



Engineering
Change Lab
USA

»»» *Inspiring* **Leaders of Change**



Exploring Engineering Education Summit

Sponsored by NCEES

and Presented in Collaboration with
ABET, Engineering for One Planet, and
Olin College of Engineering

March 14, 2023





Scanning the Horizon of Engineering Education: The Sustainability Imperative

Sponsored by



NCEES
*advancing licensure for
engineers and surveyors*

**PRESENTED IN COLLABORATION WITH ABET, ENGINEERING
FOR ONE PLANET, AND OLIN COLLEGE OF ENGINEERING**

Why is sustainability important to the transformation of engineering education? Engineering Change Lab – USA’s (ECL) virtual summit, Scanning the Horizon of Engineering Education: The Sustainability Imperative, held on March 14, 2023, explored this question. The multi-faceted answers to this question lie in **the engineering community’s responsibility in protecting our planet**, the massive impact of the work of engineering, engineering student values, employer needs and responsibilities, and the academic community’s role in preparing the next generation.

A series of significant societal, technological, and environmental challenges are reshaping what it means to be an engineer in the 21st Century. Engineering education is a primary crucible for this change, with the need to transform the curriculum, experience, and composition of the student body, faculty, and staff in higher education institutions.

Chief among these catalysts is the advent of sustainability as central to engineering practice in the future and the need for academic institutions to prepare graduating practitioners of all disciplines with the values, mindsets, skills, and competencies to take on this challenge on behalf of society.

The power of this shift is being felt within engineering schools as this imperative is spreading from the dedicated few to being more fully embraced across programs and disciplines. This crucible for change is also a major setting for addressing other significant issues and dynamics, including social justice, DEI, macro-ethics, entrepreneurship and innovation, systems thinking, and leadership.





Provocation

Provocation – ABET Accreditation and the Impact on Global Sustainability



MICHAEL MILLIGAN
ABET

Michael K. J. Milligan is the CEO of [ABET](#), the global accreditor of 4,500+ college and university programs in applied and natural science, computing, engineering, and technology. Prior to joining ABET, Milligan was a systems director at the Aerospace Corporation, leading a team at the NASA Goddard Space Flight Center developing the next generation environmental satellites for NOAA. Milligan served over 24 years as a career U.S. Air Force officer working in operations, engineering education, international R&D and technology acquisition. He holds a PhD in Electrical Engineering and a MBA.

Michael Milligan, CEO of ABET, kicked off the summit highlighting the major work to be done taking on the sustainability challenge within engineering education. He noted that sustainability is a “systems challenge” that stretches across the breadth of engineering disciplines within schools. Taking on this challenge will require changes to engineering criteria, curriculum, and student outcomes, as well as integration into a holistic experience for students. Ultimately, sustainable solutions flowing from these changes can have a significant positive impact on society.

He framed the sustainability in engineering education imperative around the challenge of meeting the [United Nations Sustainable Development Goals](#). He emphasized several of the SDGs that require greater contributions from the engineering community – Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7), Climate Action (SDG 13), Life Below Water (SDG 14), and Life on Land (SDG 15).

SUSTAINABLE DEVELOPMENT GOALS



Provocation – ABET Accreditation and the Impact on Global Sustainability

Likelihood of meeting the 17 Sustainable Development Goals in five world regions:

- Goal likely to be reached (i.e target fulfilment of more than 95%)
- Goal not likely to be reached, but more than 50% of gap between today's status and the goal is likely closed
- Goal not likely to be reached, and less than 50% of gap between today's status and the goal is likely closed



		ROW	BRIS	CHINA	OECD	USA
1	No poverty	●	●	●	●	●
2	Zero hunger	●	●	●	●	●
3	Good health and well-being	●	●	●	●	●
4	Quality education	●	●	●	●	●
5	Gender equality	●	●	●	●	●
6	Clean water and sanitation	●	●	●	●	●
7	Affordable and clean energy	●	●	●	●	●
8	Decent work and economic growth	●	●	●	●	●
9	Industry, innovation and infrastructure	●	●	●	●	●
10	Reduced inequality	●	●	●	●	●
11	Sustainable cities and communities	●	●	●	●	●
12	Responsible consumption and production	●	●	●	●	●
13	Climate action	●	●	●	●	●
14	Life below water	●	●	●	●	●
15	Life on land	●	●	●	●	●
16	Peace, justice and strong institutions	●	●	●	●	●
17	Partnerships for the goals	●	●	●	●	●

Not enough data to assess

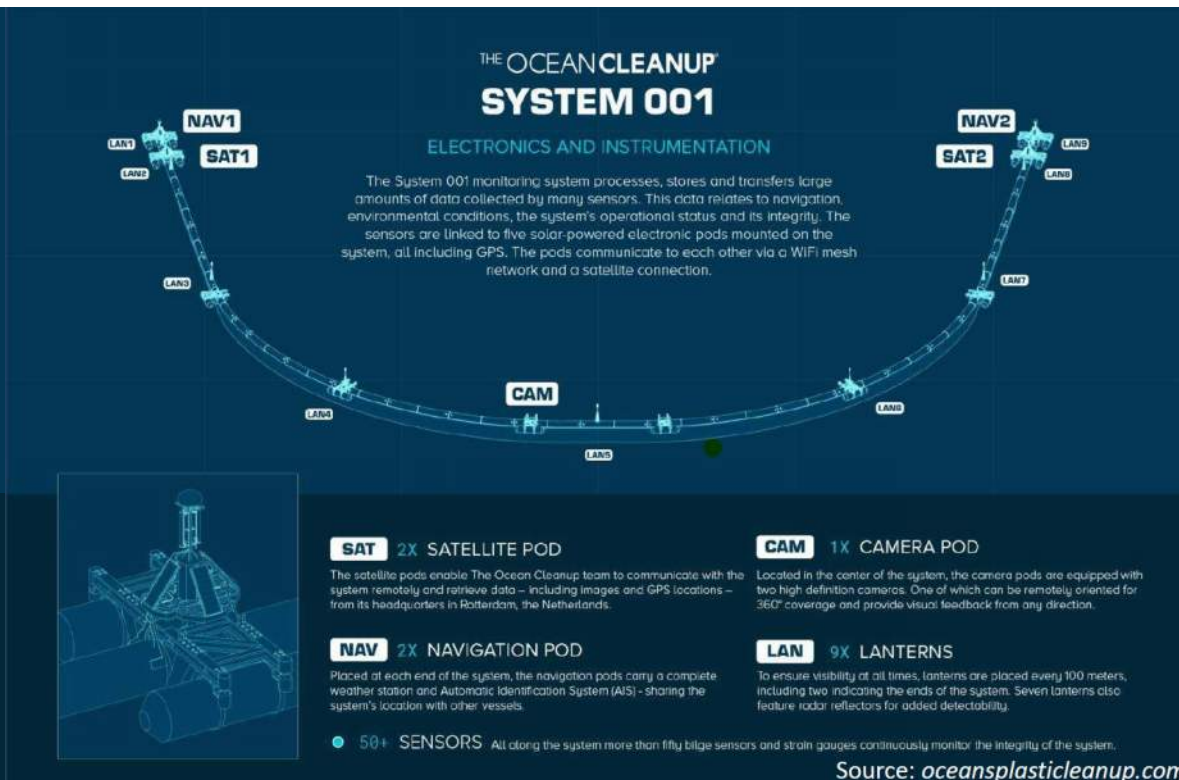


FIVE REGIONS:

- USA
- OECD (excl. USA)
- CHINA
- BRIS (Brazil, Russia, India, South Africa and ten other Emerging economies)
- ROW (Rest of the World)

Source: www.dnv.com

Milligan cited the example of Boyan Slat, an Aerospace Engineering student and entrepreneur, who wanted to make a difference in the world. Slat formed The Ocean Cleanup, a start-up company that is working on removing plastics waste in the ocean.





Provocation – ABET Accreditation and the Impact on Global Sustainability

Milligan described how ABET accreditation is uniquely positioned to drive sustainability into undergraduate engineering education and increase engineering's contributions to a resilient world. ABET as the accrediting body for over 4,500 colleges and universities across the globe, can play a role as advocate, not only for changes in curriculum, but as importantly, for shifts in the mindsets of students, educators, and other members of the engineering education community. He emphasized the importance of ABET Criterion 3, Student Outcomes, which offers multiple lenses on the importance of sustainability.



Understanding of the impacts of engineering on people and the environment.



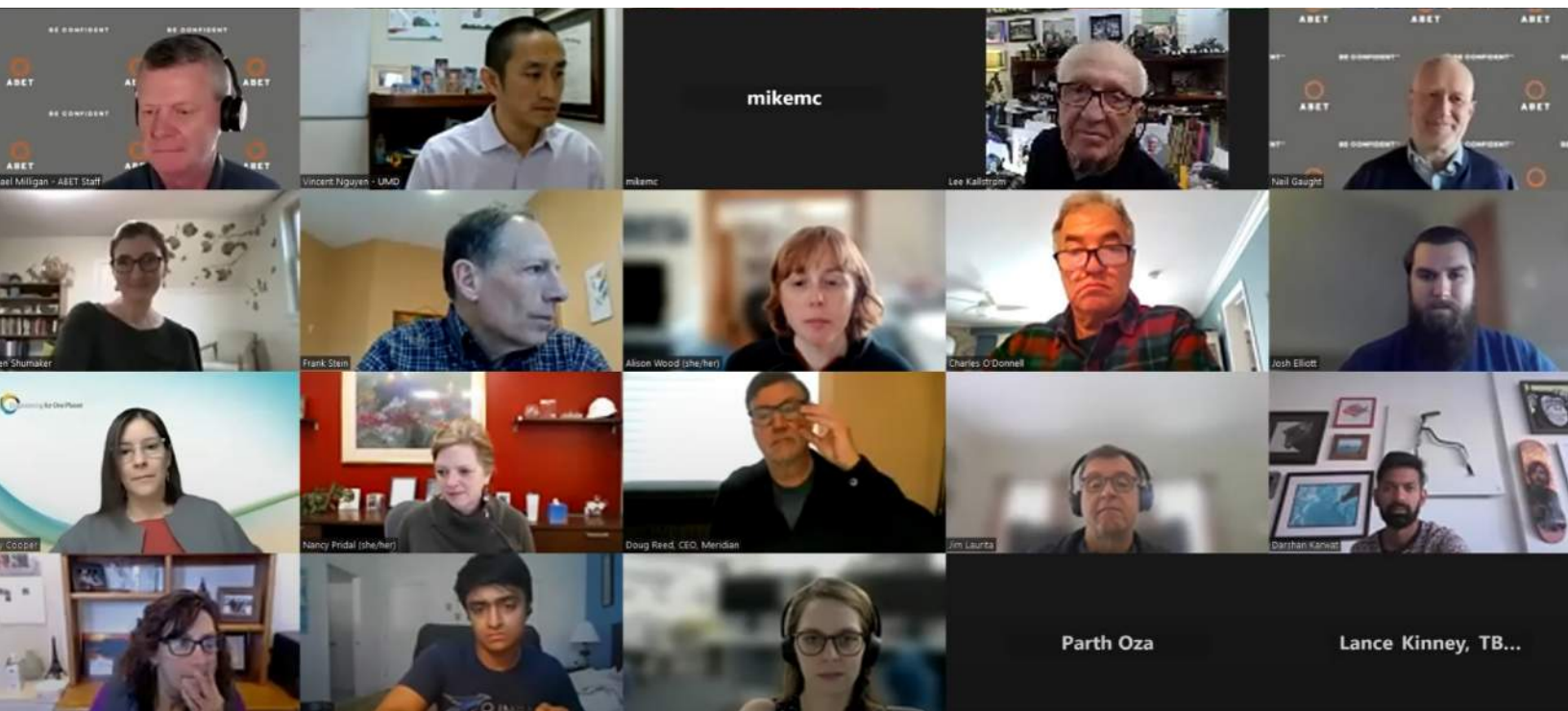
Recognition of ethical and professional responsibilities.



Understanding of both local and global contexts.



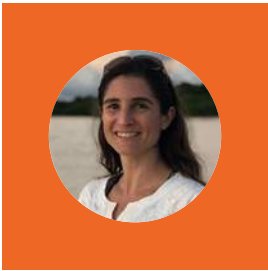
[Listen to Michael Milligan's key points regarding ABET's role.](#)





Provocation

Provocation – Sustainability and Impact-centered education



ALESSANDRA FERZOCO,
Olin College of Engineering

Alessandra is equal parts scientist, engineer, designer of learning experiences, and curious wanderer. Her technical expertise is in building chemical measurement devices, and she enjoys the interdisciplinary nature of that work. At Olin she primarily teaches impact-centered courses where the projects student work on have an external partner that shapes the relevance and longevity of student work. She enjoys the unknown nature of working on real world projects with students, and the way a third party changes the relationship between professor and student.

Alessandra Ferzoco of Olin College of Engineering described her work in integrating sustainability into **impact-centered education** and the dynamics and ethical dilemmas that students face when working with third parties from outside the educational system.

Ferzoco defines impact-centered education as an approach that ***“links learning objectives and activities to something that results in positive outcomes in the world.”*** This approach allows the students to learn the application of core engineering principles (e.g., thermodynamics) to real world projects (e.g., battery technology).

A key element of her courses is the involvement of third-party partners from outside education, such as private businesses or non-profits who bring actual projects to the students. The presence of this third party in the class impacts both faculty and students. One impact is that students develop greater trust in the teacher to provide the help they need. Another is that faculty and students learn together regarding the third-party projects.

Sustainability is also a major consideration for these impact-centered projects, and students learn to evaluate the impacts of different types of projects and solutions on people and on the environment in these real-world settings.

Combining the impact-centered approach with third parties requires faculty to carefully balance between the impact areas students want to work in and the third-party partners’ projects. By incorporating sustainability as a major consideration, students learn to evaluate the impacts of different types of projects on people and on the environment. Significant integration of sustainability into the learning experience not only impacts the students but can also have important impacts on the third-party partners.

The integration of sustainability with the impact-centered approach can also surface important ethical issues. Students learn to not only recognize, but manage real world ethical dilemmas that result when their values may not align with the third-party partner’s project. An example of this balance that students at Olin considered was helping a company to “green” their supply chain with success measured as selling more consumer products. These experiences equip students to proactively take-on the ambiguities and ethical dilemmas that will be present when they move into professional practice.



Provocation – Sustainability and Impact-centered education

Who decides who and what?

What level of risk is acceptable to different students?

Who are the people?

How much do students need to know when they enroll?

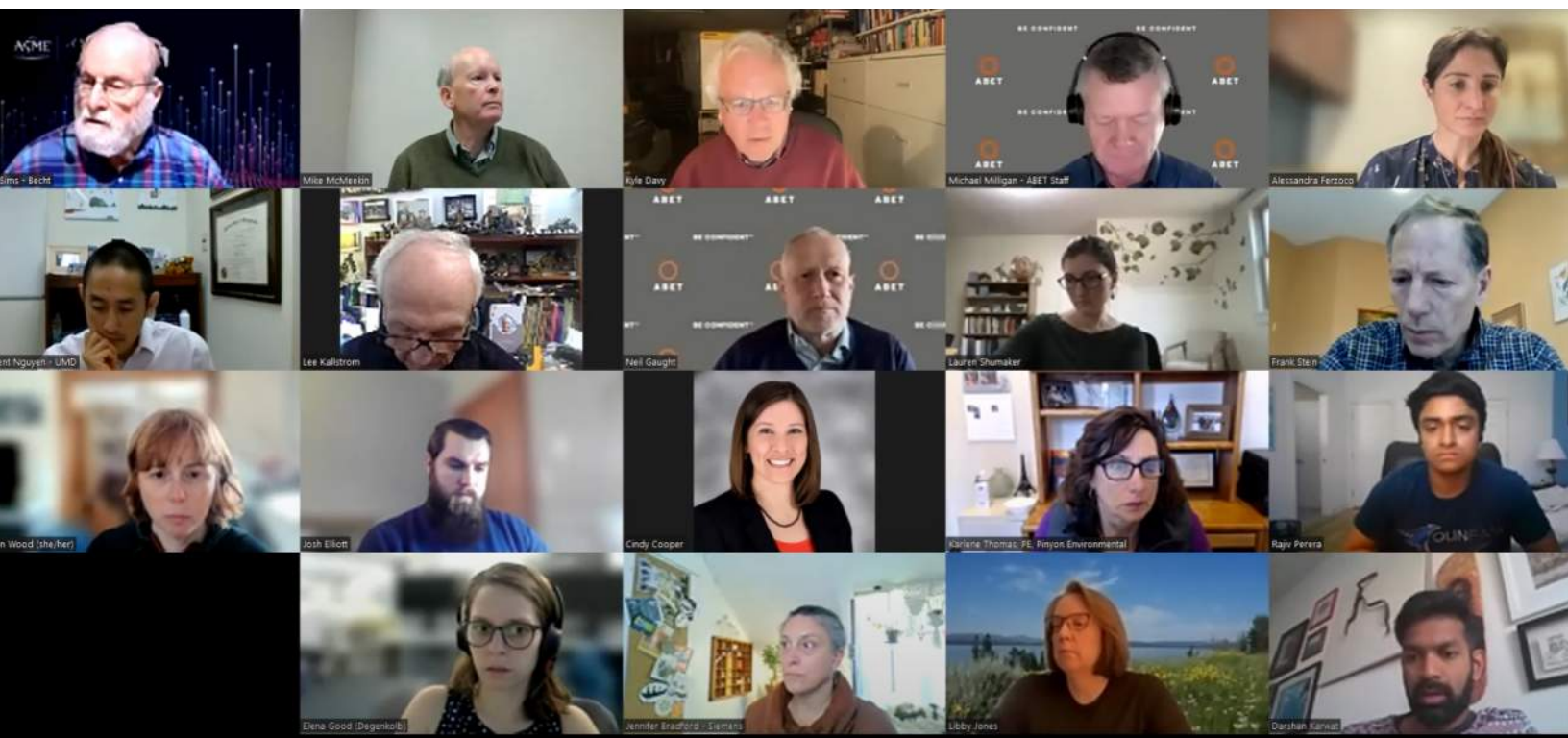
What are the projects?

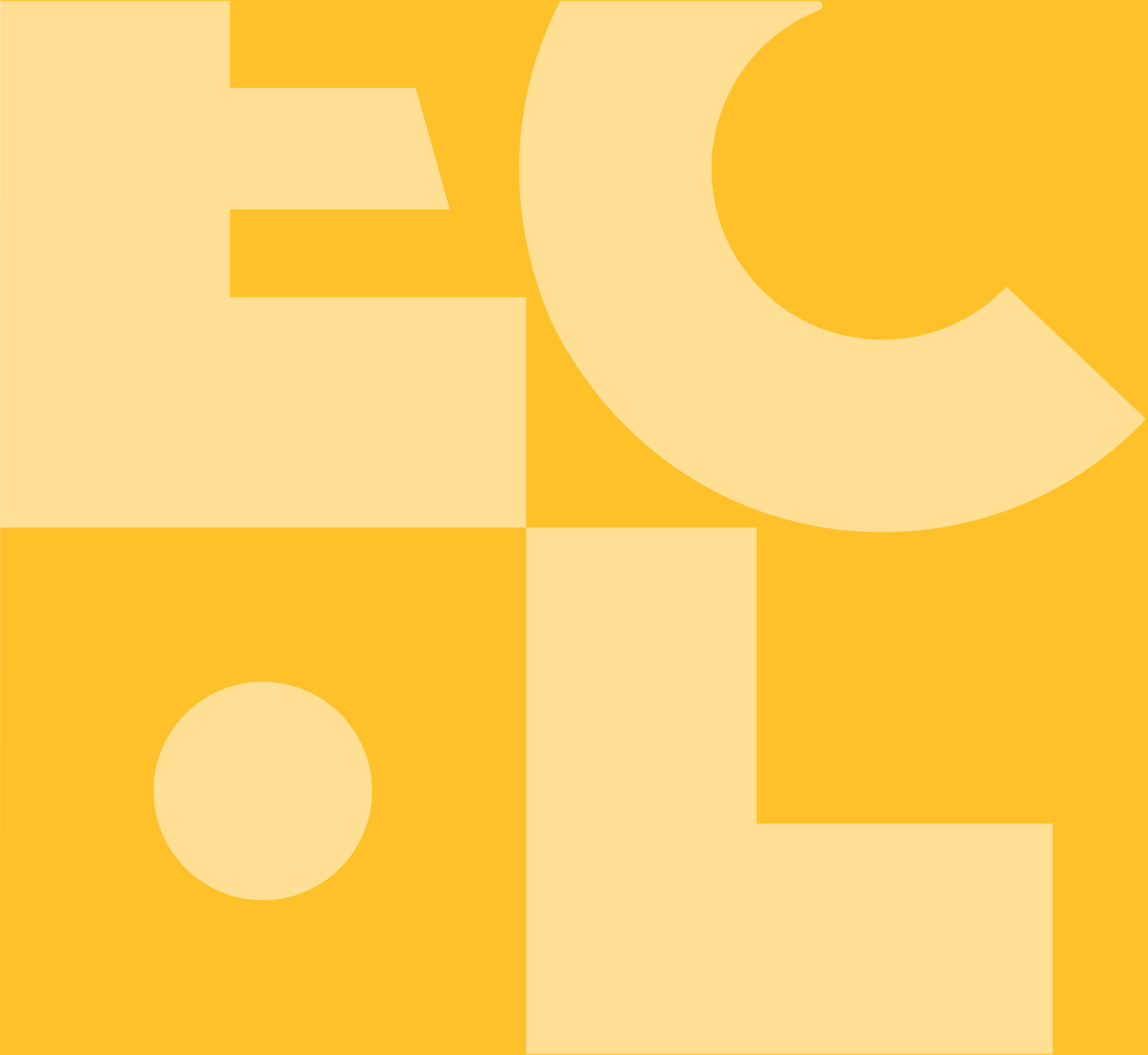
Who should pay and what should it cost?

Who defines what success and failure means?

How might students display all facets of this kind of experience to potential employers?

Impact-centered education can also include projects originated by the teacher that involve collaboration within a social enterprise in the university. An example from one of Ferzoco's classes is the development of a controller and software system to support the independence of visually impaired students by solving the "last 100 steps" of navigation.





Panel Discussion

Panel Discussion – The Student Perspective on the Sustainability Imperative in Engineering Education



BETH MICAL,
Milwaukee School of Engineering, Martin & Martin, Inc.

Hi I'm Beth! I am a structural engineer in Denver, CO with Martin/Martin. I've received my B.S. in Civil Engineering from Milwaukee School of Engineering, and I am currently working towards finishing my M.S. in Civil Engineering from there as well. I am actively involved with Engineers Without Borders and helping design and construct infrastructure in the Joyabaj, Guatemala region. I've also participated in the Associated Schools of Construction competitions.



RAJIV PERERA,
Olin College of Engineering

My name is Rajiv Perera, and I was born and raised in Jacksonville, Florida. Of the many Floridians my age that I have met in my time up north, I am one of the only ones that wants to spend the rest of my life in the sunshine state. I think that change in communities starts on a local, personal level. Now I am a junior at Olin College of Engineering studying Robotics through the lens of systems-thinking, and I like to use this lens to examine sustainability on a micro, macro, and interpersonal scale.



HOLLY RUDEL,
Yale University

Holly is a PhD candidate in Environmental Engineering at Yale University motivated to utilize her technical expertise to aid decision-makers in evaluating the impacts of their choices and select the most sustainable path.

Beth Mical, Rajiv Perera, and Holly Rudel, our panel of engineering students, offered their insight on the importance of sustainability in engineering and how sustainability has shown up in their education. Key insights are included below.



From your perspective, how important is sustainability to engineering practice both today and in the future? How does an emphasis on sustainability align with your personal values and interests as an aspiring engineer?



- Impacts on people are the most important parts of engineering.
- The recent train derailment in Ohio is an example of how we could re-envision the paradigms of engineering. What if we did not need those toxic chemicals?
- Olin's approach allows students to go deeper into issues like sustainability. We spend time on stakeholder analysis for our projects. This is growing my consciousness.

Panel Discussion – The Student Perspective on the Sustainability Imperative in Engineering Education



How has sustainability shown up in your education?



- I have had to seek out sustainable approaches through self-directed learning.
- I see the importance of incorporating sustainability across the entire curriculum, as opposed to a single course on sustainability.
- The Center for Green Chemistry at Yale, which is a long-standing engineering program with an emphasis on sustainability, including sustainable materials and chemistry for drinking water, has been important for me.
- I did not get exposure to sustainability until my master's program.



How do your classmates view sustainability?



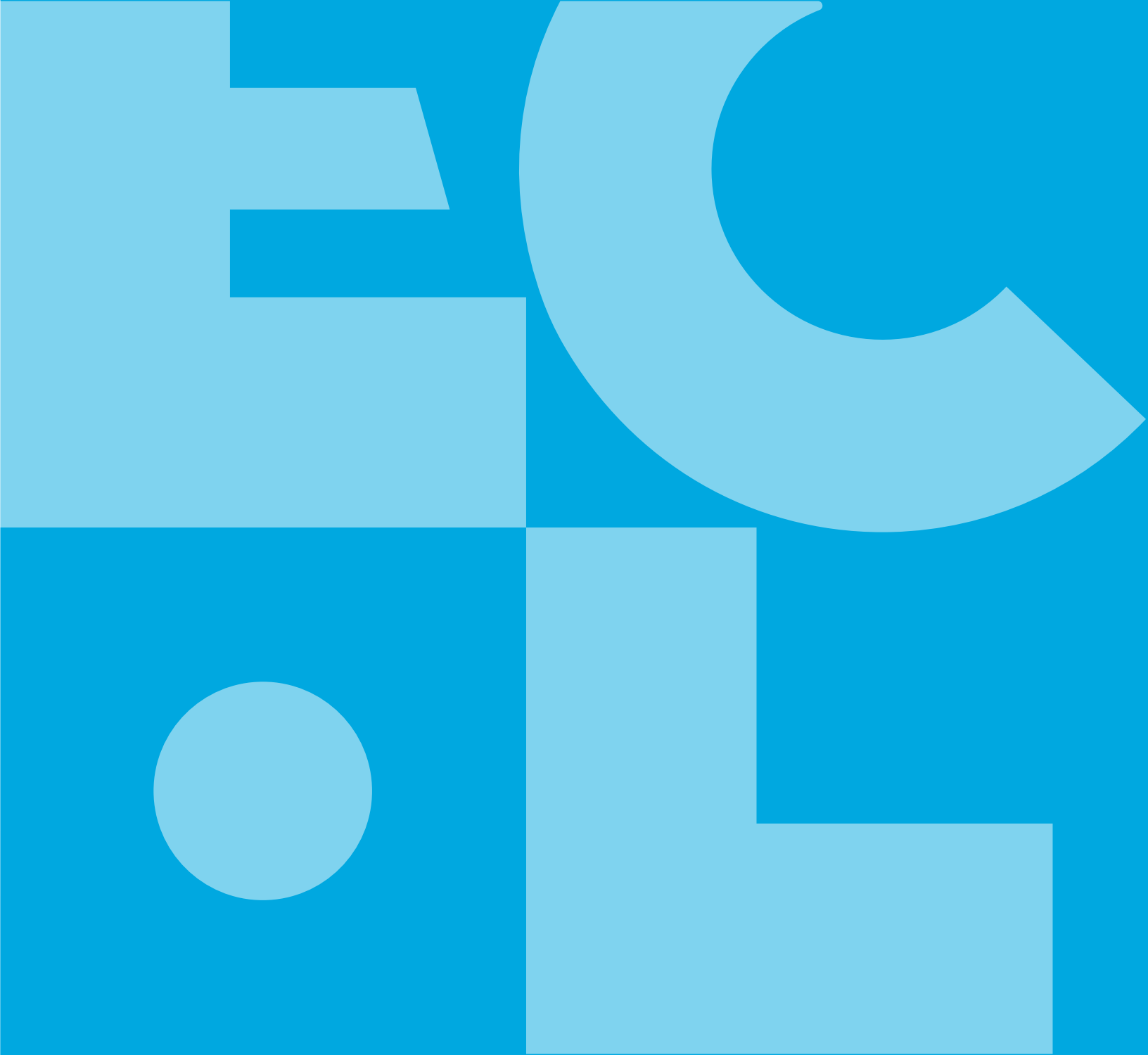
- It varies. The emphasis on reducing costs limits thinking.
- More emphasis is needed.
- I see a duality. Sustainability is important to students, but I am not seeing enough emphasis in courses or in jobs.



What is your sense of the impact of sustainability on broader social systems or issues?



- I participated in the Society of Automotive Engineers contest. The culture of this event seemed to have a “macho” focus that could exclude females. Engineering can amplify certain voices and silence others.
- Sustainability is a mindset. I am working in the area of “green” chemistry, which is intended to minimize the negative impacts of toxic chemicals on communities and broader environmental and social justice issues.
- I am now working in structural engineering. I see how buildings, roads, and bridges impact everyday living. I see how sustainability can improve the functioning of infrastructure, e.g., reducing energy consumption.



Group Exercise

Group Exercise – Envisioning Transformational Possibilities

In the first group exercise of the summit, participants engaged in envisioning what engineering education could look like given the deep, positive integration of sustainability into the fabric and values of the engineering educational system.

Small groups were asked to develop a vivid description of the future. A vivid description provides a vibrant, engaging, and specific description of an organization's aspirational future – a rich description of what the organization will be like in the future while fulfilling its mission, achieving its major goals, and living its guiding philosophy.

Key elements of this future vision were shared in large group discussion.

CULTURE AND PURPOSE OF ENGINEERING



- The engineering community is more unified in its belief in the importance of sustainability.
- There is an increased recognition that engineering involves more than being good at math and science.
- A commitment to sustainability is viewed as equivalent to our commitment to safety.
- There is greater emphasis on sustainability in licensure exams and continuing education offerings.
- An increased emphasis on sustainability has broadened the diversity of the engineering community.

EDUCATIONAL INSTITUTIONS



- “De-siloing” of the education system has occurred – breaking down barriers and increasing collaboration within universities.
- Traditional core courses are being re-evaluated based on the concept of identifying what is truly needed.
- Teaching sustainability principles in engineering is recognized for its importance.
- The increased focus on sustainability is supported by universities' industry partners and by professional societies.

TEACHING EXPERIENCE



- Faculty have tools and support systems for integration of sustainability into their classrooms, such as the Engineering for One Planet framework.

Group Exercise – Envisioning Transformational Possibilities

LEARNING EXPERIENCE



- Sustainability is integrated across the entire curriculum.
- Incoming students demand sustainability.
- More interdisciplinary, project-based learning opportunities are available.
- Deeper interactions with industry are integrated to clarify and de-mystify students' perceptions of what it means to be an engineer and to provide real-world project experience.
- Increased learning outside the classroom through internships is part of the student experience.
- Students recognize the impact of their work on people and the importance of communication skills and knowledge of the humanities to their future work.
- Engineering curriculum includes an increased focus on embedded carbon, life cycle costs, and environmental impacts. Students are equipped to address the misconception that sustainability is an additional cost.

Wrapping up the discussion of the transformational potential of the integration of sustainability into engineering education, Dr. Yvette Pearson, Vice President of Diversity, Equity, and Inclusion at the University of Texas at Dallas, offered her thoughts on the relationships between sustainability and DEI (Diversity, Equity, Inclusion, Justice). She highlighted how the United Nations Sustainable Design Goals contain elements that are closely tied to DEI as well as addressing the needs of marginalized communities – maternal mortality (SDG 3), wheelchair user mortality (SDG 11), mistaken identity (SDG 10), and early mortality (SDG 8). She emphasized the need to connect the dots between codes of ethics, policy, accreditation, and resources. Engineering students need to learn to “think globally, and act locally” in addressing the SDGs.





Innovators in Action
Provocations

Innovators in Action Provocation – Engineering for One Planet



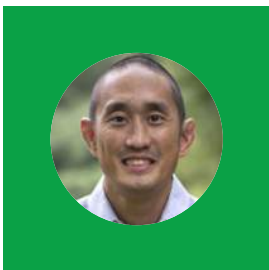
CINDY COOPER,
Lemelson Foundation

Cindy advances The Lemelson Foundation's Invention Education strategy and leads the Engineering for One Planet initiative, an effort to equip tomorrow's engineers with the skills, knowledge and understanding to protect our planet and the life it sustains. For more than 20 years, Cindy has fostered social and environmental impact through innovation, working across academic, philanthropic, business, and entrepreneurship fields. A Brazilian American, she holds an MBA from Thunderbird School of Global Management and a Psychology/Spanish BA from Claremont McKenna College.



ADAM CARBERRY,
Arizona State University

Adam Carberry is an Associate Professor in The Polytechnic School within Arizona State University's Fulton Schools of Engineering. He earned a B.S. in Materials Science Engineering from Alfred University, and received his M.S. and Ph.D., both from Tufts University, in Chemistry and Engineering Education respectively. He currently serves as the Graduate Program Chair for the Engineering Education Systems & Design Ph.D. Program, serves as a Senior Associate Editor for the Journal of Engineering Education, and co-maintains the Engineering Education Community Resource wiki.



VINCE NGUYEN,
University of Maryland

Vincent Nguyen is a Senior Lecturer at the University of Maryland. He is a member of the Environmental and Socially Responsible Engineering group integrating conscientious engineering aspects throughout the undergraduate educational experience. His efforts include integrating sustainability requirements into the mechanical engineering capstone projects, introducing non-profit partnerships for designs for persons with disabilities, and founding the Social/Environmental Design Impact Award. He manages several outreach and diversity efforts including the large-scale Get Out and Learn program.

The second half of the summit focused on the **"Innovators in Action,"** those institutions who are leading the way in the integration of sustainability into engineering education. One of those innovator institutions is The Lemelson Foundation through their **Engineering for One Planet initiative (EOP)**. The vision for EOP is to transform engineering education such that "sustainability becomes a core tenet of the profession."

Cindy Cooper summarized progress in development of the **EOP Framework** and in catalyzing the systemic change needed through development of teaching tools, financial support for curricular change, and supporting collaborative action through formation of an "impact network" of stakeholders from both inside and outside the educational system.

Cooper's presentation highlighted why change is needed, barriers to change, EOP's approach to systemic change, and important learning from early efforts to incorporate the EOP framework.



Innovators in Action Provocation – Engineering for One Planet

Why We Need to Change Engineering Education

- Engineering activity impacts our planet.
- Sustainability is an imperative for our youth.
- Sustainability is an imperative for industry with a looming shortage of people with sustainability skills.
- Engineering education has massive scope, scale, and reach – 140,000 graduates per year in the U.S.

Approaches to Move from Changing Engineering Courses to Changing the Course of Engineering

- Development of tools for teaching and assessment based on the EOP framework and companion “how-to” teaching guides.
- Support for curricular change through grants, mentorship, and communities of practice.
- Support for collaborative action through the formation of the EOP Impact Network.

Barriers to Transforming Engineering Education

- Inertia – overcoming the status quo.
- Too much to teach already.
- Faculty time and knowledge.
- Professional suicide – overcoming the publish or perish paradigm.
- Not enough support from academic leaders.
- Uneven demands from industry (this is changing).
- Need for broader cultural changes and beliefs about what it means to be an engineer.

Learning from Early Efforts to Incorporate the EOP Framework

- Faculty value the EOP framework because it...
 - » Aligns with ABET accreditation requirements and the UN Sustainable Development goals.
 - » Reflects industry needs.
 - » Offers a flexible and adaptable menu for use.
- The EOP framework can be a platform for change.

Arizona State University (ASU) and the University of Maryland are two universities that are collaborating with Lemelson in incorporating EOP principles into their engineering colleges.

Innovators in Action Provocation – Engineering for One Planet

Adam Carberry of ASU described their two-phase approach. Phase 1 explored the implementation of EOP into their Product Archaeology course, one of their core, project-based courses. In this course students select a project related to the UN Sustainable Development goals and analyze the social, environmental, and technical aspects of the project. EOP principles such as life cycle costs, material considerations, and systems thinking were introduced to the students. Post-course evaluation revealed that students were influenced by these principles.

Phase 2 consisted of a faculty training program that was intended to broaden faculty support for the integration of EOP into their courses. The training is breaking down some of the barriers to integration cited by Cindy Cooper.

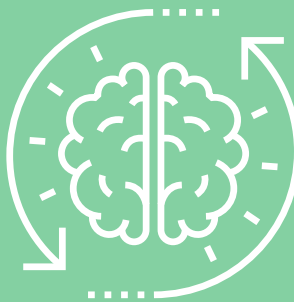
I Used to Think...

I was alone in my worry about making education more effective / relevant with regards to sustainability.

Incorporating a framework in teaching is a lot of work.

Sustainability and EOP were just based on environmental considerations such as energy and impact on the ecosystem around us.

EOP was specifically geared towards big picture environmental issues.



Now I Think...

We have a communication problem and many people care about these sustainability issues.

I can easily incorporate EOP elements in my class in multiple units!

EOP and applying EOP goes beyond just environmental consideration. It's a more human-centric and economically viable focus along with environmental consideration.

EOP is a very versatile framework that can be used in education, research, and practice to create better –and more human– engineers from the root.

Vince Nguyen of Maryland focused on their efforts to “de-silo” engineering education through involving students in **“responsible engineering projects”** in the public domain that involve collaboration with organizations across their campus. Examples of these projects included accessibility solutions for people with disabilities, climate change impacts on oysters, K-12 STEM outreach, and playground renovation.

The second element of Maryland’s pilot project involved mapping student learning outcomes related to sustainability principles throughout the entire educational experience. These efforts are intended to define what should be included in the curriculum. The analysis is based on EOP learning outcomes, DEI considerations, and agency for faculty. The assessment goes beyond traditional ABET and university requirements and includes empowerment, responsibility, motivation, empathy, and evidence of action. Maryland’s hope is that the EOP framework can help in re-defining engineers and engineering.

Innovators in Action Provocation – Engineering for One Planet

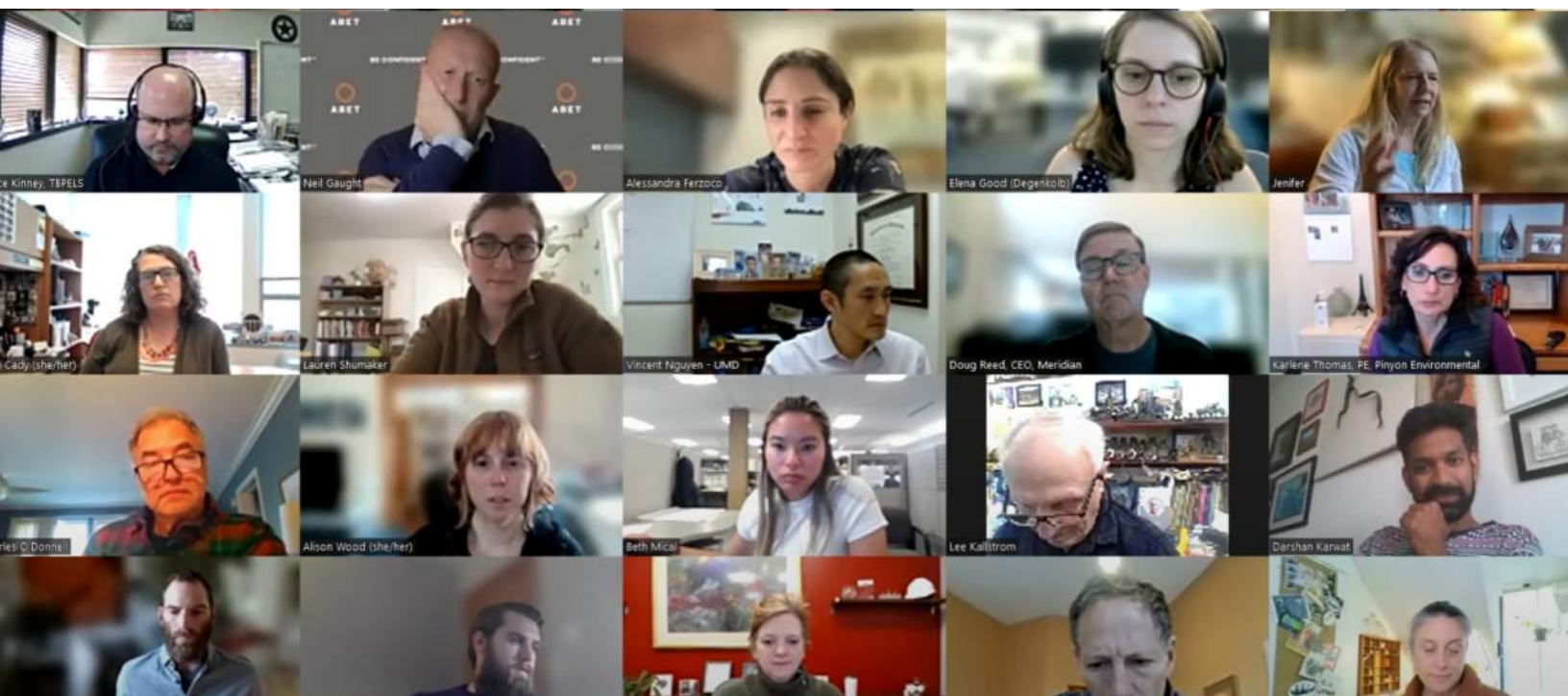
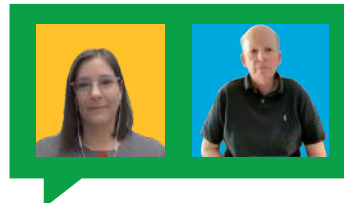
Cindy Cooper wrapped up the provocation on EOP by asking participants to consider a set of true or false questions. She emphasized that EOP is demonstrating the potential for change and transformation.

True or false?

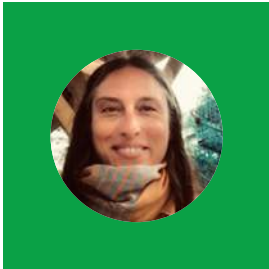
1. Humans are **a part of** nature, not **apart from** nature
 - A: When we protect the “environment,” we protect our babies, ourselves and our future generations.
2. There is no sustainability without DEI/J
 - A: Environmental issues are social issues. Diversity leads to better outcomes.
3. Sustainability is the educational priority of our time
 - A. What’s the point of education if we don’t have a livable planet?
4. Transforming engineering education is still possible
 - A. We can do this. We are doing this.

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[Listen to Cindy Cooper describe her journey with EOP.](#)



Innovators in Action Provocation – Siemens Skills for Sustainability Network



JENNIFER BRADFORD,
Siemens

Jennifer Bradford is passionate about enabling educators and learners to create a more innovative sustainable future. Jennifer leads the academic enablement program at Siemens Industry Software and sits on the Executive Committee for the Global Engineering Dean's Council and the Industry Advisory Council for ABET. Jennifer received her BS in Psychology from the University of Missouri, her MS in Instructional Design and Technology from Fontbonne University and certificates in Advanced Management and Data, Analytics and Interpretation from Washington University's Olin Business School.

Jennifer Bradford of Siemens provided the perspective of a major employer of engineers. The [**"Siemens Skills for Sustainability Network"**](#) is intended to provide a link between a major employer, engineering educators, and engineering students. They are working to reinforce the connection between education in sustainability and employability.

Siemens fosters this connection by providing forums for students and educators. Roundtable discussions with educators have produced several key findings.

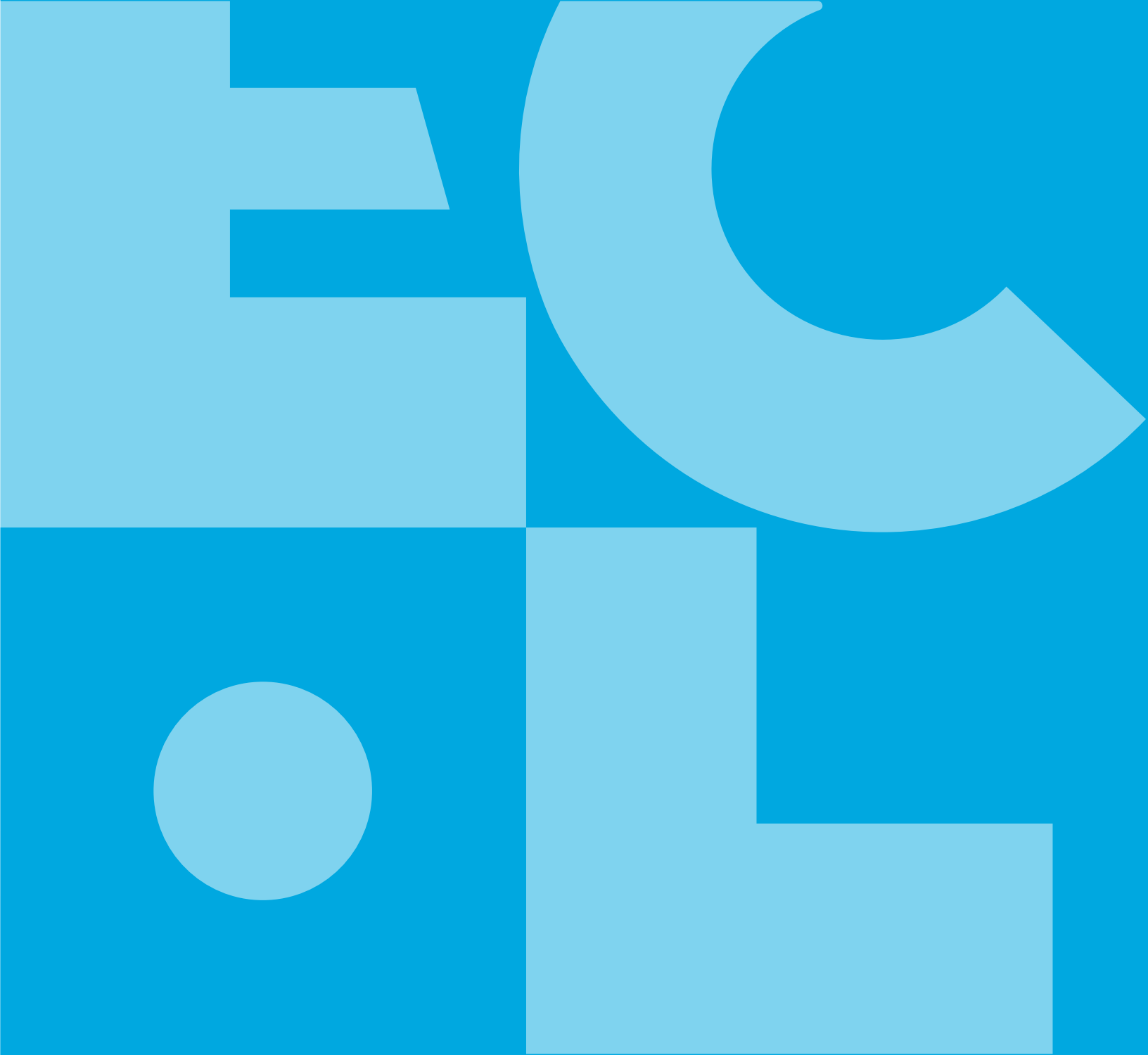
- There is a strong link between sustainability and employability – both for students and employers.
- Sustainability is messy and complex requiring strong analytical and decision-making skills.
- Sustainability education needs to begin in year 1 for all students so that it becomes the base on which higher education is built on and around.
- Faculty do not feel prepared; they need professional development to deliver sustainability in engineering education.
- There is a huge demand for more resources from industry – data, case studies, practical experiences, and collaboration.

Siemens has also worked to capture the voice of the student through a [**"Skills for Sustainability"**](#) survey. The survey has uncovered several important findings.

- Climate change is the most covered topic in studies to date.
- The second least covered topic is the UN Sustainable Design Goals.
- Circular economy is the least covered topic.
- Top career skills that students believe they will need to address sustainability included professionalism, communication, creativity, and problem-solving.
- Less than half of students reported having experienced community or hands-on project work in their first year.

Part of Siemens' work has been the development of a Sustainability Toolkit for engineering educators. The toolkit addresses three key areas – knowledge, skills, and mindset. Through its work with the Global Engineering Deans Council Industry Forum, Siemens has identified additional key points for educational transformation.

- Micro-credentials can contribute to allowing learners to develop specific skills. An example is the University of Colorado's micro-credential in Design for the Circular Economy.
- Industry must be involved in developing curriculum and in student guidance.
- Accrediting bodies must provide a clear path for recognition of both sustainability and micro-credentials.



Group Exercise

Group Exercise – Overcoming Resistance & Building Momentum

In the final group exercise of the summit, participants looked at the barriers and points of resistance that could prevent or slow the progress of incorporating sustainability into engineering education. As described by Cindy Cooper, these barriers include inertia to changing the status quo, heavy demands on faculty, professional suicide (overcoming the “publish or perish” paradigm), lack of knowledge and teaching skills, lack of support from academic leaders, and uneven industry demand. Important strategies to address these obstacles that emerged from the participant discussions are listed below.

- Need for proof points – working examples of why sustainability is important; expect that resisters will nitpick the details.
- Recognition that change takes time, while students want instant change.
- Need to talk more in the middle (the radical center) to overcome polarization.
- Peer-to-peer sharing of curriculum and tools.
- Support for early adopters.
- Educating high school STEM educators.
- Bringing students into the conversation as opposed to a top-down approach.
- Shifting the publish-or-perish paradigm and its impacts on promotion and tenure.
- Industry involvement to drive home the need.
- Recognition that, if engineering does not drive sustainability, others will, and we will be in the backseat.
- Need for credibility that comes from outside grants and from industry advisory boards.
- Addressing the power issue within universities, recognizing that the current system is working for some of those in power.
- Optimistic visioning exercises regarding sustainability and the future.
- One-on-one conversations.
- Partnering with influencers and well-known people with clout in communities.



ECL Creative Director and Lead Facilitator Kyle Davy encouraged participants to learn from change experts, such as Everett Rogers. Rogers’ Diffusion of Innovation Theory proposes that if you can convince 20% of a given population that change is needed (the innovators and early adopters), there is a near guarantee that change will sweep across that social system. (You will have reached Malcolm Gladwell’s “tipping point.”)



Challenge to the Engineering Community

It is clear that the challenges we face in the 21st century, such as sustainability, require greater contributions from the engineering community. Increasing our contributions will require change and adaptation in the way we approach our work. Numerous engineering organizations have confirmed this need for change. This need is amplified when you consider that today's engineering graduates will spend up to 40 years in their careers and that the projects that they contribute to will last for 75–100 years. The transformation in engineering education to increase focus on the impacts of our work on people and on the environment needs to start now. All of us in the engineering community can contribute to making this change happen.



All provocation presentations are available at the link below.

[**Exploring Engineering Education Provocation Presentations**](#)



A full recording of the summit is available at this link.

[**Exploring Engineering Education Recording**](#)