy Leslie
Executive Director
Engineers Without Borders USA

Thomas J. Loughlin
Executive Director
ASME

Joshua Mandell
S&T Program Officer
World Bank Group

Reese Meisinger
Managing Director, Strategic Initiatives & External Affairs
ASME

Michael Michaud
Managing Director, Global Alliance
ASME

Willard Nott
Vice President Elect, Center for Public Awareness
ASME

Emeka Okafor
Maker Faire Africa
TED Africa Director

John R. Parker
Past President
ASME

Amy Pearl
Founder
Springboard Innovation

Allian Pratt
Director, Strategic Issues
ASME

Chris Przirembel
Chair, Innovation Committee
ASME

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Registration List as of 3/10/10

Iqbal Quadir
Founder, Grameenphone
Executive Director, Legatum Center at MIT

Andrew W. Reynolds
Deputy S&T Adviser to the Secretary of State
U.S. Department of State

Elisabeth Rhyne
Managing Director, Center for Financial Inclusion
ACCION International

Bradley Rogers
Professor, Department of Engineering
Arizona State University Polytechnic

Dan Runde
Head of Partnership Development
International Finance Corporation

Robert T. Simmons
President Elect
ASME

Patti Jo Snyder
Manager, Strategic Initiatives & Innovation
ASME

Peter Sobel
Director, Corporate & Foundation Partnerships
IEEE

Marina Stenos
Director, Public Awareness and Leadership & Diversity
ASME

Robert Stoner
Assistance Director, Developing Countries
MIT Energy Initiative

Alfred Tambe
OIC International

Evan Thomas
Executive Vice President
Manna Energy Limited

Mel Torre
Communications Director
ASME

Reginald I. Vachon
Past President, ASME
Member, Strategic Issues Committee, ASME

Amos Winter
Founder & Director
MIT Mobility Lab

Andy Yager
Officer in Charge, Water, Energy and Strategies Branch
United Nations

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Participant Profiles in alphabetical order

Bernard Amadei

Bernard Amadei is Professor of Civil Engineering at the University of Colorado at Boulder. His main research and teaching interests have initially been in rock mechanics and engineering geology. He obtained his MaSc degree in Civil Engineering in 1979 from the University of Toronto and his Ph.D. degree in Civil Engineering in 1982 from the University of California, Berkeley. He was recently elected a Member of the U.S. National Academy of Engineering.

Prof. Amadei's current interests cover the topics of sustainability and international development. At the University of Colorado at Boulder, Prof. Amadei directs the Mortenson Center in Engineering for Developing Communities (www.edc-cu.org). Its overall mission is to educate globally responsible engineering students and professionals who can offer sustainable and appropriate solutions to the endemic problems faced by developing communities worldwide.

Prof. Amadei is also the Founding President of Engineers Without Borders - USA and co-founder of Engineers Without Borders-International. Prof. Amadei's goal is to promote sustainable development, appropriate technology, service learning, and system thinking in the curriculum and research of civil and environmental engineering programs at CU Boulder and other U.S. universities.

Amy Banzaert

Amy Banzaert is a PhD Candidate in mechanical engineering at MIT, where she also received Bachelor and Masters degrees in the same field. This semester, Ms. Banzaert is teaching MIT D-Lab's newest class, D-Lab: Energy. The common theme in Amy's work is understanding, disseminating, and participating in engineering projects that can create positive change for under-served communities.

Amy's PhD research involves the development of an alternative type of charcoal made from agricultural waste that can be used as cooking fuel in regions where poverty and deforestation are severe. The focus of the work addresses both manufacturing methods and health impacts. The charcoal project, undertaken in close collaboration with others at MIT and other universities, won a $200K grant from the World Bank Development Marketplace, won the development track of MIT's $100K Competition, and placed second in the Ignite Clean Energy Competition. As a graduate student, Ms. Banzaert has been a co-instructor for Toy Product Design, the Women's Technology Program, D-Lab: Design, and Solving Real Problems.

As a graduate student Ms. Banzaert has received fellowships from the Martin Family Society for Sustainability, the MIT Legatum Center for Development and Entrepreneurship, Xerox, and the Hugh Hampton Young Memorial Fund.

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Participant Profiles in alphabetical order

Mark Bent

Mark Bent is the CEO and President of SunNight Solar, which manufactures and distributes inexpensive solar-powered flashlights in the developing world.

Mark served as a US Marine, Naval officer and American diplomat prior to starting SunNight Solar in early 2006. He spent the majority of his government service in Africa and the Middle East, where he gained an appreciation for the lack of energy and the impact on people and development. He is married, with four children and resides in Houston, Texas. He flies a motor-glider when not traveling, working or playing with his children.

Charlie Brown

Charlie Brown is the Executive Director of Ashoka's Changemakers, an online community that "open sources" innovative solutions to entrenched problems worldwide and builds communities of action to support them.

Charlie also leads a small consulting firm focused on organizational strategies for managing online problem solving communities. Before Changemakers, Charlie spent three years building the architecture for Ashoka's global community of over 2,500 Ashoka Fellows and directed three policy focused Ashoka initiatives. In addition, Charlie has worked on environmental issues related to climate change, tourism, and innovations for the financial management of national parks in the U.S. and Jamaica. Charlie received a business degree from Virginia Tech and MBA from the University of Denver.

Anil Cabraal

Anil Cabraal is a Lead Energy Specialist in the Energy Unit at the World Bank. Along with Russell Sturm of the IFC and other colleagues, he launched the joint World Bank/IFC Lighting Africa Program in 2008 with a goal of bringing, through commercial channels, low cost, high efficiency, renewable energy-based off grid lighting to 250 million Africans without grid access.

Over the past 15 years at the World Bank he has been responsible for rural and renewable energy projects financed by the World Bank and Global Environment Facility. He has contributed to and led corporate strategic planning and development of financing instruments to support renewable energy investments at the World Bank. His work includes developing and guiding the implementation of grid-connected and off-grid renewable energy projects in India, Indonesia, Sri Lanka, China, Papua New Guinea, Pakistan, the Philippines, Tanzania, Zambia, among others.

He is a contributing author to “Renewable Power in Developing Countries: Winning the War on Global Warming,” (Ferrey, 2006); “Best Practices for Photovoltaic Household Electrification Programs,” (Schaeffer, Cosgrove-Davies, 1996); “Designing Sustainable Off-grid Rural Electrification Projects: Principles and Practices,” (Terrado, Mukherjee, 2008); among others.

He received the Professor Robert Hill award for his contributions towards photovoltaics for development at the 20th European Photovoltaics and Solar Energy Conference and Exhibition in Barcelona, Spain in 2005.

He earned his doctorate in Agricultural Engineering from the University of Maryland, USA in 1978 and B.Sc. in Mechanical Engineering from University of Ceylon, Peradeniya, Sri Lanka in 1974.

Catherine Casey

Catherine Casey is Innovation Manager at Acumen Fund (www.acumenfund.org), a non-profit venture capital fund that invests in companies that provide health, housing, water, energy, and agriculture to the poor in East Africa and South Asia.

Catherine is responsible for Acumen Fund's Influence initiatives, including building partnerships with government and leading strategic communications efforts. Catherine joined Acumen as a 2007-2008 Acumen Fund Fellow in Kenya, seconded to the Sustainable Healthcare Foundation, which provides micro-franchise healthcare and drug distribution in Kenya. During her fellowship, she worked with SHF's CEO to improve operational efficiency and build data collection and management systems to help scale the franchise network. Catherine is the former Director of CAMBA's Refugee Professional Training Program, and has worked with social enterprises in Uganda, Tanzania, and Kenya. Catherine earned a B.A. with highest honor from Princeton University and an MPP from Harvard University, where she was a part of the inaugural class of Reynolds Fellows in Social Entrepreneurship.

Noha El-Ghobashy

Noha El-Ghobashy is the President of Engineering for Change, LLC and Director of Technical Programming and Development in ASME's Knowledge & Community Sector.

Currently, El-Ghobashy is spearheading two important initiatives: She is leading a group that is responsible for the development of new technical content in emerging technology areas and global markets; and she is overseeing the development Engineering for Change, an innovative online environment that facilitates the development of engineering solutions addressing quality of life challenges in under-served communities in the US and around the world—an initiative to which she is profoundly committed.

Prior to joining ASME, El-Ghobashy was a lead design engineer and project manager in the telecommunications industry. She has worked for companies such as Symbol Technologies, Fujitsu Network Communications, and Jedai Broadband Networks. She earned her Bachelor's and Masters degrees in mechanical engineering from Columbia University. In addition to her role at ASME, El-Ghobashy recently served as Adjunct Professor at the Polytechnic Institute of NYU in Brooklyn, N.Y.

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Paul Faeth

Paul Faeth is the President of Global Water Challenge (GWC). He leads GWC's mission of universal access to safe drinking water, sanitation, and hygiene education. Faeth helped launch GWC with a diverse coalition of corporations, foundations, and aid organizations. GWC is a unique partnership to build healthy communities and provide sustainable, replicable, and scalable solutions to ensure the availability of clean water and safe sanitation.

Before joining the GWC in January 2007, Faeth was Executive Vice President and Managing Director of the World Resources Institute for five years. He was responsible for day-to-day operations at WRI, including human resources, finances, strategic planning, and supported external functions, fundraising and public relations. Prior to that position, he lead the Economics Program at WRI, where he directed several efforts collaborative work with industry on climate change policies, research on the sustainability of agriculture in the United States, research and implementation work on the application of emissions trading to improve water quality, and an assessment of trade and its impact on the environment. Faeth was WRI's Liaison to the Sustainable Agriculture Task Force of the President's Council on Sustainable Development organized by President Clinton. He directed WRI's effort to help a power company mitigate its carbon dioxide emissions through forestry activities in developing countries, resulting in the first project ever funded with the intention of balancing carbon dioxide emissions.

Faeth previously worked with the International Institute for Environment and Development and the USDA's Economic Research Service. He holds degrees in Agricultural Engineering from the University of Florida and in Resource Policy from Dartmouth College.

Heather Fleming

Heather Fleming is CEO and co-founder of Catapult Design, a product and technology firm that serves disadvantaged communities. Catapult's clients are organizations working in impoverished communities with technology needs – including rural electrification, water purification and transport, food security, and health.

Before starting Catapult, she worked for several years as a product design consultant in Silicon Valley, designing products for a diverse range of clients. In 2005, she co-founded and led a volunteer group focused on developing appropriate technologies for developing countries through Engineers Without Borders - USA. The team's work was featured in a variety of media and publications, including Newsweek, WIRED.com, ABC News, and PRI's The World. Heather was named a Pop!Tech Social Innovation Fellow for her work with Engineers Without Borders and Catapult Design, a program aimed at high-potential young leaders with new approaches for transformational impact. Heather is also a Staff Writer for NextBillion.net and teaches "Design for Sustainability" in Stanford University's Mechanical Engineering department.

Participant Profiles in alphabetical order

Lourdes Gallardo

Lourdes Gallardo is an Investment Officer in the private sector group of the Inter-American Development Bank working for the Opportunities for the Majority Initiative. Using loans, partial credit guarantees, and grant resources, the Initiative works to identify, develop and finance pre-commercial socially-oriented activities using market-based principles.

During her career at the IDB, Lourdes has previously worked at the Office of Evaluation and Oversight and at the Institute for Social Development. Before joining the IDB, she worked for the World Bank and for the Asian Development Bank. Lourdes earned a M.S. in Applied Economics and Management and a M.P.A from Cornell University.

Eric Green

Eric Green is the Founder of Respira Design, a social venture developing a $1 paper device for the treatment of asthma in the developing world. Respira Design was selected as winner of the Stanford social entrepreneurship challenge in 2009 and has been recognized in the *New York Times* and *Business Week.* Eric received an MD and PhD from Stanford University as part of the NIH Medical Scientist Training Program. His PhD dissertation discovered novel mechanisms in learning and memory. He is currently a resident in internal medicine at the Brigham and Women's Hospital and a clinical fellow at Harvard Medical School. He holds an AB from Harvard College.

Robert Hauck

Robert Hauck is Global General Manager of the Office of the Chief Engineer for GE Healthcare.

Mr. Hauck grew up in Western Pennsylvania and attended Villanova University where he graduated with a Bachelor's of Science degree in Mechanical Engineering. After graduation he worked in Florida for a small engineering consulting firm before joining the U.S. Volunteer Service Peace Corps. His Peace Corps assignment was in Sierra Leone West Africa where for 6 months he taught Secondary School Math and Science and for the next 2 years he was assigned to the international aid organization C.A.R.E. building roads. On his return to the States he completed a Dual Focus Masters of Science degree in Bio-Medical/Mechanical Engineering from the Ohio State University.

Mr. Hauck continued his engineering career with the Ford Motor Company in Product Engineering at Dearborn Michigan before joining GE's Medical Systems Business. He has worked for GE now for over 30 years and has had numerous global assignments in the U.S and Europe in Design Engineering, Product Development and Engineering & Service Management. He has held positions of diverse responsibility across GE Healthcare Globally, including Product and Service Productivity, Service Engineer Training, Design and Testing Technology, Technology Quality & Documentation and Safety & Regulatory Engineering. He is a member of

the Dartmouth College, Thayer School of Engineering and Tuck School of Business Masters of Engineering Management Corporate Collaboration Council and serves as a mentor for the FIRST Robotics program and Engineers Without Borders.

Catherine Lainé

Catherine Lainé is the Deputy Director of Appropriate Infrastructure Development Group (AIDG). AIDG starts small businesses in developing countries to get underserved communities renewable energy, sanitation and clean water by operating through a combination of business incubation, technology R&D and community outreach.

A social entrepreneur who transitioned into international development from academic pursuits in infectious disease epidemiology at Harvard School of Public Health and Oxford University, Catherine is passionate about finding sustainable business solutions to the problems facing the world's poor. Prior to her work at AIDG, she ran a private media consultancy for non-profits and small businesses on how to leverage open source technology for more effective communications. She is an avid blogger and speaker on technology in the non-profit sector for the NTEN conferences. She received her B.A. from Swarthmore College in Biology and is fluent in French and proficient in Haitian Creole and Spanish.

Emeka Okafor

Emeka Okafor has a diverse, interdisciplinary background focused on developing and raising the awareness of all things African. Currently, he is a Partner in Caranda, a manufacturer of globally distributed gourmet beverages and condiments locally sourced and produced from across Sub-Saharan Africa. Mr. Okafor is also a principal at the Makeda Fund, a private equity fund focused on the development of women-owned and managed Small and Medium Enterprises (SMEs) in Africa. In 2007, alongside his other projects, Emeka directed the TED-Global Conference held in Arusha Tanzania, he continues on today as the TED-Africa Director. His most recent endeavor was as a founding organizer of Maker Faire Africa 2009.

In addition to his work on Caranda, Makeda, and TED, Mr. Okafor co-founded the International Private Enterprise Group (IPEG), a volunteer initiative established to promote the role of private enterprise and capital markets in emerging markets. Emeka sitsIn addition Emeka recently served as a senior advisor to the X-prize foundation for their Global Development prize.Emeka is also an active writer and blogger. Passionately committed to sharing the issues and ideas that are guiding Africa's future, he is the founder and author of two publicly acclaimed blogs: Timbuktu Chronicles covers the confluence of entrepreneurship, science and technology in Africa and amongst Africans; Africa Unchained speaks to matters that include policy, education, culture and governance.

Mr. Okafor was born in the Stoke-on-Trent, United Kingdom and grew up in Canada and Nigeria. He was educated at the University of Nigeria and graduated with a degree in Architecture.

Participant Profiles in alphabetical order

Iqbal Qadir

Professor Iqbal Z. Quadir is the founder and director of the Legatum Center for Development and Entrepreneurship at the Massachusetts Institute of Technology (MIT) and founder of Grameenphone Limited in Bangladesh. For nearly twenty years, he has been advocating for the use of mobile phones to empower ordinary people in low-income countries and for commerce-based solutions for their advancement.

While pursuing a career in investment banking in New York in the early 1990s, Quadir recognized that the ensuing digital revolution could bring connectivity to 100 million people living in rural Bangladesh. To make this vision a reality, he established a New York based company, Gonofone Development Corp (meaning "phones for the masses" in Bengali), which became the launch pad for Grameenphone, Bangladesh's largest phone company providing access to over 22 million subscribers irrespective of their geographic location or economic standing.

From 2001-2004, Quadir taught at the John F. Kennedy School of Government at Harvard University, focusing on the democratizing effects of technologies in developing countries. In 2005, he moved to MIT where he co-founded the journal Innovations (MIT Press) and founded the Legatum Center for Development and Entrepreneurship, which promotes discourse and action on bottom-up development and administers a highly competitive fellowship for MIT graduate students who intend to launch enterprises in low-income countries. Quadir holds both an MBA and an MA from the Wharton School, University of Pennsylvania, and a BS with honors from Swarthmore College.

Elisabeth Rhyne

Elisabeth Rhyne is the Managing Director of the Center for Financial Inclusion at ACCION International. The Center is a focal point for collaboration among the microfinance industry and private sector on industry-wide challenges, including the Smart Campaign for Client Protection in Microfinance.

As senior vice president of ACCION International from 2000-2008, Ms. Rhyne led ACCION's initial entry into Africa and India, directed research efforts to develop new financial products and managed ACCION's publications and educational activities. Ms. Rhyne has published numerous articles and books on microfinance, including her new book, Microfinance for Bankers and Investors. She was also co-editor of The New World of Microenterprise Finance, which provided the introduction to microfinance for many of the field's current professionals. Ms. Rhyne was director of the Office of Microenterprise Development at the U.S. Agency for International Development (USAID) from 1994 to 1998, where she developed and led USAID's Microenterprise Initiative. She lived eight years in Africa (Kenya and Mozambique), consulting on microfinance policy and operations for governments, international organizations and microfinance institutions.

Participant Profiles in alphabetical order

Ms. Rhyne holds a master's and Ph.D. in public policy from Harvard University and a bachelor's degree in history and humanities from Stanford University.

Daniel Runde

Daniel F. Runde is Head of Partnership Development for the International Finance Corporation, the private sector arm of the World Bank Group.

From 2005 to 2007, Mr. Runde was Director of the Office of Global Development Alliances (GDA) at the U.S. Agency for International Development (USAID). From 2002 to 2005, Mr. Runde was a Senior Advisor at USAID. Prior to serving in government, Mr. Runde was an Assistant Vice President for Business Development with Citigroup in Buenos Aires, Argentina. Previously, he worked for BankBoston Argentina's corporate foundation. Earlier in his career, he was an investment banker with Alex. Brown & Sons. He has served on various non-profit boards including Society for International Development, Washington D.C., Baltimore Reads and The Harvard Cooperative Society.

Mr. Runde holds a master's in public policy from the Kennedy School of Government at Harvard University and graduated cum laude with a Bachelor of Arts in Government from Dartmouth College.

Evan Thomas

Evan Thomas has been a civil servant at the NASA-Johnson Space Center in Houston, Texas since 2004. Evan works as an aerospace engineer in the Life Support and Habitability Systems Branch on concepts for sustainable Moon and Mars spacecraft. These projects include microgravity fluid management technologies and water recovery systems.

Evan is also a sustainable development engineer, designing and managing appropriate technology programs in developing communities since 2002. Evan has worked in Nepal, Rwanda, Mexico and Afghanistan with Engineers Without Borders-USA.Since 2007, as the founding Executive Vice President of Manna Energy Limited. Manna is a social enterprise, installing water treatment, biogas and fuel briquetting technologies in Rwanda and Afghanistan, funding these ventures, in part, and as the first organization to claim United Nations carbon credits for the treatment of drinking water.

Evan received his Ph.D. in Aerospace Engineering from University of Colorado at Boulder.

Amos Winter

Amos Winter is pursuing a PhD in Mechanical Engineering at the Massachusetts Institute of Technology. His research interests include biomimetic design, fluid/solid/granular mechanics, design for international development, human power, biomechanics, mechanical/precision machine design, and design of ocean systems.

Participant Profiles in alphabetical order

Amos has engaged in numerous projects focused on developing country mobility aids. He is the founder and director of the MIT Mobility Lab (http://mlab.mit.edu/) and teaches the MIT course SP.784 "Wheelchair Design in Developing Countries." Amos is the inventor of the Leveraged Freedom Chair (LFC), a wheelchair designed specifically for use in developing countries. The LFC is propelled by a novel variable mechanical advantage lever drivetrain and is made completely from bicycle components, making it manufacturable and repairable anywhere in the developing world.

For his PhD thesis, Amos is investigating how to design compact, low-power, and reversible burrowing systems for undersea applications such as anchoring, oil recovery, and cable installation. As a practicing engineer, Amos has worked with Bluefin Robotics, Schlumberger, Massachusetts General Hospital, Whirlwind Wheelchair International, NASA's Jet Propulsion Laboratory, and The Monterey Bay Aquarium Research Institute. He received a BS in Mechanical Engineering from Tufts University in 2003 and an MS in Mechanical Engineering from MIT in 2005.

ASME helps the global engineering community develop solutions to real world challenges. Founded in 1880 as the American Society of Mechanical Engineers, ASME is a not-for-profit professional organization that enables collaboration, knowledge sharing and skill development across all engineering disciplines, while promoting the vital role of the engineer in society. ASME codes and standards, publications, conferences, continuing education and professional development programs provide a foundation for advancing technical knowledge and a safer world.

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