



For more on Engineering Change Lab-USA, contact Executive Director Mike McMeekin at [mike.mcmeekin@lamprynearson.com](mailto:mike.mcmeekin@lamprynearson.com) and visit our website [www.ecl-usa.org](http://www.ecl-usa.org)

# 2020 YEAR IN REVIEW

The background of the lower half of the page is a dark blue field filled with technical drawings and interlocking gears. The gears are rendered in various shades of blue and white, creating a sense of mechanical complexity and engineering. Technical drawings, including lines, circles, and arrows, are scattered throughout the background, reinforcing the engineering theme.

THE FUTURE IS  
ENGINEERING



# 2020 YEAR IN REVIEW

## The Engineering Change Lab – USA (ECL-USA)

is a catalyst for change within the engineering community, helping it reach its highest potential on behalf of society. In 2020 ECL-USA continued its work in exploring the most important issues impacting the future of engineering – the social impacts of emerging technologies; leadership in addressing environmental challenges; justice, equity, diversity and inclusivity in the engineering community; public policy leadership; and licensure challenges in the Fourth Industrial Revolution.

### *ECL-USA Steering Committee*



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Executive Director



**Kyle Davy**  
Creative Director &  
Lead Facilitator



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## SUMMIT 8

### **Exploring Biomedical Engineering / Climate & Extreme Weather Challenges**

March 10 & 11, Texas Medical Center, Houston, Texas

#### **Summit 8 Learning & Take-Aways**

Exploring Biomedical Engineering

- › Commoditization has resulted in engineers becoming problem solvers for problems identified by others as opposed to advisors helping to define society's most important problems.
- › Biomedical engineering provides an example of the interdependence of engineering, technology, and social systems and the positive aspects of inter-disciplinary collaboration, lessons that should be applied to other disciplines.
- › ECL-USA Challenge. Help the engineering community transform its role in society by developing its capacity to sense and address the "wicked" problems that the world faces in the 21st Century.

**"WHAT WE DECIDE TO DO IS MUCH MORE IMPORTANT THAN HOW WE DO IT."**

**- Ove Arup,  
Founder of Global Design Firm Arup**



<https://ecl-usa.org/wp-content/uploads/2020/04/Summit-8-Report-Biomedical-Engineering.pdf>

# SUMMIT 8

## **Exploring Biomedical Engineering / Climate & Extreme Weather Challenges** March 10 & 11, Texas Medical Center, Houston, Texas

### **Climate & Extreme Weather Challenges**

**Group Dialogue** – What do we think we know about leading the adaptive work required for our communities and society to respond to climate and extreme weather challenges?

#### **Perspectives of Concern**

- › There is reluctance in the engineering community to engage on climate action.
- › We are fighting the perception that the work of engineers has contributed to climate change.
- › Climate change has become a political issue rather than a scientific issue.

#### **Hopeful Perspectives**

- › We can learn from the bold action taken by AIA.
- › The time to act is now, as society’s viewpoint continues to shift in favor of action.
- › Engineers need to shift public perception through stories of our contributions to protection of the environment.

### **Learning from the Galveston Bay Coastal Surge Protection Study**

- › A small team of leaders read the importance of addressing storm surge flooding in the Houston area and convened to mobilize and initiate action.
- › The multi-disciplinary team is “breaking the frame” of traditional approaches to flood protection – pursuit of private funding; assembling the team outside of traditional procurement practices; defining and structuring the problem according to a vision to create a project with long-term value; operating with freedom from the influences of political process.

### **What Roles Can Engineers Play to Address Climate and Extreme Weather Challenges?**

- › Convener / Collaborator for Stakeholders.
- › Proactive Generator of Scenarios, Alternatives, Solutions.
- › Lead Communicator – Humanizing Problems and Influencing the Public.
- › Risk Identifier.
- › Strategic Investor of Expertise – even through pro bono work.



### **Elements of the Galveston Bay Park Plan**

- 1** Houston-Galveston industrial complex & West-side Protection to 25 Feet
- 2** Texas City Levee Raised to 25 Feet
- 3** Backside Levee around Galveston
- 4** Elevated FM 3005 and Highway 87 for Evacuation
- 5** Sand Nourishment for Beach
- 6** Possible Extension of Galveston Levee to Pelican Island



<https://ecl-usa.org/wp-content/uploads/2020/04/Summit-8-Report-Environmental-Leadership.pdf>

# SUMMIT 9

**The Engineering Ideas Institute – July 29-30, Aug 5-6**

*Session 1, Technological Driving Forces – Social Impacts of Technology*

## Session 1 Learning & Take-Aways

Exploring the Technology / Society Entanglement



The application of technology in problem-solving, such as predictive modeling, requires accountability at multiple levels – effects, explanation, and enterprise.



Addressing the lack of critical infrastructure in under-served countries requires deep understanding that “technology does not work on its own.”

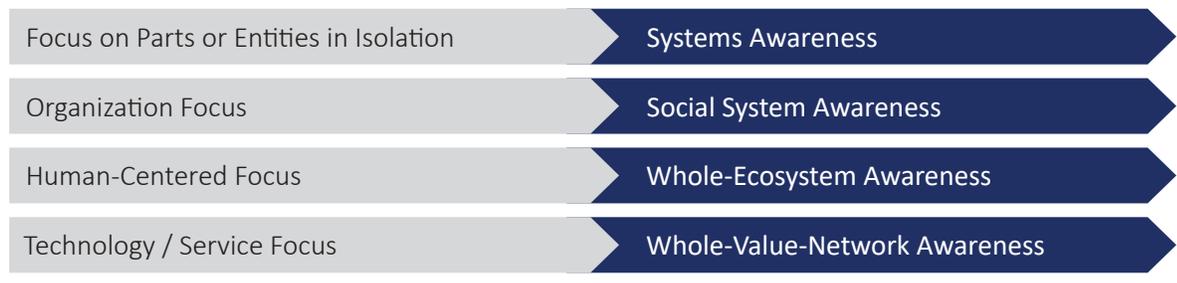


ECL-USA Challenge. ECL-USA can help advance the practice of self-reflection in engineering, helping the engineering community to contribute at its highest levels in addressing the challenges of the 21st century.

## Technology & Systems Awareness **Shifts of Mind for Getting Out Ahead**

**FROM**

**TO**



From Value Redesigned: New Models for Professional Practice, Kyle Davy & Susan Harris



<https://ecl-usa.org/wp-content/uploads/2020/09/Summit-9-Session-1-Report.pdf>

# SUMMIT 9

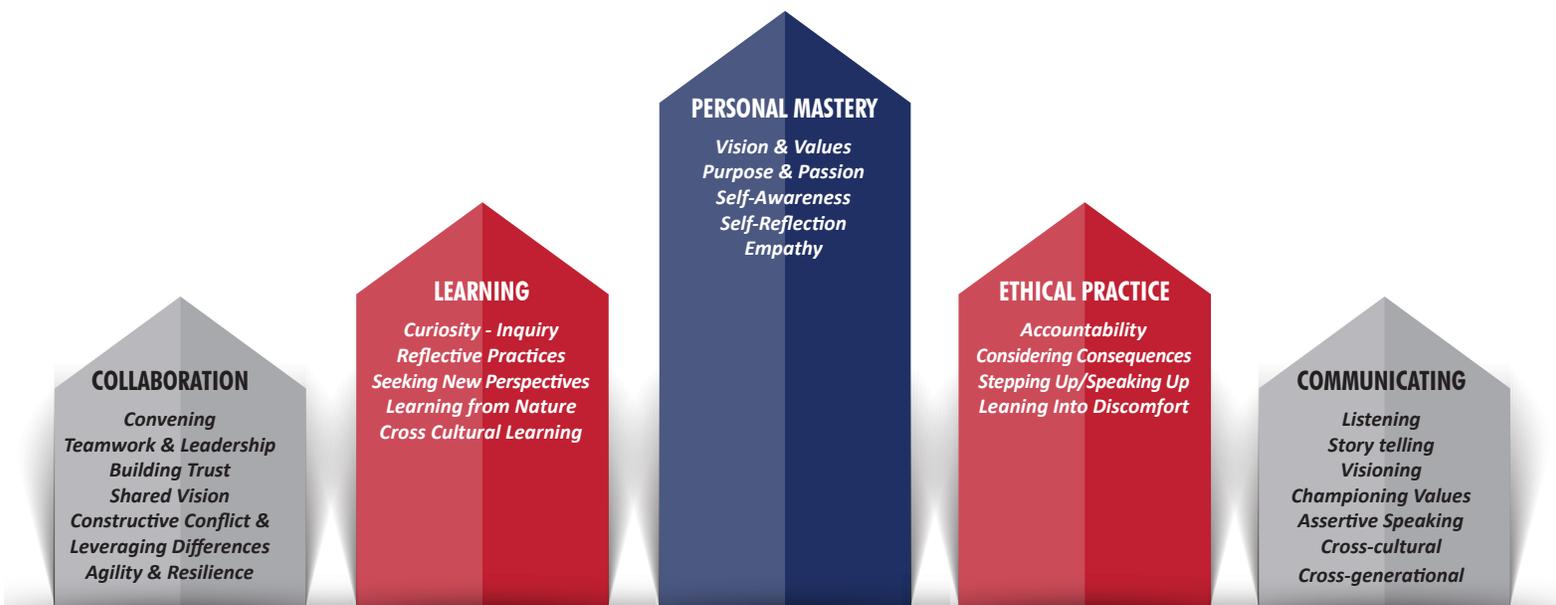
**The Engineering Ideas Institute – July 29-30, Aug 5-6**

*Session 2 – Leadership for Environmentally Responsible Engineering*

## Session 2 Learning & Take-Aways

- › The engineering community has a unique leadership responsibility with respect to protection of the environment. ECL-USA can assist the engineering community in combining our technical expertise with a knowledge of systems to increase our impact.

### **LEADERSHIP FOR SUSTAINABILITY & ENVIRONMENTALLY RESPONSIBLE ENGINEERING IN PRACTICE / WORK**



## SYSTEMS THINKING



## VALUES

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



<https://ecl-usa.org/wp-content/uploads/2020/09/Summit-9-Session-2-Report.pdf>

# SUMMIT 9

## The Engineering Ideas Institute – July 29-30, Aug 5-6

### Session 3 – Justice, Equity, Diversity & Inclusion

#### Session 3 Learning & Take-Aways



Engineering organizations need to think beyond technical fixes and transform their cultures toward equity and inclusiveness.



The engineering community needs to shift the public’s perception of engineering, stressing the importance of engineering in addressing the challenges of the future such that we attract young people of all backgrounds to engineering.



There are close ties between the public policy that impacts engineering practice and racial inequality. We can work to change those policies.



All individuals in the engineering community need to follow the examples of Rachel Attebery and make intentional choices to:

1. Admit our own bias and ignorance.
2. Choose to start with love.
3. Value relationships ahead of politics.
4. Refuse to be angry voices.
5. Create safe, equitable environments for those that are within our power to lift up.
6. Chose to be a role model for the next generation.



We all have an individual responsibility to call out harassment, unfair treatment, and bad policies.

#### TEN LEVERAGE POINTS FOR CHANGE:

- 1** Biases, many unconscious, are major drivers of behavior across all the polarity grid quadrants. Surfacing and shifting biases at all levels will require sustained efforts (personal work, training, mentoring and coaching, communicating positive role models, etc.).
- 2** Emphasize the potential to do meaningful work and to “change the world” through engineering.
- 3** Use formal training and development programs to build leadership and personal mastery skills, (increasing self-awareness, emotional intelligence, and the ability to engage in difficult conversations and constructive conflict, etc.) to drive both personal and cultural change.
- 4** Publicize more success stories and positive role models drawn from the ranks of women and URM engineers. For many students, “You have to see it to be it.”
- 5** Support basic needs of URM students as they move through educational systems (transportation, resources to take advantage of opportunities, remote learning, WIFI, etc.)
- 6** Prioritize mentoring at all levels. Build on successful programs like ACE Mentor, extending those concepts to higher education and work/practice levels.
- 7** Create more inclusive/equitable workplaces through development of work environments that support family and children choices and “non-linear” career paths.
- 8** Fix the “broken rung” in the career ladders within engineering organizations, creating a positive reinforcing dynamic where increased numbers of women and URM in management and leadership positions inspire more young women and URM’s to choose engineering careers.
- 9** Increase the candidate pool for recruiting students, faculty, and workers by reaching outside of traditional geographies and organizational partners – “fish from a bigger pond.”
- 10** Change recruiting policies and practices to access and bring on-board more women and URM’s - sanitize race/gender biases in recruiting practices.

#### BONUS:

- 11** Recognize that the COVID crisis is unsticking the system in many compelling ways, unfreezing past practices and behaviors and pointing toward new ways of learning, working, and being that could significantly impact diversity, inclusion and equity. However, there is a need to proactively and speedily identify and spread lessons learned from the COVID experience to drive that change. Waiting too long will allow the system to refreeze into “business as usual” practices and attitudes.

Finally, one critical takeaway was that we are focusing too much on isolated technical fixes that can be defeated by structural issues or interpersonal issues. As represented by the polarity matrix, the challenge of diversity, inclusion, and equity within engineering should be viewed as a “wicked problem” that demands change efforts that recognize the complexity and interconnectedness of that system.

ECL-USA Challenge. The COVID-19 pandemic is unsticking the system in many compelling ways, unfreezing past practices and behaviors and pointing toward new ways of learning, working, and being that could significantly impact diversity, inclusion and equity. ECL-USA can help the engineering community to proactively and speedily identify and spread lessons learned from the pandemic and drive that change.



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# SUMMIT 9

**The Engineering Ideas Institute – July 29-30, Aug 5-6**

*Session 4 – Public Policy*

## **Session 4 Learning & Take-Aways**

Designing effective public policy strategy requires exploration of key questions.

1. What are your objectives for intervening?
2. How will you intervene?
3. What support will you need?
4. What do you need to learn?
5. Who might be allies / adversaries?
6. What roadblocks might you anticipate?
7. Where will you start? What could be your first step?



## **PUBLIC POLICY PRIORITIES**

from ECL-USA Summit 8 Discussion & Summit 9 Survey

- › Climate Change / Energy Policy / Resilience
- › Infrastructure Policy & Funding
- › Regulatory Burden
- › Transportation Policy
- › Other

- *Technology*
- *Health Care*
- *National Security*
- *Education of Policy Makers*
- *Engineering Licensure*
- *Racial Inequities in Infrastructure Policy*



<https://ecl-usa.org/wp-content/uploads/2020/09/Summit-9-Session-4-Report.pdf>

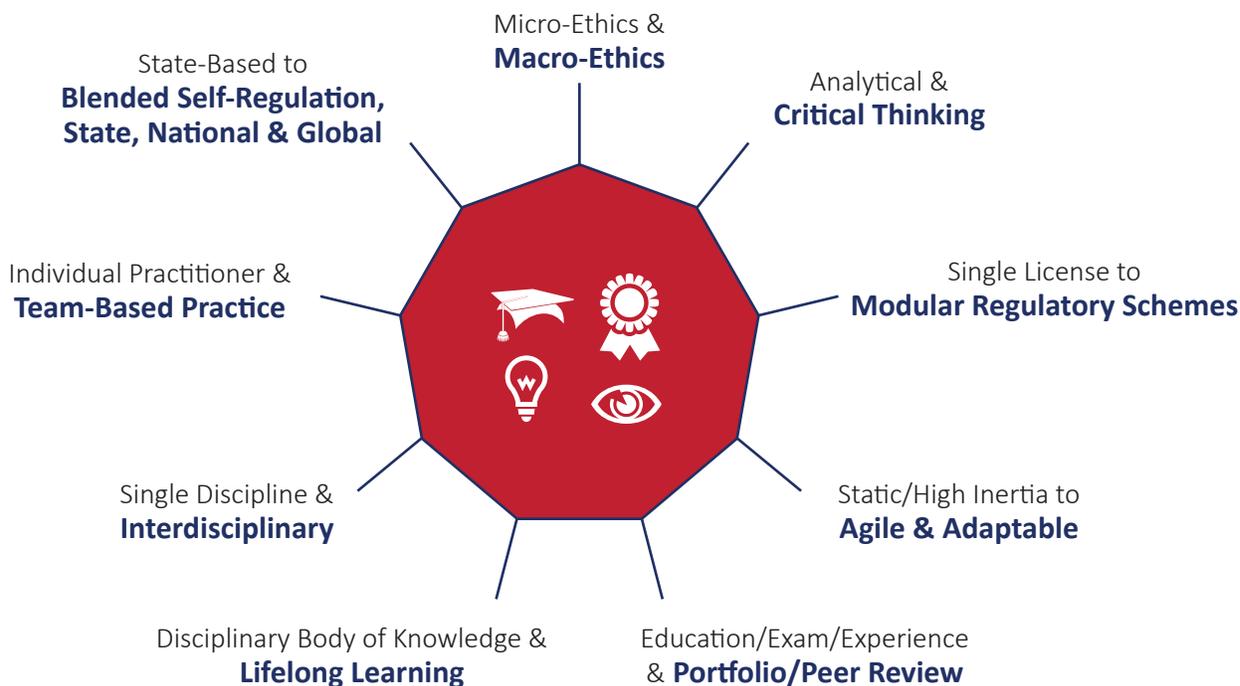
# SUMMIT 10

**Licensure Models for the Fourth Industrial Revolution – December 16**



## Summit 10 Learning & Take-Aways

**Framework for Transformation of Today's Engineering Licensure Model to a Future Regulatory System.**

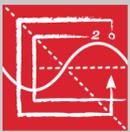


<https://ecl-usa.org/wp-content/uploads/2021/01/Summit-10-Report.pdf>

## ECL-USA Financial Supporters

We are grateful to the National Council of Examiners for Engineers and Surveyors for their award of a second grant to ECL-USA. We are also grateful for the engineering firms that joined NCEES in providing financial support in 2020.

### ECL-USA FINANCIAL SUPPORTERS:



**NCEES**  
advancing licensure for  
engineers and surveyors



We listen. We solve.®



## 2020 Outreach in the Engineering Community

Despite numerous events that were canceled due to the COVID-19 pandemic, ECL-USA expanded its outreach in the engineering community by presenting or participating in these events.

- › ACEC Colorado Infrastructure & Innovation Summit – Workshop Presentation
- › Engineers Club of Kansas City- Presentation
- › ACEC Nebraska 2020 Transportation Conference- Presentation
- › U.S. Army Corps of Engineers Engineering Research & Development Center R&D Workshop – Keynote Address
- › International Coalition for Sustainable Infrastructure Fall Virtual Symposium
- › Institute for Sustainable Infrastructure Virtual Conference – Shovel Ready Ideas for a Fresh Start – Presenter on Equity and Social Justice Panel
- › ASME Engineering for Change Impact Engineered Live Forum – Sponsor
- › The Building Science Podcast with Kristof Irwin – Stewardship and the Future of Engineering  
<https://positiveenergy.pro/building-science-podcast/2020/5/29/stewardship-amp-the-future-of-engineering>
- › ACEC Engineering Influence Podcast with Summit 9 Provocateur Darshan Karwat – The Role of the Activist Engineer in Society  
<https://acecnational.podbean.com/e/the-role-of-the-activist-engineer-in-society/>
- › ACEC Engineering Influence Podcast with Summit 9 Provocateur Jen Molnar – Engineering and Nature with the Engineering Change Lab  
<https://acecnational.podbean.com/e/engineering-and-nature-with-the-engineering-change-lab/>

- › Engineering Change Podcast with Dr. Yvette Pearson – Unsticking the System with Mike McMeekin  
<https://www.listennotes.com/podcasts/engineering-change/episode-11-unsticking-the-2GvLMX35DJB/>
- › Institute for Sustainable Infrastructure LinkedIn Live Podcast  
<https://www.linkedin.com/video/live/urn:li:ugcPost:6711664966350462976/>
- › NSPE PE Magazine Article – Are We Hearing the Human Voices Affected by Infrastructure Policy  
[https://www.pemagazine-digital.com/pemagazine/fall\\_2020/MobilePagedReplica.action?utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=TXNSPE201104002&utm\\_content=gtxcel&pm=2&folio=Cover#pg1](https://www.pemagazine-digital.com/pemagazine/fall_2020/MobilePagedReplica.action?utm_source=newsletter&utm_medium=email&utm_campaign=TXNSPE201104002&utm_content=gtxcel&pm=2&folio=Cover#pg1)



## **2021 Events**

Join us in 2021 for one of our upcoming events.

- › **January 19, 2021.** ECL-USA Virtual Open House
- › **March 22, 2021.** Summit 11 – The Imperative of Climate Change and the Future of Engineering
- › **April 2021.** ECL-USA Virtual Open House
- › **July 2021.** Summit 12- The Engineering Firm of 2030
- › **August 2021.** ECL-USA Virtual Open House
- › **October 11 – 13, 2021.** The Engineering Ideas Institute II, Boulder, CO

Remember to check out the ECL-USA website – [www.ecl-usa.org](http://www.ecl-usa.org) and the ECL-USA LinkedIn page- <https://www.linkedin.com/company/engineeringchangelabusa/> for information on our work.