

**2023 International Symposium on
Bioremediation and Sustainable Environmental
Technologies**

May 8-11, 2023 | Austin, Texas

Assessing the Sociotechnical

Humanitarian Engineering and the SustainAlytics Framework

Jane Cloninger

Breanna Moak

Melissa Harclerode

Cannon Silver

Tuesday, May 9,
2023

**CDM
Smith**



What is Humanitarian Engineering?



Humanitarian Engineering is an Evolving Field

Engineering for the Betterment of Communities

The engineering profession has long been proud of its world-changing contributions through infrastructure, water treatment, medical devices, computers and many other technological advancements that continually impact society. The Cockrell School's Humanitarian Engineering Program takes engineering for society to the next level, providing undergraduate students with rewarding, multidisciplinary opportunities to focus their learning around communities that need their help the most.

The UC Berkeley Master of Development Engineering responds both to the growing need for Development Engineers to solve societal challenges as well as to the increasing importance of technology in the aid sector. The program reflects the demand for diverse STEM professionals who can invent, adapt, or implement technologies to benefit low-resource communities.

The Humanitarian Engineering Program educates engineers and scientists to work as partners with communities seeking to enhance their social, environmental, and economic sustainability.

Students in the program learn to take a sociotechnical approach to make a difference in the world through their professional careers, whether in community development or corporate settings.

Mission:

Humanitarian Engineering at Ohio State aims to educate students on the application of science and engineering to address complex societal challenges with an emphasis on collaborating with communities to achieve their desired vision of well-being through a curriculum grounded in proven theories of sustainable development and applied engineering and socio-cultural learning experiences.

Humanitarian Engineering is an Evolving Field

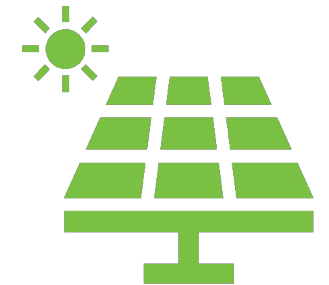
■ Multidisciplinary

- Engineering, technology, social science, community engagement, mapping

■ Partnership with communities

- Not philanthropic or academic; a collaborative process

■ Working with under-served, low-resource, or disadvantaged communities



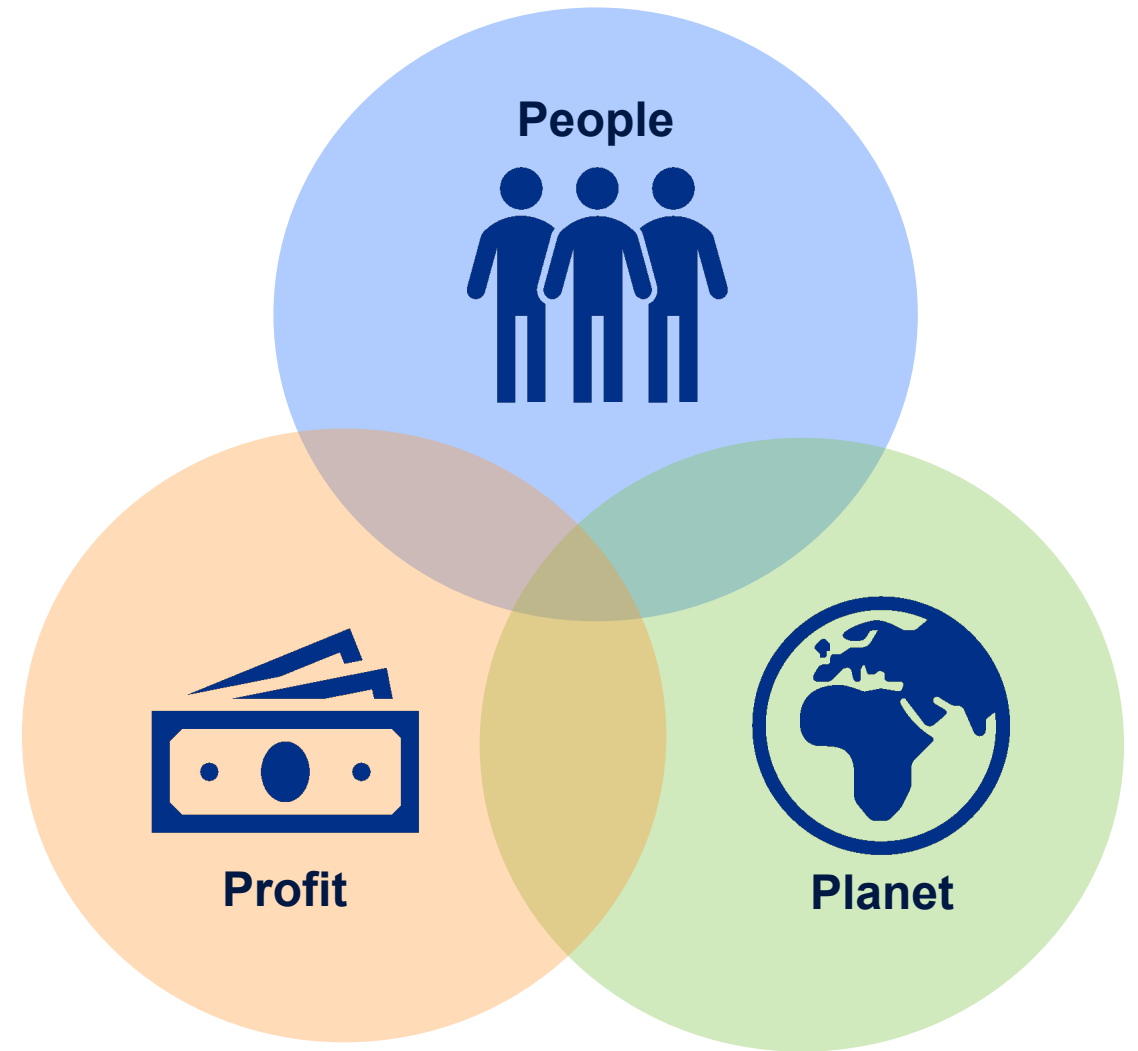


What is the SustainAlytics Framework?

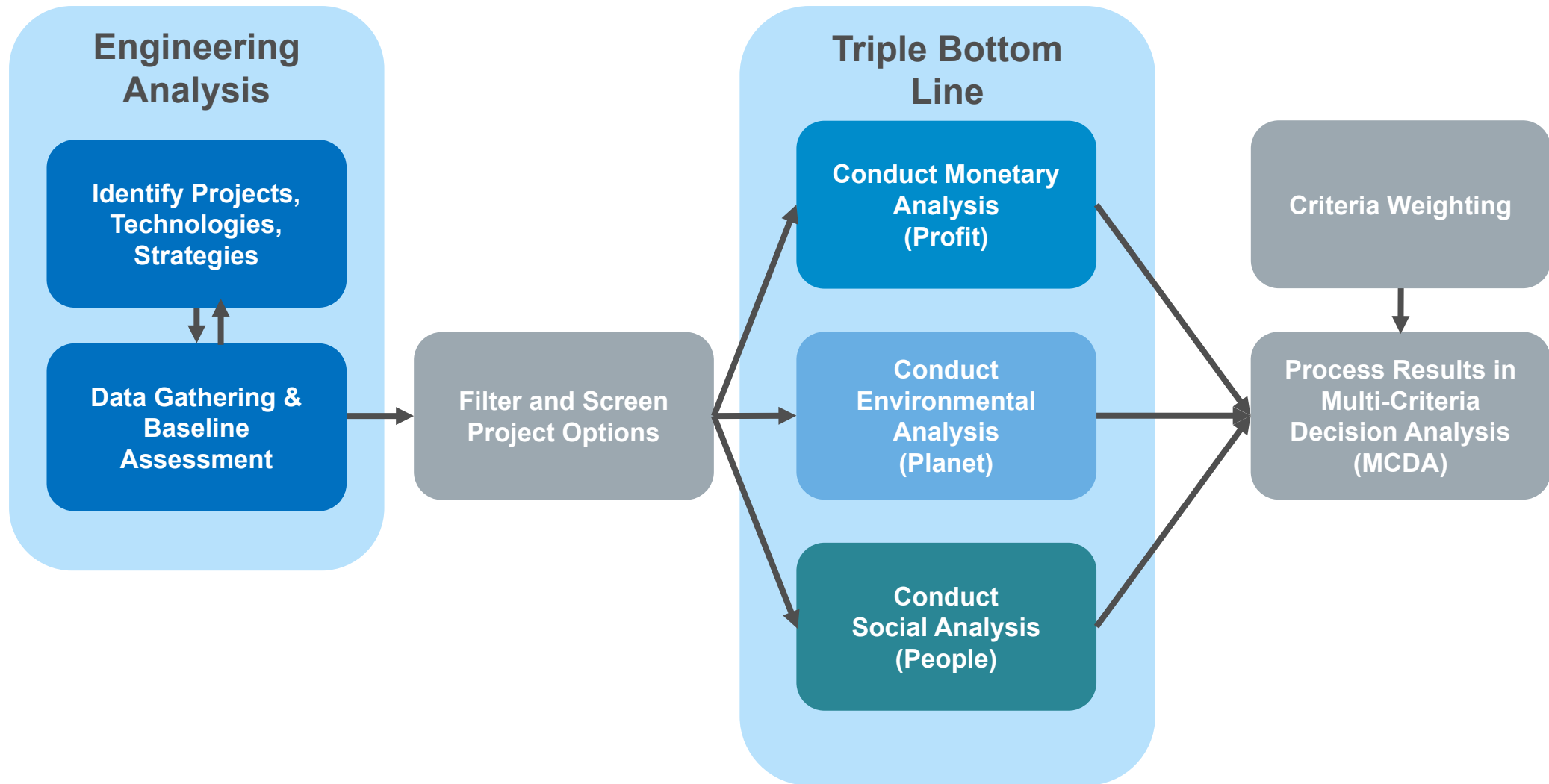


SustainAlytics Framework

- **Assesses overall project sustainability according to the Triple Bottom Line (TBL): People, Profit, Planet**
- **Adapts to client and community needs and priorities**



SustainAlytics Framework (cont'd)





How can we apply it?



Preliminary Assessment Criteria

**Stewardship
of
ecosystems
and natural
resources**



**Reduction
of materials
and energy**



**Political
autonomy
and self
determination**



**Local
economic
diversity**



**Social
justice**



Industrial Remediation

- Reuse and recycling of materials for building construction
- Early community engagement in remedy selection
- Robust communications plan



Brownfield Redevelopment



- Consider community safety and local knowledge
- Limited community engagement before implementation
- Incorporate local biodiversity and native plantings

Remediation evaluation

Doing well:

Reduction of materials and energy

Protection of local ecosystems, stewardship of natural resources

On the right track, but can use some improvements:

Political autonomy and self-determination

Social justice

Area for improvement:

Local economic diversity

SustainAlytics Framework Social Metrics

Metric	Methodology	Score
Community engagement throughout project timeline	Determine the frequency and accessibility of opportunities for the impacted community to offer feedback	<p>0 No attempts made to seek feedback from impacted community</p> <p>5 Attempts made at two points in project life cycle</p> <p>10 Attempts made prior to implementation, at least twice during implementation, and once post-implementation</p>

SustainAlytics Framework Social Metrics (cont'd)

Metric	Methodology	Score
Tree canopy	Through mapping applications, determine changes to local tree canopy pre- and post-implementation, considering EJ community placement	Numerical scores for different project options will be compared and ranked

Assessed Options for Social Impacts

Metric	Methodology	Score
Impacts to public transportation accessibility	<p>Anticipated impact on:</p> <ul style="list-style-type: none">• Number, frequency, and distribution of stops• Pedestrian linkages to public transit (footpaths, crossings)• Hours of service and availability to essential worker corridors• Population density around public transit nodes• Overall system footprint• Quality and cost of service	<p>0 Negative impact to public transportation accessibility</p> <p>5 Neutral/no-net change to public transportation accessibility</p> <p>10 Positive impact to public transportation accessibility</p>

Resources to Assess Sustainability



ITRC

Sustainable Resilient
Remediation (2021)



U.S. EPA

Community Involvement
Plan resources
Green Remediation
guidance (2008)



**The Council on Environmental
Quality (CEQ)**

Climate and Economic Justice
Screening Tool (CEJST);
mapping category for Legacy
Pollution disadvantaged
communities

Why Assess Sustainability?

APRIL 21, 2023

Executive Order on Revitalizing Our Nation's Commitment to Environmental Justice for All

lands and waters. Pursuing these and other objectives integral to advancing environmental justice can successfully occur only through meaningful engagement and collaboration with underserved and overburdened communities to address the adverse conditions they experience and ensure they do not face additional disproportionate burdens or underinvestment.

Acknowledgements

■ **The abstract for this presentation was prepared and submitted by:**

- **Jane Cloninger** (cloningerje@cdmsmith.com) - CDM Smith, Houston, TX, USA
- **Breanna Moak** (moakbd@cdmsmith.com) - CDM Smith, Kansas City, MO, USA
- **Melissa Harclerode** (harclerodema@cdmsmith.com) - CDM Smith, Edison, NJ, USA
- **Cannon Silver** (silvercf@cdmsmith.com) - CDM Smith, Columbus, OH, USA

■ **The contributions of all authors are acknowledged and greatly appreciated.**

Thank You!



Jane Cloninger
cloningerje@cdmsmith.com



Connect with me on LinkedIn!