9.2.4   POETS Culture of Inclusion Strategic Plan

1. Overview

POETS' vision is to be the pre-eminent research and education organization driving the integrated, optimized, concurrent movement of thermal and electrical power in tightly constrained mobile environments. In order to achieve this goal, supporting and enhancing diversity and inclusivity within our center is essential. Diverse research groups have been shown to have a positive effect on innovation, creativity, problem solving, and decision making in a multitude of sectors including STEM fields. Moreover, to ensure that our diverse members are working optimally together, an inclusive environment needs to be present where all members feel supported and valued.

This strategic plan represents POETS' approach to establishing and achieving our diversity and inclusion goals as well as measures to determine our progress for Y1-Y6 of the center. Our plan allows for an annual review of the ERC's achievements and challenges to determine the upcoming year's focus areas. This plan is based on information currently available about POETS internal environment, was created from input of center members and will continue to evolve with the center's needs and aims.

Our strategic plan focuses on the following outcomes:

(1) The center reflects the rich diversity of the nation, with a particular focus on race and gender minority groups within STEM fields.
(2) Center members and program participants report a strong sense of inclusivity.
(3) The center recruits and engages diverse members into the STEM pipeline and workforce.

Our overall approach consists of the following strategies:

(1) Perform assessments to measure center's level of diversity and inclusivity.
(2) Create a supportive, open and inclusive environment, supporting our diverse members.
(3) Educate members within the community of diversity and inclusion best practices.
(4) Center outreach efforts focus on engaging underrepresented groups in STEM and increasing their interest and retention in STEM fields.

2. Rationale and Intentions

To have sustainable technological progress in POETS' research areas of interest, it is essential to maintain and improve our current STEM workforce. First, the STEM workforce drives innovation and advancement by expanding our knowledge base and bringing novel technologies to the marketplace. In order for POETS to reach this reality and maximize our scientific potential, we seek to attract and support the best, diverse talent from the STEM workforce by creating an inclusive culture. It is also essential to create a STEM pipeline for a continuous source of talent to grow and sustain our efforts. POETS is uniquely positioned for such a task by operating at the intersection of academic, industrial and government sectors and supporting education and outreach efforts at the K-12, undergraduate and graduate student level (Figure 22).
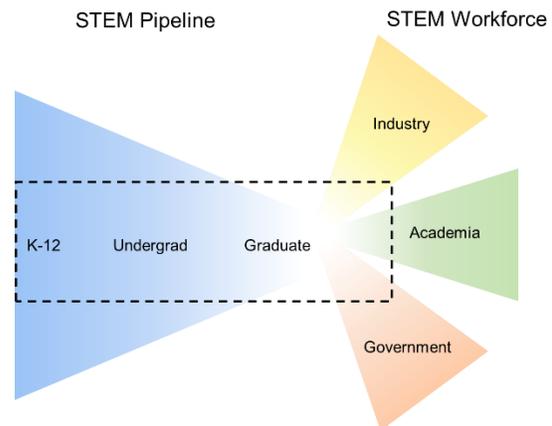
Figure 22. POETS operates at the interaction of the STEM workforce and the STEM pipeline.

POETS will focus its diversity and inclusion (D&I) efforts on the center members who we have the greatest influence on: pre-college students, undergraduate students, POETS graduate students, POETS staff members and POETS faculty members. We will leverage our industry and government partners to support our D&I efforts through their additional knowledge, financial and personnel resources. POETS' education and outreach efforts are leveraged to attract diverse students into the STEM field and support them through their STEM journey via carefully crafted programs, supported by center members including POETS faculty, students and staff. We acknowledge that ERCs have limited direct influence on university graduate admission and faculty search committees; however, by cultivating trained diversity advocates within our center, POETS will begin to influence the larger admissions infrastructure within academia. These efforts will also have an impact on the overall university climates, affecting the retention and effectiveness of our academic researchers.

While our D&I efforts are focused on the advancements of POETS' research agenda, there will be indirect benefits to a larger community beyond our center. We will share D&I best practices through publications and at conferences. Educating our members on diversity and inclusion best practices and creating an inclusive environment will produce trained diversity advocates who will work to promote diversification of the STEM workforce within their own communities. Thus, our D&I efforts in our center can impact the diversity in STEM on a nation-wide scale.

3. Defining Success: Outcomes and Metrics

Given our intentions outlined above, we have defined several outcomes that will help us achieve the goal of creating a diverse, productive center driving our research interests (Figure 23).

Outcome 1	Outcome 2	Outcome 3
The center reflects the rich diversity of the nation, with a particular focus on race and gender minority groups.	Center members and program participants report a strong sense of inclusivity.	The center recruits and engages diverse members into the STEM pipeline and workforce.

Figure 23. POETS Diversity and Inclusion Strategic Plan Outcomes

Outcome #1

POETS would like its center members (students, faculty and staff) to reflect the rich diversity of the nation. Because diversity encompasses many factors, we are focusing our efforts on race/ethnicity, specifically focusing on African Americans and Hispanics, and gender diversity as our primary thrust. Engaging persons with disabilities will be our secondary thrust. These demographics have been chosen due to the large disparity of their inclusion in STEM fields. Our long-term outcome is for our center's African American, Hispanic, women and persons with disabilities participation rates to exceed the national average for these individuals in engineering by 10% at various levels of education and employment status within POETS (pre-college, undergraduate, graduate student, faculty members, and staff).

Outcome #2

Having diverse, technically proficient center members is not sufficient. POETS aims for its center members to report a strong sense of inclusion. Inclusiveness is measured by several metrics including: centeredness, connectivity, comfort, communication, and participation level within the center and its activities. Correlations between inclusiveness measures and members' demographics, status (e.g. student vs professor), university and thrust will aid us in determining challenge areas and their level of priority. Our long-term outcome is for greater than 90% of our members and program participants to rate POETS as being "overall inclusive" as well as greater than 80% satisfaction on other metrics that correlate to inclusivity as listed above.

Outcome #3

To sustain and enhance our workforce's diversity and productivity, the center will engage and recruit diverse members into the STEM pipeline. This will be achieved by leveraging POETS' education program. The short-term outcome of these efforts will be to have high levels of underrepresented minority engagement within POETS programs, improve students' attitudes toward STEM and their preparation level for entering STEM fields. The long-term outcome of these efforts will be for students involved with POETS education efforts to stay engaged in STEM fields demonstrated by STEM graduate rates, enrollment into graduate school and/or entry into the STEM workforce.

4. Strategy

POETS is using a four-pronged strategy to achieve our desired outcomes (Figure 24). First, formative and summative assessments, such as surveys, town halls, focus groups and informal interactions, assess the level of diversity and inclusion across the center, at each university and within education efforts. This determines our progress towards all three outcomes. Second, we implement activities and establish an infrastructure to cultivate a supportive, open and inclusive environment. An indirect effect of an inclusive climate may be to attract diverse members to our center. Third, by educating our members on inclusion and diversity best practices, we are enabling our members to be D&I advocates. We believe this improves the center's overall climate and aids our efforts to bolster the STEM pipeline as many center members support our education efforts. Lastly, by focusing our outreach efforts on minority recruitment, retention and

support, we further feed diverse members into the STEM pipeline, with a fraction of those students feeding into our center. In sum, our D&I strategy is center wide effort that helps us achieve our desired outcomes.
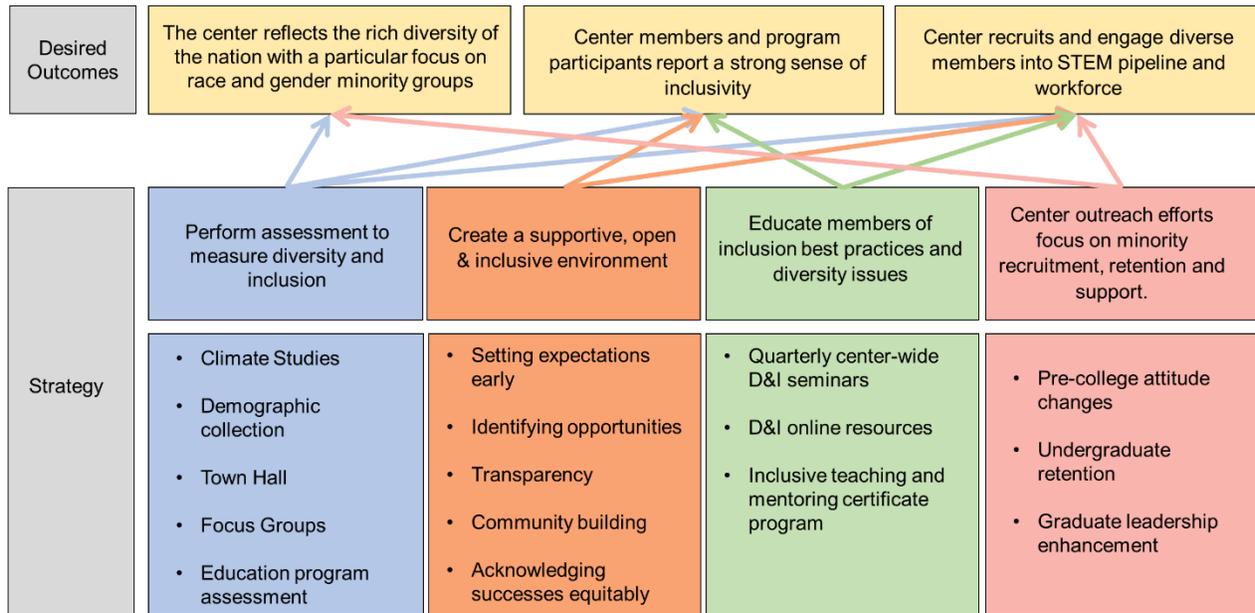

Figure 24. POETS Mapping of Strategy to Task to Achieve Desired Outcomes

Strategy #1 Perform assessments to measure center's level of diversity and inclusivity

Assessments are necessary in determining our progress towards our goals and places for improvement. We will perform formative and summative assessments annually to determine our progress towards our outcomes.

- Annual climate surveys. POETS' climate survey determines the inclusivity levels within the center (graduate students, postdocs, staff and faculty members) which will be administered by the Inclusivity Director at POETS' fall annual meeting.
- Annual center members' demographic collection. In preparation for the NSF annual report submission, POETS collects demographic, personnel type, and discipline area information for all faculty, graduate students, undergraduates, staff and other individuals that interact with POETS education efforts, through the POETS Portal system (https://members.poets-erc.org/). The POETS Portal collects demographic information on members' gender, race, ethnicity, citizenship, country of origin, and disability. Data collection occurs roughly in the month of January.
- D&I report: The D&I report contains a summary of the climate survey, demographic numbers, highlights of D&I successes and recommendations on how the center can achieve its desired D&I outcomes. The report is published one month after the center demographics are collected, distributed to the center and posted on POETS website.
- Graduate student town hall: This is a forum for graduate students to share their concerns about the center in a virtual or live person format. The town hall generally occurs twice a year and provides a way for students to discuss topics of concern and discuss ideas for solutions. SLC and POETS HQ summarize these points and work together over the next six months to address the issues.
- Focus groups at each university: Focus groups are great for providing depth of understanding for a particular topic and has the advantage of being more flexible than a survey and often greater

participation rates. They are also an excellent venue to discuss concerns or ideas specific to a POETS University. This activity occurs annually facilitated by the Associate Director for Education and Inclusivity and the SLC university representative. These meetings are informed by climate studies and town hall events, but are also flexible in agenda items.

- Education Program Assessment: POETS has several levels of D&I assessments for each of its education programs. POETS Education programs include Pre-College (RET program and Young Scholars High School research program), Undergraduate (REU program, freshman interdisciplinary project course) and other graduate programming. These assessments are both formative and summative. More details of these assessments can be found in the POETS Education Strategic Plan under the Assessment Plan section. These assessments collect information on student demographics, attitude changes and involve longitudinal tracking.

While our primary metrics of success are race, gender and persons with disabilities percentages across the center, we continue to track other types of diversity, such as disability status more broadly, sexual orientation, family status (children, part time, responsibility for others), religious background, veteran status, English proficiency, age and tenure at organization, bachelor college (private vs public), etc. We also look for how these are correlated with inclusivity issues present in the center. This provides us with a richer picture of the climate at the center level.

Strategy #2: Create a supportive, open and inclusive center environment, supporting diverse members.

POETS seeks to create a supportive, open and inclusive environment that allows each of our members to thrive and engage at the individual, research group, university and center level. While we seek create an infrastructure to foster an inclusive culture, we also acknowledge that individuals need to play an equal role within the infrastructure for us all to be successful at achieving our D&I objectives. Several efforts will function to aid us in our mission:

Setting expectations. To create a sustainable, center-wide culture of inclusion we provide clear communication about POETS' commitment to D&I and the center members' role in POETS D&I efforts.

- POETS researchers: As a part of the onboarding process all graduate students, staff and faculty members are required to complete a short, online D&I introductory course. Graduate students are also required to attend the new student orientation at the annual meeting and a brief seminar on D&I at POETS, run by the inclusivity director.
- POETS education programs: All program mentors involved in POETS' formal education programs (Young Scholar, REU, RET) are required to participate in three cultural competency mentor training workshops prior to working with their mentees: (1) equity and inclusion, (2) understanding the impact of conscious and unconscious assumptions and biases on the mentor-mentee relationship and (3) how to foster inclusive and effective mentoring relationships and workplaces. These workshops teach mentors best practices for working with minority students and explain their responsibilities in maintaining an inclusive educational environment. The Young Scholars (high school) and the POETS REU (undergraduates) program include pre-program mentee workshops that review culturally-relevant "mentoring-up" strategies.

Identifying missed opportunities for enhancing POETS experience. Instead of approaching D&I from a deficit model (identifying problems or failures of a particular group), POETS' is approaching D&I from a

strength-based perspective: What opportunities are we missing out on that could enhance the productivity of the center? How can a D&I perspective and/or efforts assist with leveraging such an opportunity?

- Graduate student town hall: This forum is not only leveraged to gauge the climate of the center (Strategy #1), but also to foster a community among graduate student researchers and identify solutions to improve the center. Prior to the town halls, university representatives on the SLC collect ideas from their peers that would improve their research experience within the center. These issues are collected and prioritized by the SLC and a topic list is published prior to the town hall. The town hall in effect is a brainstorming session where all universities work together to address university-specific and center-wide opportunities. SLC and POETS HQ summarize discussion points and work together over the next six months to address pressing issues. The town hall occurs twice a year.
- Education and Diversity Proposal Process: In alignment with the POETS internal NSF research proposal process, the center puts out a request for education and diversity proposals. POETS faculty, undergraduate, graduate students and staff may write proposals to fund initiatives that are in alignment with the Education and Diversity Strategic Plan, fall within the education and diversity needs document and that are not already a part of the POETS' formal education programs (REU, RET, Young Scholars).

Transparency of information and initiatives. An open, inclusive community requires transparency of decision making and center wide efforts.

- Website and weekly email digest: The POETS website is a central hub that helps disseminate center information to all its members and is a mechanism for transparency of activities. The website also includes news posts to share university and students successes. The weekly email digest summarizes events for the weekly and highlights member accomplishments.
- Biannual Newsletter: This activity is led by the SLC to foster knowledge about center activities from a research, industry, diversity, education and administration point of view. The newsletter also spurs inclusivity as newsletter content is directly gathered by the SLC, as opposed disseminated directly from the directors, compelling students to interact with multiple stakeholders across the center.
- D&I report: A D&I report, summarizing the center climate survey and center demographic numbers, is published annually in the spring. The report contains recommendations on how the center can achieve its desired D&I outcomes and highlights D&I successes. This will be published one month after the center demographics are collected, distributed to the center and posted on POETS website.
- Education and Diversity Proposal Process: See above. This initiative plays a key role in allowing center members to take ownership of education and inclusion efforts and helps to become a part of the decision making process.

Community Building Activities within the Center. Creating a community of collaborators that engages all its members is essential for center-wide collaboration and research progress.

- Annual Meeting and NSF Site Visit: Twice a year in the fall and the spring, the center meets to share research progress with POETS faculty members, industry members, students, staff and education participants. All members have collaboration- or learning-driven breakout sessions for members' individual roles (i.e. faculty, industry, students). Additionally, center wide activities are designed to foster connections, collaboration and community.
- Webinars: Bi-weekly seminars keep researchers connected in between the fall and spring center-wide meetings. This allows for sharing of research and discipline-specific knowledge. Careful

attention is paid to ensure full representation of all universities, disciplines and center role (faculty, industry, students, etc.)

- <u>Samepage</u>: SamePage is an online collaborative tools used across the center, primarily among POETS staff members and graduate students. This provides a mechanism for students and staff to create a virtual community, socially and professionally. It is used to foster research collaboration as well as virtual center-wide activities.

Community Building Activities among Graduate Students. Community building among graduate students across the center, and within each individual university, is essential for students' research and educational progress.

- <u>Student Retreat</u>. The student retreat occurs a day before or after the center-wide annual meeting in the fall. This retreat creates a space for students to have specialized programming including social, collaboration and education activities. An in person town hall often occurs during this time as well.
- <u>Tech Conference</u>. A day prior to the center-wide NSF site visit, students organize a technical conference where they present their novel research in the spirit of collaboration. These presentations draw on a multi-disciplinary group of engineers and showcases their diverse approaches to solving today's challenges. It is a unifying activity for many students, giving many their first opportunity to give a short oral presentation to the center, solidifying their role in the center.
- <u>University-based social activities.</u> The student leadership council has a university representative that is responsible for organizing university-based social activities, whether that be gathering for POETS bi-weekly webinar or monthly social hours. This helps strengthen the university community among students.

Community Building Activities within Education Programs. POETS formal, summer education programs are designed with inclusivity in mind and thus community building plays an integral role in program participants' experiences. In particular, because these program focus on working with minority students, providing networking and mentoring opportunities is important for achieving our inclusion and education objectives.

- <u>Young Scholars Program</u>. The Young Scholars program brings underrepresented minority high school students from the local community to a POETS institution to participate in a summer research experience. Young Scholars community building activities include daily lunches, weekly interactive professional development workshops, field trips, and social events.
- <u>REU Program</u>. The Research Experience for Undergraduates (REU) program recruits underrepresented minority undergraduate students from across the nation and matches them with a POETS research lab to engage in a 10-week summer research program. REU community building activities include bi-weekly webinars, social events at each university, and a bi-weekly virtual student course.

Acknowledging Successes Equally. Acknowledging center member activities allows individuals to feel valued and integral to the success of the center. It also provides incentives for adherence to POETS values (See Reward Structures Section).

- <u>News stories</u>: The newsletter and the website news feed provide avenues to highlight academic, research and education success stories.
- <u>Best webinar awards</u>. On a semester basis, the SLC selects a winner for the best webinar award.

- Awards. Annually at the technical conference students and faculty are awarded a variety of awards including: Best webinar, teaching award, interdisciplinary award, etc. We strive our best to have equal representation across our universities.

Strategy #3: Educate members within the community of best inclusion practices and potential diversity issues or bias

By educating our members on inclusion and diversity best practices, we are enabling our members to be D&I advocates. We believe this improves the center's overall climate and aids our efforts to bolster the STEM pipeline. The following efforts help us educate center members:

- D&I website resources. The POETS website provides on-demand D&I resources for our members to review as needed. This includes a repository of past webinars on D&I topics as well as curated articles and course modules on the following topics:
  - Inclusive teaching modules and courses for faculty members and graduate students
  - Self-Assessments to explore topics of personal bias, presentation of those bias through outward behavior and actions and cultural competency
  - Literature resources to review D&I terminology, theories and studies
  - Best practices for engaging diverse communities and becoming a D&I advocate
- Inclusive teaching and mentoring certificates. POETS researchers have access to two training workshops on inclusive teaching and inclusive mentoring. Once an individual completes all modules of the workshop they will receive a certificate and acknowledgment on our website and newsletter.
- D&I webinar series. Each year, during the regularly scheduled bi-weekly research webinar, POETS's ADEI holds a webinar to review topics relevant to our center and informed by the D&I report.
- Industry partner diversity resources. We work to leverage our industry partners in multiple ways. Industry partners are offered the option of paying a portion of their membership fee as in kind resources, such as D&I training courses, speakers and workshops. We also work with their HR departments to assist in gather D&I resources.

Strategy #4 Recruit and engage diverse members into STEM pipeline and workforce

Focusing our outreach efforts on minority recruitment, retention and support, we can further feed diverse members into the STEM pipeline, with a fraction of those students feeding into our center. The following efforts represent our recruitment and engagement strategy within our education initiatives.

- Pre-College. For our pre-college programs the primary goal is to increase positive attitude toward STEM fields and improve understanding of science and engineering processes.
  - RET program. The Research Experience for Teachers (RET) is a program that brings middle school teachers to a POETS institution to develop inquiry-based, Next Generation Science Standards (NGSS) -aligned curriculum around POETS related-topics.
    - Recruitment: RET teacher recruitment efforts are focused at middle schools with high enrollment, as compared to the local community, of African American and Hispanic and free/reduced lunch designations. Curriculum that is disseminated by POETS RET teachers thus impacts at need, underrepresented minority students.
    - Accessibility: All finalized curriculum is designed to be inexpensive and is disseminated on multiple platforms (online, teacher professional development workshops, etc.).
  - Young Scholars Program. The Young Scholars program is an opportunity for academically talented first-generation college students with demonstrated financial need to advance

their goal of pursing higher education. Our scholars receive the opportunity to participate in an authentic research experience, under the mentorship of a faculty member or graduate student over a six-week summer internship.

- Recruitment. Participants are recruited at high schools known to have high African American and Hispanic enrollment and free/reduced lunch designation. We also considered the importance of academic support beyond the summer experience, thus we strive to recruit students from school's AVID and Upward Bound programs.
- Support. The program strives to make students comfortable in a university setting and begin to build a STEM network among their peers and university members. This is achieved by mentor/mentee training, social events, connections to campus cultural houses, and weekly check-ins.
- University pipeline. By exposing students to campus resources and building their comfort and confidence in a university settling, the program strives to show the POETS institutions as an attractive and attainable place for higher education.

- Undergraduate. Our primary objective for our undergraduate education efforts is to increase retention of underrepresented students through cross-disciplinary, project based learning and prepare students to transition to the STEM workforce.
  - REU: The Research Experience for Undergraduate (REU) program focuses on recruiting of underserved, underrepresented minorities and attracting students to POETS institutions for graduate studies.
    - Recruitment. Advertisement of the summer program is focused at Hispanic Serving Institutions (HSIs), Historically Black College and Universities (HBCUs), minority serving professional conferences (SHPE, SACNAS, NSBE) and their job boards. In person and in depth recruitment occurs at three HSIs in San Antonio, TX (St. Mary's University, San Antonio College (SAC) and University of Texas at San Antonio) and at one HSI in Palo Alto, CA (Cañada Community College). Two of these universities (SAC and Canada) have active MESA program which focus on supporting underrepresented community college students' transition to a four year university. The MESA program provides tutoring services, academic advising and hands-on project-based research experiences locally.
    - Admission. We strive to accept 80% or higher minority students.

- Graduate. Our objective is to support culturally competent, STEM leaders through T-type preparation (breadth and depth).
  - As one unit within multiple engineering colleges, we have a limited role in graduate school admission programs; however, we strive to help our REU students and undergraduate researchers apply to graduate programs at POETS institutions. We also believe that our D&I efforts to educate graduate students and faculty members will help create an attractive environment for underrepresented students.

Implementation of Diversity and Inclusion Plan
Management

Institutional transformation requires a team of dedicated stakeholders as well as a well-conceived, well-executed action plan. To be a diverse, inclusive center, POETS Associate Director of Inclusivity is responsible for coordinating D&I efforts, measuring and reporting institutional process, and providing technical and programmatic assistance to the POETS institutions. The POETS Director will be responsible for overseeing the implementation of the Strategic Plan and the reporting of findings to the center.

However, the diversity leaders cannot operate in a vacuum; it must have widespread support. POETS SLC university representatives, POETS Management committee and POETS HQ staff play an active role in implementing the outlined strategies in this plan by coordinating campus efforts, aligning structures and budgets, and ensuring transparency of the process. Additionally, all stakeholders, both internal and external to the campus take on leadership roles and act as partner "change agents."

Accountability

An annual review of the D&I strategic plan and publication an annual D&I report will keep us as a center accountable to our goals. We are also working with each institutions' Diversity and Inclusion offices to review our published reports on an annual basis.

Communication of Plan

Clear communication of our D&I goals is essential for ensuring center members' alignment with our mission. As such, we have multiple avenues to communicating our efforts and progress with the community at large. First, the D&I section of the POETS website is the first place Center members can go to learn about our goals and efforts. Here all center reports and data will be housed for public review. Second, an annual webinar is dedicated to communication of the center's D&I strategic plan and D&I report. Third, during annual university focus groups, university-specific successes and challenges will be communicated and discussed.

Reward Structures

One catalyst for institutional transformation is sufficient reward structures – awards, advancement mechanisms, policies, and practices that recognize and incentivize achievements. Several mechanism are in place to encourage adherence to POETS D&I goals.

- Inclusive teaching award. This award will be given to a faculty member that has demonstrated inclusive teaching or mentoring practices at the undergraduate or graduate level. Nominations will be collected prior to the annual meeting.
- Inclusive Teaching and Mentoring Certificate program. This virtual and in person training, facilitated by UIUC, incentives graduate students and faculty to expand their knowledge of D&I topics.
- Mentor awards. For both our Young Scholars and REU program, an award will be given to top mentors, nominated by their mentees or supervisors.
- News stories: The quarterly newsletter and the website news feed provide avenues to highlight academic, research and education success stories related to D&I efforts.

Timeline and Milestones

The following gives an annual tempo for our D&I Strategic Plan as it has evolved through the first 5 years of POETS. We will continually monitor our outcomes and adjust our attention and efforts to meet the plan's goals. Where appropriate, we add or remove D&I activities based on their effectiveness and impact as well as how our strategic goals evolve. We add D&I activities based on projected impact and remove them based on redirection of strategic goals.

From year 1 to 5 year of POETS, we have achieved several important D&I milestones: Launch of first Technical Conference (2016), Student Retreat (2017), Student Climate Survey (2017), Annual Student Focus Groups (2018), and Faculty Climate Survey (2020). We will continue to monitor our outcomes and adjust our attention and efforts to meet the plan's goals. For years 6-10, we will worked to improve our climate survey

and roll out to faculty and staff (2020), formalize the climate report (2020), implement a D&I certification program (2021), and utilize all university D&I resources for D&I webinar series (2022). Where appropriate, we add or remove D&I activities based on their effectiveness and impact as well as how our strategic goals evolve. We add D&I activities based on projected impact and remove them based on redirection of strategic goals.

Figure 25. Timeline of D&I Milestones