





## Transforming Engineering Culture to Advance Inclusion and Diversity (TECAID): An Evidence-Based Approach & Model

February 22, 2018 (12:30-1:30pm ET)

Co-Sponsor  **ASEE**  
Committee on Diversity, Equity, and Inclusion




Support for this work was provided by the National Science Foundation under grant # 1445076. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Science Foundation.





### Webinar Overview


- **Why** engage in DEI-focused engineering department culture change? (2:20)
- **What** are useful resources, and what is the evidence that using these resources can help engineers to lead DEI department culture change? (12:12)
- **How** does one go about DEI-focused engineering department culture change? (15:00)
- **Who** has engaged in this change process? (28:15)




### WHY Engage in DEI-Focused Department Change? ASME Perspective




Thomas Perry, P.E. (TECAID Co-PI)  
Director, Engineering Education (ret., 2017)  
American Society of Mechanical Engineers (ASME)



Aisha Kenya Lawrey, M.P.A. (TECAID Co-PI)  
Director, Engineering Education  
American Society of Mechanical Engineers (ASME)



### Tom's Personal Context



### The Digital Mechanical Engineer



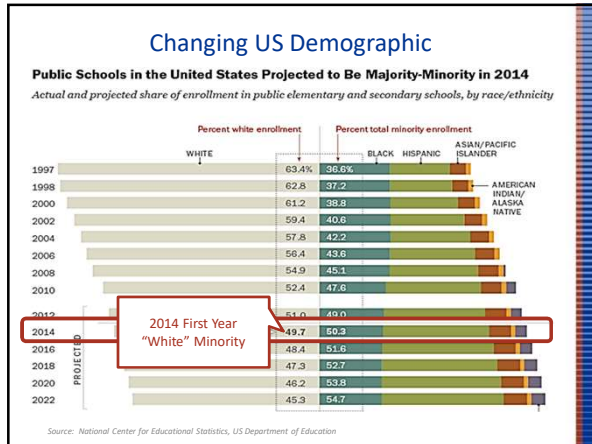
Image Source: Google - ASME Mechanical Engineering (January 2018).

Image Source: Google - MDRZ.com/Mirand.com/Techniques CEO Council

### The Changing Student-Talent Supply-Chain



Image Source: Google - NBC News.com



### Innovation

“Diversity drives innovation. When we limit who can contribute, we in turn limit what problems we can solve.”

Telle Whitney  
 CEO & Co-Founder  
 Anita Borg Institute for Women in Technology

Image Source: Google: The CUBE-Grace Hopper Celebration 2016

### Aisha's Personal Context

Richer and more extensive practice-based engineering experience for students

Increased flexibility in ME Programs

Development of students' professional, and communication skills to higher standards

Greater cultivation of collaborative inclusion, diversity, creativity, and innovation among students and faculty

New balance of faculty research/ industry practice skills in ME programs


Google: ASME Vision 2030 Project

### ASME Engineering Education: Strategies


- Convene & Collaborate
- Communicate
- Advocate


### ASME Engineering Education: Specifics


- Degree Program Quality Standards**
  - ABET Accreditation
  - ~400 ME/MET Degree Programs Globally
- Leadership Development**
  - ASME Department Heads Community & Leadership Summits/Workshops
- Research, Best Practices & Advocacy**
  - Vision 2030 Advocacy
  - Collaborative Research/Programs
  - Awards, Fellowships

 **Principles: Diversity & Inclusion**  
 Approved by Board of Directors (June 12, 2017):


- 1) Our global professions require creativity and innovation, which are best achieved when persons with varied perspectives, experiences, and talents work toward a common goal.
- 2) Understanding and experiencing diversity and inclusion in higher education are critical to competitiveness, innovation, and our social and economic futures.
- 3) Further, we expect our accredited programs to support this vision.




 **Undergraduate ME Enrollment: 8 Years**

 **62%** Overall  
**55%** Men  
**119%** Women

ASEE Data, 2008-2016, US & Canada




**Equality**




The assumption is that everyone benefits from the same supports. This is equal treatment.

**Equity**




Everyone gets the supports they need (this is the concept of "affirmative action"), thus producing equity.

**Justice**



All 3 can see the game without supports or accommodations because the cause(s) of the inequity was addressed. The systemic barrier has been removed.

Image Source Google: Pinterest-Laura Thomas on Equality, Equity, & Justice



**Department Culture**

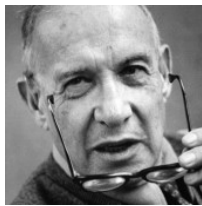
Easy to observe, measure  
 Numbers, systems, processes, physical space



Hard to observe, measure, affect  
 Values, Hidden Assumptions, Norms, Unwritten Rules

Image by P.K. Murthy V


**Culture is Paramount**



**"Culture Eats Strategy for Breakfast."**


Peter F. Drucker  
 Clarke Professor of Social Science & Management,  
 Claremont Graduate University, 1971-2005

Image Source Google: AZ Quotes



**ASME Engineering Education Key "Take-Away(s)"**

- **Diverse perspectives are critical** for addressing the multidisciplinary, global problems that we face.
- **ME is the largest U/G engineering discipline**
- **Women's enrollment is growing** at a faster rate than men's (although women are still only 13% undergrads)
- **Capitalize on women's enrollment growth**
- **Focus on culture change strategies** to recruit and retain women and role model faculty
- **Strive for the 30% "tipping point"**
- Culture change strategies used to support women's engagement will be **beneficial to all URMs.**



### WHY Engage in DEI-Focused Department Change? WEPAN Perspective



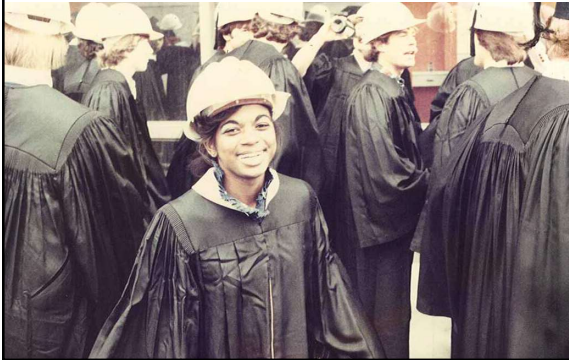
Amy Freeman, Ph.D. (TECAID Co-PI)  
President, Women In Engineering ProActive Network (WEPAN)  
Chief Diversity Officer and Associate Provost,  
Tufts University



“What girl wouldn’t want to do this?”



One’s lived experience informs perception...



“You think you’re over it– and then you get a letter...”



### Why the TECAID Model?

It is possible to raise consciousness,  
and change behaviors in a way that will encourage  
the growth of a diverse and inclusive  
scholarly community.



Working to Achieve  
Gender Equity through  
Culture Transformation



Working to Achieve Gender Equity through Culture Transformation

50♂ / 50♀

**WEPAN**  
Women in Engineering ProActive Network

- Welcoming Environments



Working to Achieve Gender Equity through Culture Transformation

50♂ / 50♀

**WEPAN**  
Women in Engineering ProActive Network

- Welcoming Environments
- Student Participation




Working to Achieve Gender Equity through Culture Transformation

50♂ / 50♀

**WEPAN**  
Women in Engineering ProActive Network

- Welcoming Environments
- Student Participation
- Research-based strategies




Working to Achieve Gender Equity through Culture Transformation


50♂ / 50♀


**WEPAN**  
Women in Engineering ProActive Network

- Welcoming Environments
- Student Participation
- Research-based strategies
- Systems-level improvements



TECAID Changes the Culture







TECAID Changes the Culture






### Women in Engineering ProActive Network (WEPAN) Key "Take-Away(s)"


- We change the culture when we **change the daily individual experience where perceptions are formed.**
- The TECAID Model provides **practical, research-based solutions that engage all members** of a department in long- term, systemic cultural change.


### HOW to Effect DEI-Focused Department Change?



Gretal Leibnitz, Ph.D. (TECAID PI)  
Research & Grants Consultant  
Women in Engineering ProActive Network (WEPAN)



Diana Kardia, Ph.D.  
(TECAID Organizational Change Consultant)  
Founder and Partner, Kardia Group, LLC



### Resources: Website



[www.wepan.org/mpage/TECAID](http://www.wepan.org/mpage/TECAID)

TECAID Wins 2017 NSF Video Showcase



### Evidence Based TECAID Outcomes

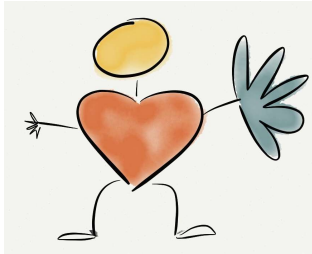



Image Created by J.R. Briggs

- ↑ Knowledge and Use of Diversity, Equity and Inclusion (DEI) Concepts
- ↑ Confidence in Leadership Skills
- ↑ DEI Action


[http://www.wepan.org/mpage/TECAID\\_Outcomes](http://www.wepan.org/mpage/TECAID_Outcomes)



### Example: Increased Knowledge of Diversity Concepts

"Micro-Inequities" Awareness


BEFORE	↑	AFTER	
59%		96%	



### Example: Increased Knowledge of Diversity Concepts


"Micro-Inequities" Awareness Informs Interactions

BEFORE	↑	AFTER	
36%		69%	




Example: Increased Confidence

**AFTER**  
**>90%**



- How to engage in **productive change** processes
- **Leadership skills**
- How to create **organizational change**



Example: DEI Action Taken

**Within Last 6 Months**  
**100%**

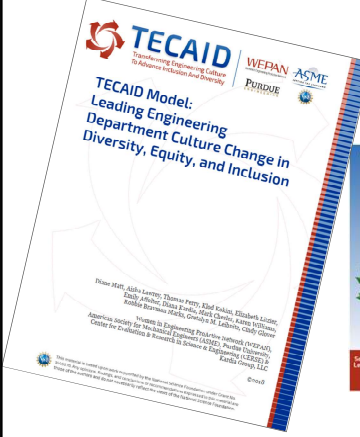




- **DEI action taken**  
(Participants taking no action dropped from 37% to 0%)

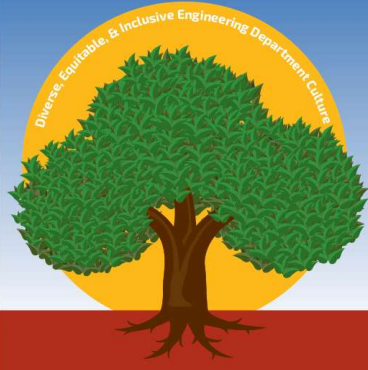



Resources:

[TECAID Model & Graphic](#)

Leading Engineering Department Culture Change in Diversity, Equity, & Inclusion (DEI)






Chat: What's Your Vision?

- Why does having a diverse, equitable, and inclusive engineering department culture matter to **you**?



Leading Engineering Department Culture Change in Diversity, Equity, & Inclusion (DEI)

TECAID Case Studies

**Case Study 3**  
**Navigating Conflict while Engaging in DEI Change Efforts**

Diversity means through the experience of differences – and differences bridge conflict. Conflict is not always negative. However, conflict is typically considered a problem to be solved or avoided. However, conflict is typically considered a problem to be solved or avoided. However, conflict is typically considered a problem to be solved or avoided.

This case study documents the Thomas Kilbourn Conflict Mode Instrument. This tool describes how people deal with conflict:

- **Attribution:** Making an attempt to resolve the conflict
- **Competition:** Pushing for their way to have their way
- **Collaboration:** Both parties working together to find a solution which will meet the objectives of both parties
- **Compromise:** Both parties working together to find a solution which will meet the objectives of both parties
- **Accommodation:** Giving in to the other party's needs
- **Withdrawal:** Avoiding the conflict

Each of these modes works very well in some circumstances and not so well in others. Attribution of blame can lead to problems such as resignation, open hostility, and much more. This case study has been revised (in part) to focus on the use of different modes of conflict resolution in specific situations. In addition, you have added "or a" after each mode to indicate an open-ended approach to resolving the conflict. You will also find a new section on the use of the conflict mode instrument. This is a useful tool to use to create a more positive departmental climate.

Through this case study, which demonstrates faculty working through many types of conflict situations you will see:

- **Example of the use of all 5 modes from Thomas Kilbourn Conflict Mode Instrument.**
- **Differences between productive and unproductive conflict behaviors.**

Resources:  
[Case Studies](#)

Leading Engineering Department Culture Change in Diversity, Equity, & Inclusion (DEI)

Diverse, Equitable, & Inclusive Engineering Department Culture

Build a DEI Change Team

Secure Department Leadership Support      Use Conflict Constructively

Engage Expert Assistance      Cultivate & Sustain a Growth Mindset

TECAID Case Studies

**Case Study 1**  
**Working as a Team on DEI Issues: The Challenges and Benefits**

Most change efforts involve multiple individuals working together in a coordinated manner. However, in academia, most faculty work independently in the majority of their collaborative efforts outside of their specific research interests. This is a major challenge faced by faculty engaging in change efforts in the process of effectively building and sustaining a change team.

This case study documents how a team-building experience, like the one presented through TECAID, helps a diverse collection of individuals become a cohesive unit.

In Case Study 1, you will see how several faculty members:

- **Created a team** to help on departmental problems.
- **Identified common goals** and shared them with the rest of the department.
- **Used their own** unique skills and experiences to address departmental issues and develop good teamwork.

**The Case Study**

Like the other teams, Team PNC came into the TECAID process empty about the possibilities for creating a multi-departmental and inclusive climate in their department. A primary concern was their department's similarity in tenure and sustaining a critical mass of female faculty members.

The team had focused some track and leader diversity:

- **Low:** A multi-faceted multi-departmental chair and full professor
- **High:** A female assistant professor

The team also represented a variety of DEI-related views and concerns. A question that affected several team members was how to work through their own differences to be an effective team.

During one of the TECAID workshops, participants were asked to reflect upon and share their social identities (such as race, gender, and sexual orientation) and their experiences and feelings regarding discrimination and prejudice. For many, this was an uncharted and edgy – and often uncomfortable – territory. For many, this was a very successful experience. These kinds of issues are addressed in the workshop.

Resources:  
[Case Studies](#)

Leading Engineering Department Culture Change in Diversity, Equity, & Inclusion (DEI)

Diverse, Equitable, & Inclusive Engineering Department Culture

Identify DEI Concerns & Vision

Build a DEI Change Team

Secure Department Leadership Support      Use Conflict Constructively

Engage Expert Assistance      Cultivate & Sustain a Growth Mindset

Leading Engineering Department Culture Change in Diversity, Equity, & Inclusion (DEI)

Diverse, Equitable, & Inclusive Engineering Department Culture

Learn About DEI-Focused Department Culture Change

Identify DEI Concerns & Vision

Build a DEI Change Team

Secure Department Leadership Support      Use Conflict Constructively

Engage Expert Assistance      Cultivate & Sustain a Growth Mindset

Leading Engineering Department Culture Change in Diversity, Equity, & Inclusion (DEI)

Diverse, Equitable, & Inclusive Engineering Department Culture

Learn About DEI-Focused Department Culture Change

Identify DEI Concerns & Vision

Plan & Implement DEI Change

Build a DEI Change Team

Secure Department Leadership Support      Use Conflict Constructively

Engage Expert Assistance      Cultivate & Sustain a Growth Mindset



**TECAID Case Studies**

**Case Study 2**

**Gathering Strategic Information for Planning DEI Change**

Many change efforts experience a sense of urgency, having catalyzed in response to an acute crisis or a need for change. However, effective action is predicated on an understanding of the underlying issues, and it is not sufficient to focus on symptoms. Do we really want to solve the underlying issues, and can we distinguish symptoms from causes that lead to change? The first challenge facing change efforts is the dual dilemma of gathering strategic information.

This case study demonstrates a productive approach to strategic intelligence gathering – particularly in a case related to diversity, equity and inclusion (DEI) change. The approach involves:

- thoughtful and effective data collection in response to an acute problem
- tracking and making productive use of differences in how individuals perceive the problem
- analyzing the conditions for making change.

Note: In this case study, the term Underrepresented Minority (URM) can encompass those with identities that are not dominantly represented in their Mechanical Engineering department. This term can include, but is not limited to, women people of color (POC), LGBTQ+ people, and people with disabilities. URM will include those with multiple identities and non-dominant identities, like a white, transgender man.

**The Case Study**

Recently, several undergraduate URM students approached their faculty advisor with concerns about their experience in the department. In some classes, they had been excluded from student lab teams. They'd also experienced unfair assignments and comments and brought this issue to the Chair.

This was not good news for the department. These faculty feared the possibility that such concerns could lead to competent students underperforming and perhaps even leaving their department – thereby making it even more difficult to recruit diverse students in the future. They were also concerned about the role of professional organizations of faculty.

The Chair decided to create a Task Force focused on two issues: identifying social (local and broader) causes of their department and their students' experiences or frustration or discussion about diversity and inclusion.

Resources:  
Case Studies

**TECAID** WEAPAN ASME  
Transforming Engineering Culture  
To Advance Inclusion and Diversity

**Force Field Analysis Worksheet for Planning Change**

Force Pushing for Change Reason(s) (C)	Force Pushing Against Change Barrier(s) (C)
	Individual
	Team
	Department
	Larger Environment

Resources:  
Force Field Analysis  
& Worksheet



**TECAID** WEAPAN ASME  
Transforming Engineering Culture  
To Advance Inclusion and Diversity

**Toolkit**

Diversity, Equity, & Inclusion (DEI) Department Culture Change  
TECAID Model Graphic

Resources:  
Toolkit & Worksheet



**“What does TECAID Mean for YOUR Work?”**  
**Key “Take Away(s)”**

**T**eams & Time  
**E**ducation & Engagement  
**C**ommitment & Customization  
**A**daptation & Assessment  
**I**terative & Inimitable  
**D**ynamic & Daring



**Who has Engaged in this change process?**

William (Bill) Predebon, (TECAID Participant)  
Department Chair & Professor, Mechanical  
Engineering-Engineering Mechanics  
Michigan Technological University



**Bill’s Personal Context**

**The Boston Globe**  
New Black Panthers seek to unite neighborhood

Image Source Google: Boston Chapter of New Black Panther Party  
Image Source Google: Think.Create.Change.org



### What did TECAID work mean to your department and Faculty?





Image Source Google: Huffington Post      Image Source Google: The Odyssey Online



### Teaming Learning Outcomes in ME at Michigan Tech


Implementing in the ME Practice Courses and the Sr. Capstone Design sequence:

1. Full engagement in the team
2. Team roles
3. Productive conflict
4. Analyze evidence
5. Identify each students strengths




### Key “Take-Away(s)”


- **Start at the top** – has to be important to the chair for change to happen.
- Get a **critical mass of stakeholders** who believe in the effort
- Faculty are busy: **Indirectly educate faculty** by developing the tools for faculty to teach the students inclusive approaches
- **Implement in stages**
- **It is a long term endeavor** – keep at it and don’t give up



### Who has Engaged in this change process?



Klod Kokini, (Co-PI)  
 Professor, Mechanical Engineering  
 (Formerly Associate Dean, College of Engineering)  
 Purdue University



### Klod’s Personal Context










### How can the office of a Dean be leveraged in support of Department DEI Culture Change?







### Purdue Departmental DEI Change



### Key “Take-Away(s)”

- Culture is traditionally defined by majority. **Education of all, including the majority on DEI is critical** for real change
- Institutional **support**, through **Provost, Dean, Head is key to change**
- It is important to **build a community for change (inclusion) AND to increase underrepresented group members (diversity)**
- **It is a journey, not a destination: persistence is key**



### Questions? Comments?

[www.wepan.org/mpage/TECAID](http://www.wepan.org/mpage/TECAID)

- Gretal Leibnitz, [Leibnitz@wepan.org](mailto:Leibnitz@wepan.org) (General TECAID Questions)  
 Amy Freeman, [Amy.Freeman@tufts.edu](mailto:Amy.Freeman@tufts.edu) (WEPAN Questions)  
 Aisha Lawrey, [LawreyA@asme.org](mailto:LawreyA@asme.org) (ASME Education Questions)  
 Bill Predebon, [wwpredeb@mtu.edu](mailto:wwpredeb@mtu.edu) (TECAID “Dept. Chair” Questions)  
 Klod Kokini, [kokini@purdue.edu](mailto:kokini@purdue.edu) (TECAID “Dean/faculty” Questions)  
 Diana Kardia, [diana@kardiagroup.com](mailto:diana@kardiagroup.com) (TECAID DEI & Organizational Change Questions)



Please provide us your feedback on this webinar:  
<https://www.surveymonkey.com/r/TECAIDWebinar1>

Thank you!