ENGINEERING CHANGE LAB USA

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THE ENGINEERING IDEAS INSTITUTE

SESSION 2:

LEADERSHIP FOR ENVIRONMENTALLY RESPONSIBLE ENGINEERING

Summit 9 Report
July 29-30, Aug 5-6 2020
Session 2

Leadership for Environmentally Responsible Engineering

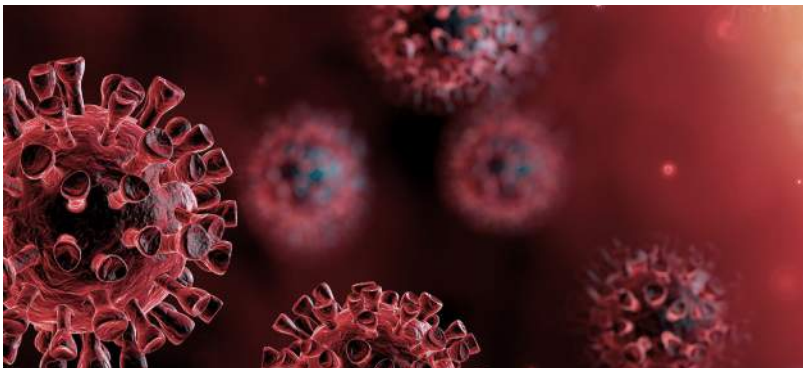
Summit 9 • Session 2 | July 30, 2020

Session 2 Overview

At the Houston ECL-USA Summit, we were introduced to the concept of Environmentally Responsible Engineering (ERE), the heart of a new major initiative launched by The Lemelson Foundation and Venturewell "to enable engineers to be better equipped to create positive outcomes for the planet and the life it sustains, now and for future generations, and to help ecosystems recover and thrive when possible."

Session 2 of the Engineering Ideas Institute explored what it takes to lead the work of ERE through the stories of leaders actively engaged in this type of work. Provocateurs drew from their experiences in engineering, environmental science, and related design disciplines to illustrate and help participants understand the range of leadership capacities and skills required to successfully shift the organizational ecosystems surrounding technology projects toward environmentally responsible outcomes.

This session also explored the type of leadership that engineers can offer society in a post-COVID-19 world as stewards of technology and nature, helping society move along a pathway toward a future we want, while avoiding the kind of conditions we don't want.



PROVOCATEURS

Cindy Gilbert, MS, MEd
SENIOR PROGRAM OFFICER – VENTUREWELL

Cindy Gilbert leads the higher education catalyst team at VentureWell and plans, develops, and executes the organization's faculty and institutional change initiatives. In this role, Cindy oversees the faculty grants program, the Frontier Set program, and is working to advance VentureWell's sustainability and environmentally responsible engineering initiatives. Prior to joining VentureWell, Cindy founded and led higher education programs at the Biomimicry Institute and Minneapolis College of Art and Design where she launched a fully online, multidisciplinary MA in Sustainable Design.

Jennifer Molnar
LEAD SCIENTIST & MANAGING DIRECTOR, CENTER FOR SUSTAINABILITY SCIENCE
THE NATURE CONSERVANCY

Jen Molnar is lead scientist and managing director of The Nature Conservancy's Center for Sustainability Science, developing scalable solutions that leverage business and policy. Jen has over 20 years of experience using science to improve decision-making, including science leadership in NGO-private sector collaborations to shift practices and business models (e.g., TNC-Dow, TNC-Syngenta). Jen received a master's degree from Yale's School of the Environment, and an B.S. in environmental engineering from Harvard, and has previous private sector experience in hydrology and remediation.

Brian Sifton
SUSTAINABILITY PROGRAM MANAGER
BLACK & VEATCH

Brian Sifton works at the intersection of sustainability, strategy and innovation, managing Black & Veatch's corporate sustainability program and collaborating across businesses to bring sustainable infrastructure solutions to market.

Betsy del Monte, FAIA
ARCHITECT & SUSTAINABILITY CONSULTANT, CAMERON MACALLISTER GROUP
ADJUNCT PROFESSOR, SOUTHERN METHODIST UNIVERSITY

Betsy del Monte is an architect with 30 years of experience in high-performance architecture and environmentally responsive design. She is a consultant with the Cameron MacAllister Group, working with firms to enable sustainability and resilience. She is also an adjunct professor at SMU's School of Engineering, teaching a Masters degree in sustainability and development. She received architecture degrees from the University of Virginia and Rice University. She is a Fellow in AIA, and Senior Fellow in the Design Futures Council, and currently serves on the national AIA Strategic Council.

Synopsis of Provocations

ENVIRONMENTALLY RESPONSIBLE ENGINEERING: BUILDING CAPACITIES FOR LEADING THE CHANGE

Cindy Gilbert
SENIOR PROGRAM OFFICER – VENTUREWELL

Cindy Gilbert provided an overview of the Lemelson Foundation / VentureWell "Engineering for One Planet" initiative. The need for the initiative was demonstrated several years ago when VentureWell surveyed teams of student inventors participating in their program. The survey identified an important gap. 70% of the students included sustainability as a personal value of "utmost importance," but 60% had never considered the environmental impacts of their inventions. From the desire to close this gap came the aspiration for the Engineering for One Planet initiative – to "ensure all engineering professionals are equipped with the fundamental competencies and skills in environmentally responsible engineering (ERE) by transforming engineering education.

Work on fulfilling that aspiration is well underway, with a desired outcome of creating curricular content that all engineers experience that is also aligned with ABET requirements. Through work with an extensive network of stakeholders, the initial draft of the ERE curriculum framework has been completed.

At the core of the framework is the skill of ***SYSTEMS THINKING***, "the most fundamental concept and approach that students must learn to become environmentally responsible." The decision to prioritize the importance of systems thinking aligns with the learning from numerous previous ECL-USA events. Systems thinking is a skill that is critical to the future of the engineering community.

The framework also recognizes overall leadership skills as one of the key focus areas for the ERE curriculum, particularly critical thinking skills along with communication and teamwork.

All the provocateurs for Session 2 were asked to reflect on their personal development as environmentally responsible leaders. Cindy Gilbert described her personal role models – Canadian environmental activist David Suzuki and Janine Benyus, writer and thinker on biomimicry. She described Suzuki's emphasis on values, empathy, and guardianship (putting the next generation first), being reflective on one's own experience and beliefs, and his conviction that every person (and species) has the right to "speak" and be heard. From Benyus, she learned about the importance of ethical decisions and choices in leadership, particularly in our basic relation to nature, and seeking new perspectives (Inquiring, "How would nature do this?"). For both, she underscored a common leadership trait of great communication skills.

Cindy also commented on the drivers of her personal leadership practice, including the importance of considering the consequences of actions and decisions, stepping up and speaking up even when it's tough, the alignment of personal values with work, valuing community over individual, and listening, learning, and leaning into discomfort to grow and change.

Appendix A: Engineering for One Planet: Core Student Learning Outcomes

Cross-referenced with Engineering Accreditation Requirements and United Nations Sustainable Development Goals

Legend

Δ Is used to denote when a Framework student learning outcome is directly tied to The Accreditation Board for Engineering and Technology student outcome as described in Criteria 3.

∞ Is used to denote when a Framework student learning outcome is directly tied to the SDG Goal #12 learning outcomes.

NATURE AND ENGINEERING

Jennifer Molnar
LEAD SCIENTIST & MANAGING DIRECTOR, CENTER FOR SUSTAINABILITY SCIENCE
THE NATURE CONSERVANCY

Jen Molnar's work at The Nature Conservancy (TNC) revolves around her desire to combine her environmental engineering background with a deeper involvement with nature to address environmental challenges. Using TNC's partnership approach, she is working to create greater use of natural infrastructure solutions that combine engineering solutions with additional environmental benefits.

Jen described TNC's 10-year collaboration with Dow Chemical that began with a commitment by Dow's CEO to value nature in every decision made by the company. A key to the successful partnership with Dow was their experience in the 1990's with construction of a wetlands for waste treatment at a Gulf Coast facility rather than a conventional treatment plant. Dow estimates that this decision, driven by a single engineer within Dow, has saved hundreds of millions of dollars while also providing critical habitat for migratory birds. Dow staff have described this engineer as an "isolated pool of passion" within their company.

TNC and Dow are working to bridge across disciplines to build trust (a common theme of ECL-USA discussions regarding the future of engineering) through cross-cultural learning, science-based technical training related to understanding nature, and training in systems thinking. Jen's engineering background has been an asset in connecting and collaborating across the different disciplines.

Now, Dow requires all real estate projects to include an assessment of nature, bringing nature into tangible business decisions. They are looking at watershed enhancement options to address their water supply needs and planting forests to mitigate air quality impacts. By 2020 they hope to create $1 billion in value from their nature-enhancing projects.

Molnar concluded her provocation by acknowledging the important role that engineers need to play in addressing the challenges of the future, such as pandemics and climate change. She re-emphasized the importance of leadership skills in fulfilling this role – systems thinking; investing in soft skills like communication to better understand each other; convening (workshops and learning events); relationship-building; collaboration across diverse groups of stakeholders; and leveraging differences to achieve better solutions.

LEADERSHIP FOR RESILIENCE IN THE TIME OF COVID-19

Brian Sifton
SUSTAINABILITY PROGRAM MANAGER
BLACK & VEATCH

Brian Sifton brings a background in environmental science, urban planning, and economics to his role at Black & Veatch. His experiences have revealed three important leadership behaviors that contribute to building resilience.

Anticipating *– Learning to seek out and assess signals from your environment.*

Coping *– Experimenting and pivoting in real-time.*

Adapting *– Never wasting an opportunity to learn. Assimilating knowledge gained from any experience.*

Sifton then outlined the similarities between the COVID-19 pandemic and the looming challenge of climate change. (The McKinsey article from the summit pre-reading list, "Addressing Climate Change in a Post Pandemic World" deals with this subject in detail.)

- Increased risk to human health and security and economic growth, with a disproportionate impact to those least equipped to adapt and cope.
- Both are collective action problems: COVID – participation in vaccinations; climate change – reductions in greenhouse gas emissions.
- Both emerged from simple market activities: COVID- getting on a plane; climate change- individual decisions on energy use.
- Similar uncertainties around the willingness to make individual change.
- Both expose the fragility of public services.

How do the leadership skills of anticipation, coping and adapting apply to the impacts of climate change on infrastructure? One area of potential major impacts is to the critical Infrastructure (power plants, treatment plants, transmission lines, transportation infrastructure, etc.) that the engineering community designs. According to Sifton, this critical infrastructure

not only improves quality of life and supports economic activity but is also the "connective tissue" between the built and the natural environment. All this infrastructure is sensitive to the climate and will experience significant climatic changes within the lifespan of the infrastructure. The engineering community has a responsibility to anticipate the impacts and design for more resilience. Knowing, however, that anticipation and forecasting rarely result in accurate forecasts requires engineering designs to also be capable of coping with and adapting to changing conditions. Resilience will be required at the individual, organizational, and environmental levels.

Sifton concluded by emphasizing the importance of placing systems thinking at the core of the ERE framework. This will ensure that the leadership skills of anticipating, coping and adapting are applied in the most effective manner to how we design and what we design.

WHAT DO I KNOW ABOUT LEADERSHIP?

Betsy del Monte
ARCHITECT & SUSTAINABILITY CONSULTANT, CAMERON MACALLISTER GROUP
ADJUNCT PROFESSOR, SOUTHERN METHODIST UNIVERSITY

At a key turning point in her career as an architect, Betsy del Monte came to the realization that the impacts of her work, like that of engineers, extends beyond the project property line. One of the key influencers and role models in her shift in mindset was Ray Anderson, the founding CEO of Interface Carpets. Anderson, an industrial engineer, also had a career-changing moment, when he realized the true impacts of his company, impacts that he described as stealing from future generations. Anderson re-invented his company to incorporate principles from nature and became a well-known advocate for sustainability. Another role model for del Monte was Ed Mazria, one of the early leaders of sustainability in architecture.

Influenced by these two role models and her own efforts to educate herself, del Monte shifted her career, and, in her words, began to "do penance for my earlier work."

One of del Monte's shifts came when she was asked to create a graduate degree program in sustainability in the SMU College of Engineering. She built a comprehensive curriculum that she also taught.

She also sought to learn from the work of other organizations. In addition to AIA and engagement in its Committee on the Environment (COTE), she became involved in the United States Green Building Council (the "greenies"), Urban Land Institute (her clients), and the Climate Reality Leaders (group formed by Al Gore).

In 2019 del Monte was one of the leaders within AIA that pushed for the passage of a "Resolution for Urgent and Sustained Climate Change." This resolution was passed resoundingly at the 2019 AIA Convention and has led to a transformation of AIA's mission with climate change at the core of the mission.

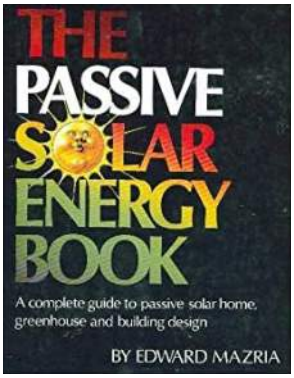
The COVID-19 crisis has led to another pivot within AIA. Then, the racial inequality crisis also came to the forefront. The convergence of these three high priority crises (climate change, COVID-19 and social equity) has led to the reality that we have one crisis – ***the structure of our society is both inequitable and environmentally irresponsible.***

Del Monte, like the other provocateurs, once again stressed the systems thinking that is required for the engineering community to contribute to addressing this one convergent crisis. She cited the example of Houston that has suffered in recent years from the impacts of severe storms. Houston's urban conditions, like other major cities, was shaped decades ago by the practice of red-lining. This practice has created impacts that still exist in access to healthy food, good schools and healthcare. Consequently, recent flooding has resulted in inequitable impacts. Now the city faces important decisions on how flood protection expenditures should be equitably distributed.

Del Monte's final challenge was to think deeply about the questions, "what is our work?" and "who are the public we protect?" The lesson for leaders is that, like an old house, we need to do what needs to be done.

Ray Anderson

Ed Mazria

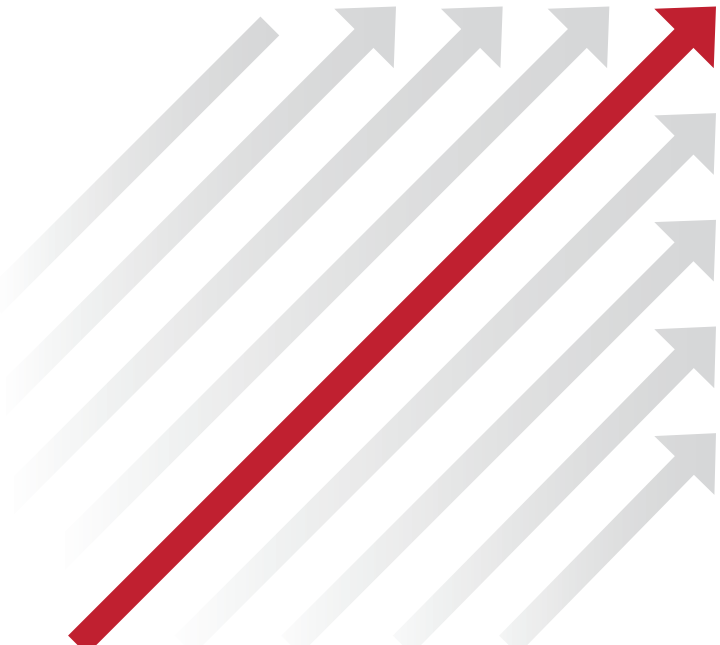


LEADERSHIP MOMENTS EXERCISE

All the provocateurs reflected on their role models and on their personal development as environmentally responsible leaders. Having heard these leadership stories, session participants were asked to identify a person from their own experiences that was an exceptional leader with respect to sustainability and environmental responsibility and reflect on the capacities / skills that made the person an effective leader. In group discussion, participants shared their personal stories. The whole group report-out revealed common leadership skills and traits that stood out in all the stories.

- Ability to communicate across different disciplines and stakeholder groups.
- Skill at building trust through building relationships, including a sense of vulnerability and humility in listening to other voices.
- Ability to holistically see the big picture.
- Breaking down silos and connecting.
- Empathy and appreciation of other's perspectives that allows finding common ground and facilitates constructively dealing with conflict.
- Passion and commitment to personal values and purpose (i.e., Ray Anderson).
- Vision.
  - *Seeing the big picture - what others don't see yet;*
  - *Willing to do the hard work and inspiring others to do the same.*
  - *Being open to learning and to a change in tactics but not to compromising on the overall vision.*
  - *Helping others to co-create a common vision.*
  - *Possessing the political savvy that helps to bring others to consensus.*
- Personal moment of clarity that caused a shift to leadership role. Be open to it!
- Agency.
  - *Feeling like you have the ability to make change (sometimes not possible for marginalized groups).*
  - *Willingness to try and accept failure and learn.*
- Vulnerability and a willingness to take risks.
- Tenacity / perseverance / grit.
- Life balance.
- Curiosity about and appreciation for Nature.

A key question posed in the group discussion was whether there is a unique leadership responsibility for the engineering community. Those who understand technology and technical issues and can combine that technical expertise with a knowledge of systems, have great responsibilities and can have great impact.



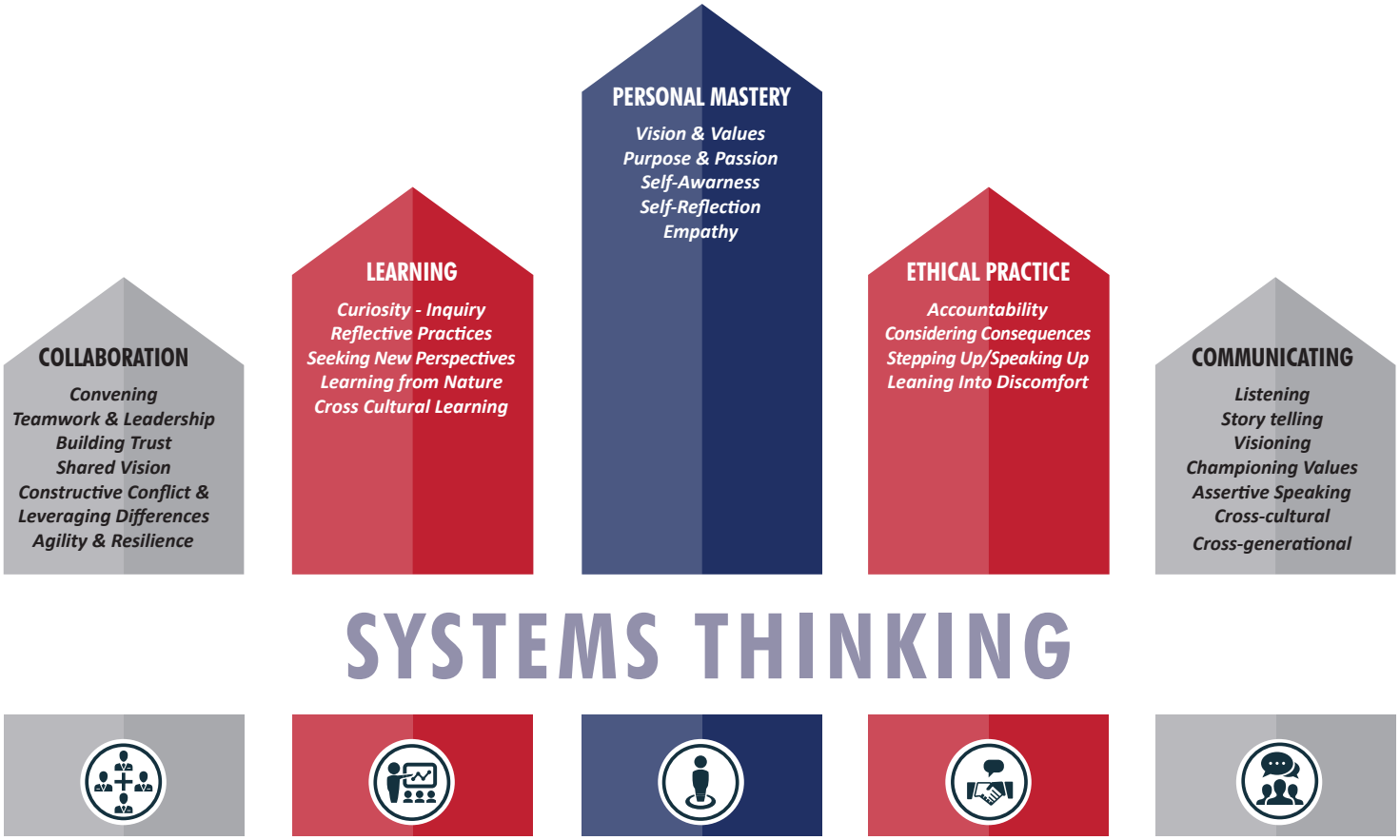
ENVIRONMENTALLY RESPONSIBLE LEADERSHIP & THE COVID-19 PANDEMIC

As a conclusion to this session, provocateurs and participants discussed the relationship between environmentally responsible leadership and the COVID-19 pandemic. The discussion was framed around the following question.

? What are we learning about the leadership role engineers and the engineering community, as stewards of technology and nature, can offer to society in a post-COVID-19 world?

- Jen Molnar commented on the importance of the prioritization of public sector investments resulting from the pandemic.
- Emotions have an impact on our ability to accept and understand scientific data.
- Shifting of values that get embedded in technology.
- How do we create, maintain and ethically use the trust we have as "experts" in planning for crises like COVID-19?
- Being willing to speak truth to power.
- Mobilizing people to want to tackle tough problems.
- Importance of perseverance and grit.
- Being willing to reflect on why we (as ECL-USA) didn't focus earlier on the COVID crisis?

LEADERSHIP FOR SUSTAINABILITY & ENVIRONMENTALLY RESPONSIBLE ENGINEERING IN PRACTICE / WORK



VALUES

Long-term • Community • Inclusiveness • Deep Appreciation for & Learning from Nature • Put Next Generation First