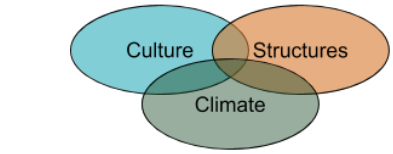
1.0 Introduction

We propose to address gender inequities on the STEM faculties of Colorado State University (CSU) by applying evidence-based strategies to shift university and unit **culture**, **structure**, and **climate** to effect lasting, institutionalized change. Our goals focus on recruitment, retention and leadership, with activities embedded in institutional offices outlined in the schematic to the right.



EEO: Equity & Equal Opportunity
FC: Faculty Council
HR: Human resources
IRPE: Inst. Research & Planning Effectiveness
Provost - CSU STEPS
TOD: Talent Development
VPD: Vice President for Diversity

The specific proposed activities of the CSU STEPs (Advancing **S**tructures **T**hrough **E**vidence-based **P**ractice**s**) for Gender Equity program are: (1) Recruitment: Adapt STRIDE Program; (2) Retention: Improve Evaluation Processes, Expand Data Collection, Improve Community Support through Empowered Allyship; (3) Leadership: Provide Department Leaders with Resources, Support and Accountability.

The U.S. is at a crossroads, with a broader understanding of social injustices providing a tremendous opportunity to effect real change, while the pandemic threatens marginalized and minoritized groups most, amplifying inequities. We propose change strategies adapted to the specific issues faced at CSU in this uniquely challenging time to take advantage of the momentum to address inequities and embed programs within the institution and its culture.

2.0 Organizational Context

The composition of the STEM faculties at CSU, like other US academic institutions, does not reflect the US population or the pipeline of outstanding people, particularly racially and ethnically minoritized women, with doctoral degrees in STEM fields (Ceci *et al.* 2014). Here, we present quantitative data on representation, hiring, retention, time to promotion, and leadership, as well as campus climate. In *3.0 Equity Efforts and Problem Analysis*, we further explore mechanisms underlying the systemic gender and racial equity problems we find, supported by a qualitative study and exit interviews.

Table 1. a. Representation on the tenure track at CSU by broad field, gender and minoritized race/ethnicity status. Number of individuals (percentage within each given broad discipline).
b. US population approximate percentages for comparison

	Women		Men	
a. CSU 2016-2020	minoritized	non-minoritized	minoritized	non-minoritized
Life Sciences	24 (7.9)	84 (27.7)	29 (9.6)	166 (54.8)
Phys/Math	10 (5.6)	35 (19.6)	20 (11.2)	114 (63.7)
Engineering	7 (5.8)	11 (9.2)	22 (18.3)	78 (65.0)
Non-STEM	53 (7.3)	294 (40.4)	49 (6.7)	331 (45.5)
b. US Pop.[1]	20.1	30.7	19.5	29.7

[1]https://www.census.gov/quickfacts/fact/table/US/IPE120218

To preserve individual anonymity as required by federal law, quantitative data from our Institutional Research office are pooled over a 5-year period without duplication. This dataset is then disaggregated into four broad disciplines, as well as by gender identity and ethnic/racial minoritized status. The four disciplines, based on departmental Classification of Institutional Programs (CIP) codes, are:

- **Life Sciences**: Biological, Natural, Agricultural Sciences
- **Phys/Math:** Physical, Chemical, and Computational Sciences, plus Math and Statistics
- **Engineering**
- **Non-STEM**: Liberal & Fine Arts, Psychology (non-STEM by CIP code at CSU), etc.

Within these disciplines, we further break the data down by gender and minoritized status. **Gender** includes people who identify as women or as men, although we recognize that gender is not binary. **Minoritized status** here focuses on racially and ethnically minoritized people who self-identify as African American, Latinx or Hispanic, Native and Pacific Islander and Asian

American. We include Asian Americans, as evidence suggests that there are strong biases against Asian women in the sciences (Milkman *et al.* 2015). Non-minoritized people are defined as those who identify as white or foreign nationals. These groupings (woman, man and minoritized, non-minoritized) are by no means homogenous or complete, but they allow us to examine the state of CSU from an intersectional perspective, in full recognition that gender, race and ethnicity do not exist in isolation from each other or other social identities.

Women, particularly minoritized women, are underrepresented in all STEM disciplines at CSU, with the most severe disparity in Engineering (Table 1). In general, underrepresentation of women can stem from trends in hiring, retention, or both (Marschke *et al.* 2007). Figure 1 compares patterns in recent CSU hires to the percentage of earned doctorates in 2015 reported by NSF. In our evaluation of hiring patterns, we found that non-minoritized men hired at CSU are represented at higher rates compared to the representation among the earned doctorate populations in all four broad disciplines. With the exception of minoritized women in Engineering, minoritized women and men, and non-minoritized women are represented among the hired population at lower percentages than the earned doctorate populations. Women leave academic job tracks from their postdoctoral research positions (Thomas *et al.* 2015), so we do not expect hiring to perfectly match earned doctorates, but it is an important goal to strive toward. If hiring is even slightly biased over the long term, an institution mathematically cannot reach parity in representation (Marschke *et al.* 2007). Thus, it is crucial to address hiring disparities directly.

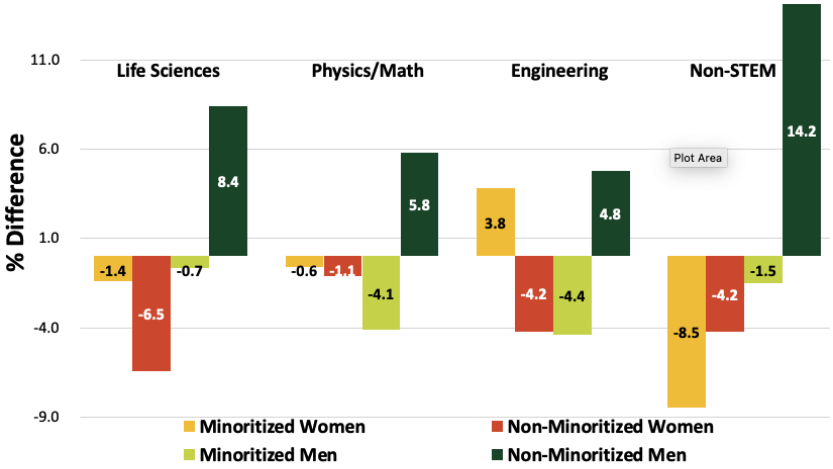


Figure 1. % Difference between CSU hires (2016-2020) and earned doctorates (2015)* *wmpd19-sr-tab07-007 at https://ncses.nsf.gov/pubs/nsf19304/data/

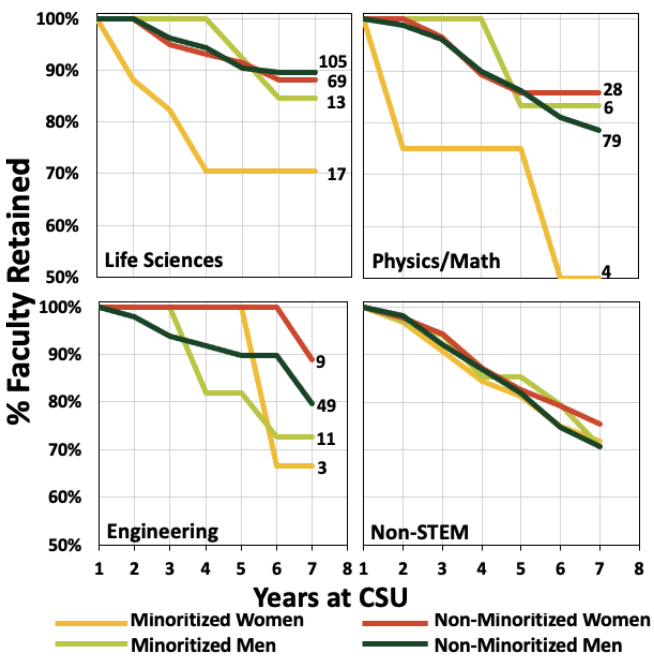


Figure 2. Retention of tenure-track faculty members from their starting year to 7 years out. Cohorts include all individuals who started at CSU on the tenure-track in any rank between 2004 and 2014.

Retention data at CSU are also concerning. Minoritized women are retained at strikingly lower rates in STEM fields (Fig. 2). Breaking down the data on representation by non-tenure track (NTT) status and rank (Table 2) corroborates these retention data, showing small percentages of minoritized women in all fields at all ranks. Interestingly, minoritized women are even more strikingly underrepresented among NTT faculty than are non-minoritized women. Because sizable percentages of non-minoritized women on the faculty are not on the tenure track, treatment and integration of those faculty members is an issue of gender equity.

To further explore the factors that lead to differences in faculty success after hiring, we evaluated time to promotion. Minoritized women are promoted more slowly to associate professor (Fig. 3a) than others in Life Sciences, and women as a group are promoted more slowly than their male counterparts in Phys/Math and Engineering. Minoritized women in Life Sciences also are promoted more slowly to full professor (Fig. 3b). The relatively short time to promotion for women to full professor in Engineering (Fig. 3b) reflecst hiring of people with time credited from other institutions, according to our Institutional Research office, suggesting a laudable effort to improve representation.

Table 2. Percent of faculty by identity, type, and rank in the four broad fields

	Women								Men							
	Minoritized				Non-minoritized				Minoritized				Non-minoritied			
Field	NTT	Asst	Assoc	Full	NTT	Asst	Assoc	Full	NTT	Asst	Assoc	Full	NTT	Asst	Assoc	Full
Life Sciences	1.6	2.6	2.6	1.0	10.5	4.4	8.5	8.9	1.4	1.4	2.0	3.6	13.1	7.2	10.7	20.5
Physics/Math	1.0	2.1	1.0	1.0	11.3	4.5	4.5	5.2	1.4	2.1	2.4	4.1	14.4	11.0	13.4	20.6
Engineering	0.0	2.2	0.8	0.8	3.9	3.4	2.2	2.2	0.0	2.2	5.6	7.3	15.2	15.2	15.2	23.6
Non-STEM	3.6	1.4	1.3	0.7	29.9	6.3	7.2	5.4	2.0	1.1	1.1	0.9	19.0	5.6	6.4	8.0

NTT: Non-Tenure Track Faculty; Asst: Assistant Professors; Assoc: Associate Professors; Full: Professors

Together, these data illustrate that minoritized and non-minoritized women experience distinct challenges at CSU. Both groups could benefit from proactive hiring practices, particularly non-minoritized women. Importantly, addressing retention issues is crucial for moving towards parity in representation of minoritized women at CSU, and for their career progression and success.

CSU is a highly decentralized university, which means that Department Chairs and Heads, in particular, are key actors with respect to hiring and retention, and can be an important part of solutions. Departmental leadership in STEM also reflects university-wide culture and structures. While the proportion of women serving as Chairs and Heads has tracked the increased proportion of women on the faculty over time in non-STEM departments, that has not been the case for STEM departments (Fig. 4). Efforts to hire more women Chairs and Heads are being pursued, but for them to be successful, we must concurrently improve culture and climate (Jackson 2014). Full participation of our current and future departmental leaders, both men and women, is crucial in effectively creating cultural change. Supporting leaders (both

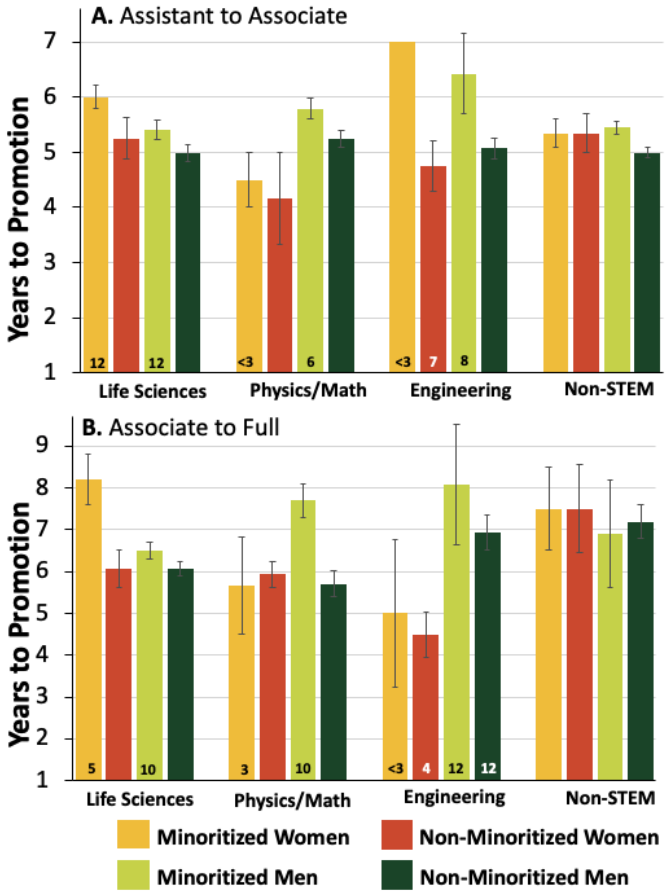


Figure 3. Years to promotion to associate and to full in the four broad fields by demographic groups. Cohorts are people promoted between 2004 and 2020. Population sizes smaller than 20 are indicated at the bottom of the column.

white and POC) is a major thrust of our proposed activities.

3.0 History of Equity Efforts and Analysis of Equity Challenges

Our proposal is founded upon extensive ongoing efforts to understand and improve equity as outlined in the following timeline. We are now strongly positioned to implement the strategies proposed here to address remaining equity issues.

- 2012 Confidential exit interviews initiated by the Offices of Equity & Equal Opportunity (EEO) and of the Vice President for Diversity (VPD)
- 2013 former CSU President Tony Frank pledged that CSU would become "the best place for women to work and learn;" the Standing Committee on the Status of Women Faculty formed (now the President's Council for Gender Equity on the Faculty - CoGen).
- 2014 CoGen commissioned an external expert to conduct an intensive qualitative study on culture and climate for women faculty members; CSU climate survey initiated by senior personnel Dr. Archibeque-Engle and others in the VPD
- 2015 VPD created the Faculty Institute for Inclusive Excellence (see *4.2.3 Improve Community and Support Through Allyship*); Institutional Research and Planning Effectiveness initiated an annual faculty salary equity analysis. Women full professors were earning less than men, and minoritized associate professors were earning less than non-minoritized associate professors. These differences have now been rectified.
- 2018 CoGen (then chaired by PI Hufbauer) initiated EnCircle, a mEntoring Circles program aimed at women on the faculty, supported by the President's Office, which includes an opt-in affinity group for people of color that is run by a woman of color.
- 2019 CSU subscribed to the National Center for Faculty Development and Diversity (NCFDD, facultydiversity.org), providing faculty members and others access to their outstanding training materials; President Joyce McConnell started the Race, Bias, and Equity Initiative; Non-tenure track faculty members (mostly women) obtained improved contracts, with clear guidelines for required evaluations and promotion pathways.
- 2020 Non-tenure track faculty became fully represented and participating members of Faculty Council, name changed internally to focus on appointment types (Contract, Continuing, Adjunct Faculty CCAF) rather than what they are not (non-tenure track); To address issues of equity during the pandemic, a new section was added by co-PI Susan James to annual review materials to facilitate faculty describing COVID-19 impacts on their research, and an opt-out delay of tenure-clock was instituted for pre-tenure faculty.

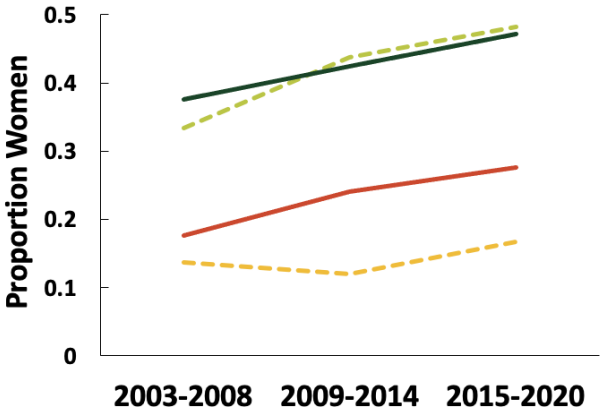


Figure 4. The proportion of women on the faculty (solid) and among Chairs (dashed) in STEM (orange) and non-STEM (green) departments.

These diverse and targeted efforts have helped us make great strides in addressing problems (e.g. salary), but problems still remain, as section 2 illustrates. Equity challenges like salary disparities are symptomatic of underlying issues with university structures and culture. As such, they will re-emerge unless the root problems are addressed. **The qualitative study, climate survey, and exit interviews elucidate the root causes underlying our quantitative findings**.

The qualitative study commissioned by CoGen found that gender bias impacts the professional status, productivity, health and work satisfaction of women on the faculty. The biases stem from leaders, other faculty members, and students, as exemplified in the following statements:

"*When [our department chair] first came, … he told all of the women the same story about his wife, that she did the right thing and stayed home with the children*."

"*Evaluation is where predominantly men would make comments -- very clear comments, such as: Remember we're the ones who decide if you get in the club.*"

Women of color and LGBTQIA faculty members reported experiencing institutional silencing, including facing more severe consequences for expressing concerns about equity (Bubar & Jennings 2017; Jennings *et al.* 2018). Participants in the study conveyed disillusionment and skepticism that CSU's long-serving leaders would create real change:

"*... at the bottom of my heart I know that this is probably never going to happen as long as the provost's office people stay …[the same]. [There is] probably never going to [be] any change here because there is a big block there*."

Since that study, leadership in the Provost's office has changed, to a woman Provost (Dr. Mary Pedersen) and a woman Vice Provost for Faculty Affairs (senior personnel Dr. Susan James), leaving us poised to consolidate and expand our equity efforts. Furthermore, the qualitative study provided concrete recommendations, and several are incorporated below.

Exit interviews are consistent with the findings from the qualitative study. Departures of women faculty, particularly women of color, are strongly driven by the internal climate of a department. Unfortunately, systematic exit interviews were paused in 2018 due to lack of personnel.

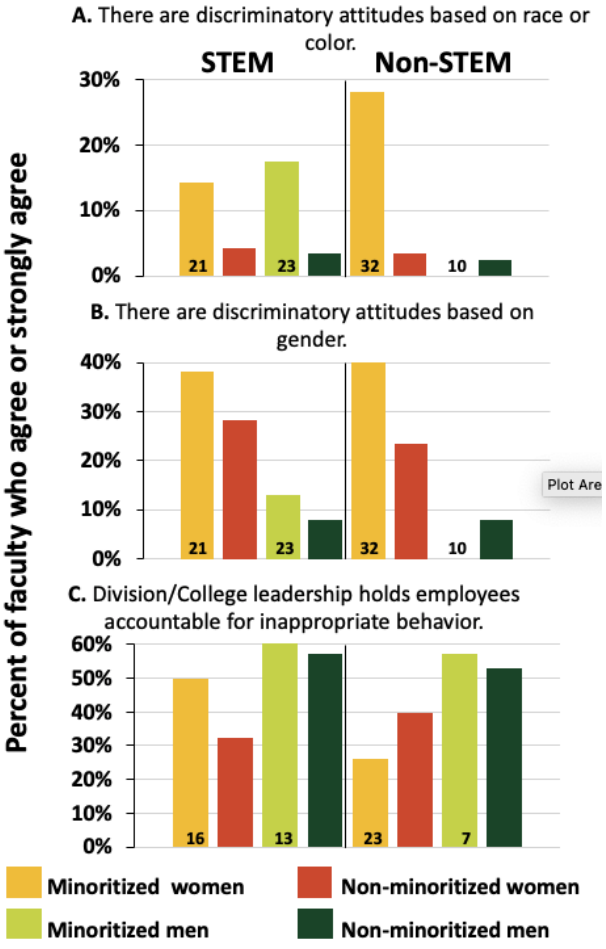


Figure 5. Climate survey data (2018) showing faculty (tenure-track and non-tenure track) agreement with three statements. n < 60 indicated at the bottom of the column.

The climate surveys provide quantitative data that support the findings of the study and exit interviews. For example, minoritized women and men in STEM at CSU perceive discriminatory attitudes based on race (Fig. 5a), while women (minoritized and not) perceive discriminatory attitudes based on gender (Fig. 5b), highlighting how structural and socialized racism and sexism intersect to create a climate in which it is difficult for minoritized women to thrive. An "intersectional takeaways" analysis of the climate data revealed that minoritized women have concerns about sense of belonging, leadership and accountability (Fig. 5c), department/unit perceptions, and respect.

Data from the climate surveys are available down to the department level, and individualized reports are provided to each departmental unit. Department heads and faculty members have been socialized to understand these data and are familiar with their own unit's status, providing a foundation for working to change the structures, culture, and climate.

In combination, the qualitative and quantitative evidence reveal a campus culture that does not

reflect or validate women, particularly minoritized women. Rather, like many other institutions in the US, it systematically reproduces sexism and racism, and it remains dominated by white men in all four broad STEM disciplines (Table 1). Our efforts over multiple years have positioned us strongly to transform our institutional structures, culture, and climate through adapting evidence-based approaches. CSU STEPs will work to create a university that is inclusive, dignifying, and validating of all gender identities and of racially minoritized groups, by addressing the intersectional challenges faced by minoritized women in STEM.

4.0 Activities Description

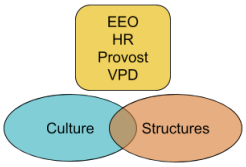
Our overarching, long-term goal is to transform university and unit structures and improve culture and climate to achieve gender equity in STEM, with an intersectional focus on minoritized women. We propose an interlinked suite of activities (Fig. 6), targeting recruitment, factors that influence retention (evaluation, allyship, data collection and analysis), and leadership. These activities will be structurally based in existing locations and offices, to provide accountability and life beyond the grant. This work will be coordinated through a new CSU STEPs office, housed under the umbrella of the Provost's office.

4.1 Recruitment

Recruitment below the available pool of earned doctorates and below proportions of different groups found in the nation as a whole will prevent reaching gender parity, even if all else is equitable (Marschke *et al*. 2007). At CSU, women in STEM, minoritized and non-minoritized, are generally under-recruited (Figure 1), as are minoritized men. Thus, we propose to adapt approaches from the University of Michigan STRIDE program (Sekaquaptewa et al. 2018). We focus on gender equity broadly but keep intersections of power structures and identities in mind, to make certain that challenges faced specifically by racially and ethnically minoritized women are not neglected. As a consequence, these programs should be helpful for recruiting of minoritized men, and people from other marginalized groups as well.

4.1.1 Adaptation of STRIDE Program

For this and the other activities, we provide small schematics as seen on the right, indicating whether the activity targets culture, structures or climate directly, and what offices will be involved in implementation. Abbreviations for offices are found on page 1 of the narrative.



Currently, our search and hiring programs are overseen by the Office of Equity & Equal Opportunity and cover all employees of the university. One of the training units for Search Chairs and committee members focuses on diversity, equity, and inclusion, but largely from a compliance perspective. A separate training, also for all employees, is offered out of the Office of the Vice President for Diversity. While there are excellent reasons for consistency across appointment types, faculty members have particular roles and responsibilities that differ from other employee groups, and disparities in representation, retention and success are particularly found among faculty groups, especially STEM faculty. Thus, we propose to restructure these training sessions to include a suite of offerings specifically for faculty hires. Initially we would focus on those who have not had the existing training, or who were trained 10 or more years ago (as well as any others interested in updating their training). After roll-out, we would require that the training be refreshed every 5 years to capture all the participants in the search process over time and reinforce the curriculum and messages.

We will customize the materials provided in University of Michigan's STRIDE program for CSU. New training sessions focused on diversity issues related to faculty hires will be hosted by the Office of Equity and Equal Opportunity and offered by the two new staff members who are part

of the long-term institutional support for this proposal (see letter from EEO VP Prieto). Tracking of training will use our existing system (bridgeapp).

4.2 Retention

Our retention efforts focus on three components: (1) improving evaluation procedures, (2) understanding retention and departures more thoroughly to be able to address issues as they arise, and (3) creating a cadre of allies to improve climate in departments. We do not focus on mentoring because most departments have discipline-specific mentoring programs, and we have the cross-disciplinary EnCircle mentoring program.

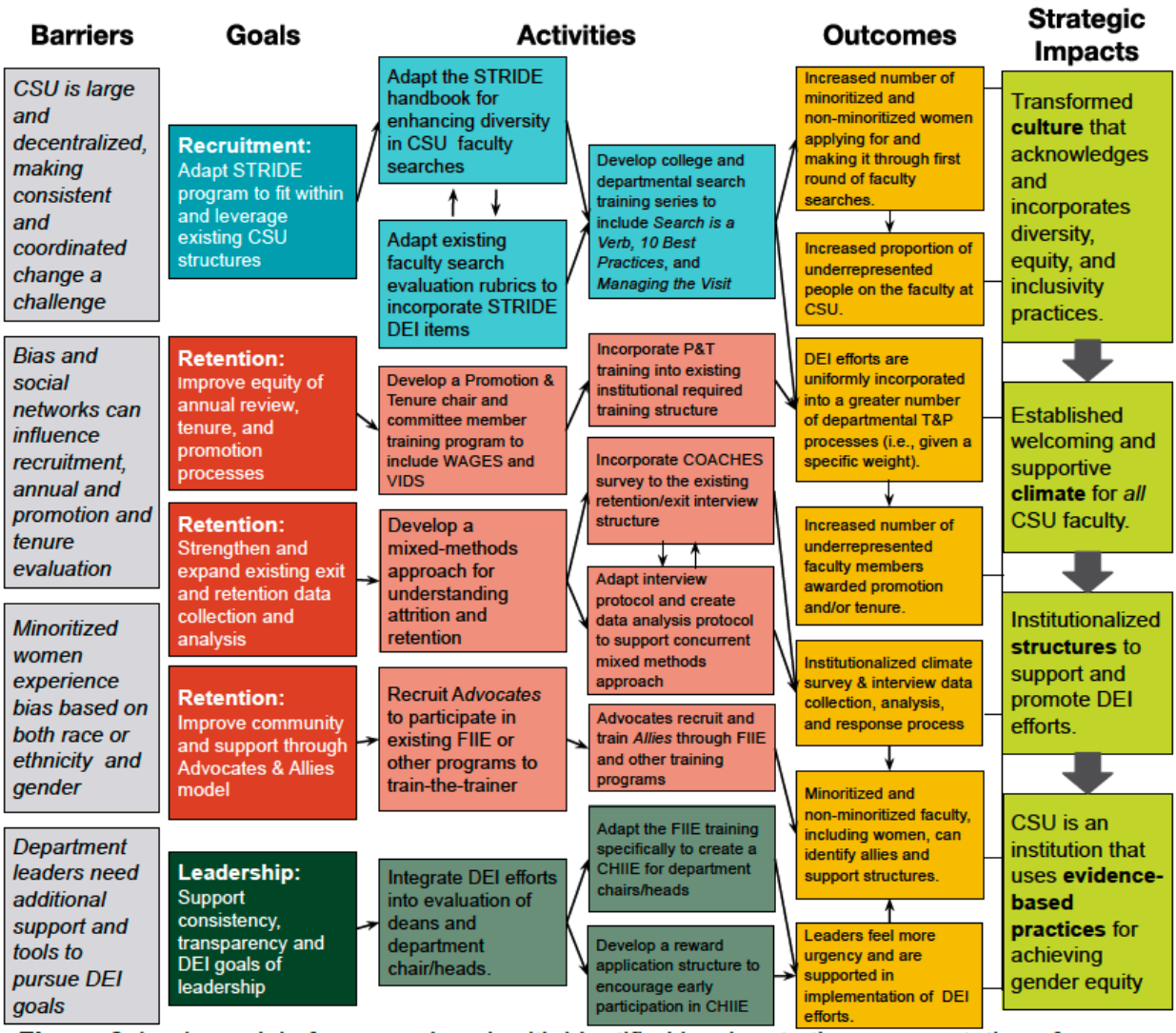
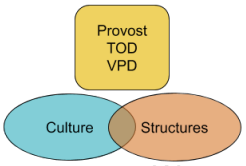


Figure 6. Logic model of proposed work with identified barriers to the representation of women and minoritized faculty members at CSU along with project goals, measurable outcomes, and strategic impacts.

4.2.1 Improve Evaluation (Annual Review, Tenure and Promotion) Processes

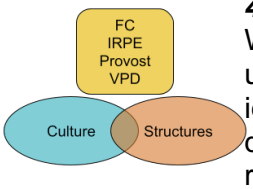
There are two main classes of interventions focused on annual review, tenure and promotion processes: structural and educational (Laursen and Austin 2014). Here, we focus on educational interventions, but with a structural component in that they will be standardized and formalized across units, similarly to Search Chair and Committee training.



In most STEM departments at CSU, a single committee conducts annual, mid-term, and promotion/tenure reviews (the Promotion and Tenure or P&T committee). Currently, there is not consistent training of P&T Chairs or committee members on either the logistics or the ways that bias enters the process, or how to notice and address it. Annual reviews are a crucial structural part of supporting new faculty members and integrating them into departments. We leverage this structural piece by providing educational resources and programming to those involved.

We propose implementing two tested and feasible programs: (1) WAGES (Workshop Activity for Gender Equity Simulation; Zawadzki *et al.* 2012, 2014; Cundiff *et al.* 2014, 2018) and (2) VIDS (Video Intervention for Diversity in STEM; Pietri *et al.* 2017; Hennes *et al.* 2018; Moss-Racusin *et al.* 2018). WAGES is a game that was developed at The Pennsylvania State University with NSF support. The game teaches participants to recognize the cumulative effects of unconscious gender bias on women's advancement. It also develops the awareness that gender-related factors can be more significant at certain career stages. The game is played by 6-8 people at a time, and we will initially train chairs of P&T Committees together. The game is particularly well-suited to this audience in how it demonstrates the bias that women of color and white women face in academia. Players progress along an academic career trajectory from postdoctoral researcher, through the tenure process, and on to leadership roles. By the end of the game, players see how patterns of behavior, not individual incidents, produce gender inequity in academia. The game works particularly well when played by multiple groups at a time, as any individual group might have a disadvantaged player who is able to progress through the ranks, but overall, the pattern that we see in our faculty ranks arises, with certain types of individuals progressing well while others are largely left behind.

Video Interventions for Diversity in STEM (VIDS) are experimentally tested short videos that expose participants to gender bias research and have been shown to increase bias literacy and reduce modern sexism (Pietri *et al.* 2017; Moss-Racusin *et al.* 2018). There are two types of videos. In the first, actors illustrate gender bias in different contexts including bias in letters of recommendation, backlash toward agentic women and modest men, and bias in the interview process for pregnant women. The second set of videos are expert interviews. These are straightforward presentations of findings from peer-reviewed literature. The videos are directly connected to specific studies (e.g., Rudman & Glick 1999; Madera *et al.* 2009; Moss-Racusin *et al.* 2010) and are accompanied by suggested discussion questions. These videos are an ideal intervention for our community because they have been shown to increase awareness of bias and gender inequity across different situations, as well as provide techniques to confront these problems (Pietri *et al.* 2017). In addition, VIDS reduces modern sexism and increases action-oriented emissions of empathy and anger in both men and women (Moss-Racusin *et al.* 2018). We will pair VIDS with UNITE (Underscore effective diversity training; Hennes *et al.* 2018). UNITE helps to avoid the perception that bias is immutable, and it buffers against potentially harmful effects of bias training on women's sense of belonging in STEM. VIDS is a free resource for the scientific community supported by the Alfred P. Sloan Foundation.



4.2.2 Expand Data Collection: Exit and Retention Interviews

We propose a structural change to university policies aimed to better understand why faculty members leave or stay, and how that is influenced by identity and discipline. We have a good understanding of recent rates of departures, with evidence showing that minoritized women leave at higher rates than other groups (Fig. 2), due largely to the climate they experience (Exit interviews, Fig. 5). We propose to re-initiate formal exit surveys and expand data collection to include a subset of faculty members who are successfully retained, as well as a sample of

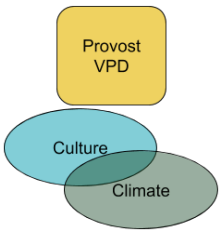
faculty members who do not apply for outside offers. Exit interviews will be integrated as an automated (opt-out) step in our off-boarding process and run out of the Office of Equity and Equal Opportunity with the support of the two new positions leveraged by this proposal. The qualitative data will be anonymized and shared with the Provost and the VP for Diversity. Qualitative data will be analyzed by the new position, again leveraged by this proposal, housed in the VP for Diversity Office. We will combine the exit/retention interviews with the established Collaborative on Academic Careers in Higher Education (COACHE), Faculty Retention and Exit Survey in a mixed methods approach. The combination of the qualitative interviews with the quantitative findings of the COACHE survey will provide a depth of understanding of the climate needed to guide transformational change. Additionally, we will implement "equity checks" through the Office of Institutional Research to evaluate how well applicant pools for STEM faculty positions reflect the demographics of the national data on earned doctorates and whether the demographics of employees that leave reflect the demographics of our current employees or if some demographic groups are over-represented.

4.2.3 Improve Community and Support Through Allyship

We propose to adapt the successful and wide-spread Advocates and Allies model developed at North Dakota State University (NDSU) to CSU (Anicha *et al.* 2018). **Advocates** are senior faculty members who educate themselves about issues of gender [in]equity, plus intersectionality with race, ethnicity and other forms of minoritization. Originally focused on men at NDSU, we will encourage men but also encourage others to participate, acknowledging that there are many other axes of identity that can be included in allyship. Two Advocates per college will be recruited from each of the STEM colleges. This grant will offer Advocates $1000 of summer salary for their effort in coordinating and training, following NDSU's approach. Non-STEM Advocates will also be recruited and paid through the Provost's office.

These Advocates will participate in one of the training programs offered out of the VP for Diversity Office if they have not yet engaged in deep training. They will then recruit and help train **Allies**, faculty members who work with Advocates as proponents of equity in their units. Advocates and Allies serve as change agents, committing to be active and vocal proponents of gender diversity and equity specifically in terms of increasing diversity of the faculty through hiring and promotion, and ensuring the fair and equitable treatment of minoritized or marginalized people within their units.

We propose that Advocates and Allies engage in one of several opportunities for gaining skills for their roles. They could partake in the National Conference on Race and Ethnicity in Higher Education (NCORE), or one of the following CSU programs: the Social Justice Leadership Institute, the Creating Inclusive Excellence Program, or the Faculty Institute for Inclusive Excellence (FIIE) program. These four opportunities allow participants to delve deeply into justice, diversity, equity and inclusion material and gain tools for promoting and supporting change. Providing a menu of options will make participation more feasible for the Advocates and Allies. NCORE has a long record of improving multicultural competence in higher education (Plagman-Galvin & Gansemer-Topf 2018). We have not conducted research directly on the other two CSU programs, but we have strong evidence for the effectiveness of the FIIE program, which uses many elements in common with the others.



FIEE was developed at CSU in 2014 with the belief that an increased focus on faculty multicultural competency would benefit the overall climate at the institution. The FIIE program prioritizes inclusive excellence, specifically: 1) intrapersonal awareness, (2) interpersonal awareness, (3) curriculum transformation, (4) inclusive pedagogy, and (5) inclusive learning environments (Salazar *et al.* 2010). To this end, the FIIE is a year-long immersive experience for faculty members consisting of 6 workshops with the goal of developing awareness,

knowledge, and skills in participants (Sue *et al.* 2019). It includes a semester of mentoring/coaching from previous fellows of the program and culminates with a participant-designed project to demonstrate increased multicultural competency, such as curricular infusion, departmental diversity strategic plan, or seminar series.

In 2019- 2020 the impact of the FIIE was assessed through semi-structured interviews with faculty members who had participated in the program. Through thematic analysis of interviews, investigators (including senior personnel Dr. Shannon Archibeque-Engle) sought to understand the motivations of participants, the outcomes of participation, and the departmental and university level implementation of skills learned. Emergent themes include Individual Impact, Institutional Impact, Knowledge Growth, Skill Attainment, Facilitation, Barriers, and Program Improvement. Overall, the findings strongly indicate a positive impact on the multicultural competency of the participants. This quote exemplifies this:

> "*... you can't do [equity work] ... in your classroom space only or ... in your departmental committees only, right? It's sort of that, once it's been seen it can't be unseen. I think if you really see [the problems] and you really do this work, you can't help but do it everywhere because you see it everywhere.*"

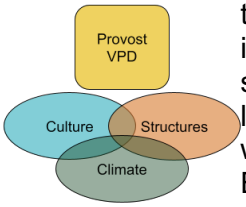
Thus, while the research evaluating the FIIE program is not yet finalized and published, we feel we have strong evidence to continue to use FIIE and the other programs that implement many of the same materials as part of our adaptation of the Advocates and Allies program.

4.3 Leadership

The qualitative culture study and the climate surveys show that CSU would benefit from greater consistency and transparency in leadership, and the building of trust between leaders and the CSU community, especially the faculty. Leaders themselves have expressed the need for support in developing and implementing diversity, equity, and inclusion plans.

4.3.1 Provide Departmental Leadership with Resources, Support and Accountability

The Council of Chairs and Heads, under the leadership of co-PI Gregg Dean, have formed an Action Network that engages all CSU Department Chairs and Heads to identify concerns, training needs, and share solutions with each other. The social unrest in the last year inspired this group to arrange their own training session on social justice and equity issues, and they are eager to follow up. Thus, this is an excellent time to support that group further through adapting University of Washington's leadership training program for CSU (Austin & Laursen 2014). Specifically, we will leverage our existing resources in the Faculty Institute for Inclusive Excellence program to create a Chair/Head Institute for Inclusive Excellence (CHIIE) with information tailored to departmental leaders. Participation in CHIIE will be encouraged by the Provost's office, supported by code changes that just went into effect that clearly integrate diversity, equity and inclusion efforts into evaluation of university leaders. These code changes were led by senior personnel Dr. Sue James (Vice Provost), Dr. Sue Doe (Chair of Faculty Council), and PI Hufbauer (Vice Chair of Faculty Council).



Additionally, participation will be encouraged through a grant program available to Departments of participating Chairs/Heads. We adapt this approach from the University of Colorado, Boulder and the University of Michigan (Laursen & Rocque 2009). Participants in CHIIE will have the opportunity to submit a 2-page proposal for an IDEA (Inclusion, Diversity, Equity, Access) grant from the CSU STEPs program to support departmental changes. We will coach and support Chairs and Heads in the development of their proposals. Examples of the types of programs that we anticipate supporting include time release for a faculty member to lead the writing of a Diversity Strategic Plan for the department, time release for a faculty member to work with Institutional Research and Planning Effectiveness to study their data around student and faculty diversity and success, or support for sending faculty and staff members to NCORE (The

National Conference on Race and Ethnicity in Higher Education). We will roll out this program in a deliberately staggered way over the course of the grant. This staggering allows us: (1) to test and improve the CHIIE programing, (2) to work more closely with a smaller group of departments, (3) a means of comparing climate in departments that have been involved with those that have not yet, facilitating rigorous publication about the programming effectiveness.

5.0 Project Evaluation

Formative and summative evaluation activities are critical to the implementation of this project. Formative aspects of the evaluation will be conducted under the guidance of co-PI Dr. Laura Sample McMeeking, Director of the CSU STEM Center, a physical scientist, who is an expert in professional development methods and holds extensive experience in designing and implementing evaluations at multiple scales. The formative internal evaluation will be conducted collaboratively with the project team, several of whom also have evaluation experience. Summative aspects of the evaluation, under the guidance of Dr. Rebecca Cors, will be conducted by Christine Fabian Bell, MS, both evaluators at the University of Wisconsin-Madison, Wisconsin Center for Education Research. Cors and Bell have prior experience evaluating an NSF ADVANCE program and initiatives related to faculty professional development, improvement of campus/department climate, and equitable faculty search and hiring practices. The external evaluator will also review aspects of the internal evaluation.

Following the Kirkpatrick 4 Level model for evaluating programs (Kirkpatrick & Kirkpatrick 2006), the internal and external evaluators will answer the overarching evaluation question: *Have the interventions been adapted to meet the needs of the CSU community and goals of CSU STEPs?* The four levels refer to the extent to which (1) intervention participants are satisfied (reaction), (2) participants achieve the learning objectives and exhibit changes in knowledge, skills, and attitudes toward DEI initiatives (learning), (3) participants intend to implement what was learned (behavior), and (4) participant's employment of strategies and how this influences climate, demographics, recruitment, retention (results). This model will be used both to improve the training components while in development (formative), and will also serve to evaluate the overall impact of the CSU STEPs program on participants and the institution (Table 3).

The internal and external evaluators will collaborate to ensure that quantitative and qualitative data collected have utility for both formative and summative evaluation purposes, reducing duplication of effort and conserving project resources. Prior to the development of evaluation materials, they will also review the evaluation methods used by each adapted component (e.g., STRIDE and VIDS) to test effectiveness and replicate or adapt those methods for the CSU implementation of each component. In years 2 and 3 of the project, the internal and external evaluator will collaborate with the project team on publications focused on the experiences of minoritized and non-minortized faculty members and leaders as they relate to participation in the CSU STEPs program as well as the overall results of the program on institutional change.

5.1 Internal Formative Evaluation

The internal evaluator, in collaboration with the project team (specifically, IRPE and VPD), will be responsible for helping to adapt the proposed DEI strategies to fit the CSU context, as outlined in the logic model (Fig. 6), by collecting participant needs and experiences through surveys and interviews (when needed). These activities will inform the adaptation of existing strategies and development of new ones by allowing the project team to make data-based decisions about changes to program components and will ensure that relevant content is included to meet the project objectives in the CSU context. The internal evaluator co-PI Sample McMeeking will provide immediate feedback to the project team during the early stages of project component development as a means of ongoing improvement.

Table 3. Evaluation plan: Summary of program elements, anticipated outcomes, performance indicators, and evaluation methods or sources for CSU STEPs.

Proposed Activities	ADVANCE Indicators* (Internal Evaluator)	Anticipated Outcomes (External Evaluator)	Evaluation Methods
Goal 1: Recruitment			
Activity 1a: Adapt the STRIDE handbook for the CSU faculty search process **Activity 1b:** Adapt existing faculty search rubrics **Activity 1c:** Develop search training series	• Updated CSU faculty search handbook (P) • Search rubrics include DEI efforts (P) • # of search committee/chair attending training (A&P) • Training participant reflections and self-evaluation (P)	• Increased number of minoritized and non-minoritized women apply (A&E) • Increased proportion of underrepresented people on the faculty (A&E)	• Document review of intervention materials • Training attendance records • Pre-survey needs assessment and readiness for training • Post-survey training evaluation survey • Individual interviews and qualitative analysis • IRPE data analysis
Goal 2: Retention			
Activity 2a: Develop, promote, and incorporate P&T training **Activity 2b:** Develop a mixed method approach for retention/exit process **Activity 2c:** Recruit and train advocates and allies	• # participating in WAGES and VIDS (A&P) • Participant satisfaction with training (P) • Participant motivation and intent to employ strategies (A) • # advocates and allies recruited and trained (A) • Advocate and ally satisfaction with training and motivation to implement strategies(P)	• DEI efforts have been incorporated into T&P processes (E) • Increased # of underrepresented faculty promoted or tenured (A&E) • COACHE survey and interview process have been institutionalized (E) • Allies and support structures are easily identifiable (A&E)	• Review institutional processes for retention/exit process • Review departmental P&T processes • Survey advocates/allies for satisfaction with training • Interview advocates/allies focused on how/if they adopted training strategies • IRPE data analysis
Goal 3: Leadership			
Activity 3a: Integrate DEI efforts into deans and heads/chairs evaluation process **Activity 3b:** Adapt FIIE training for heads/chairs **Activity 3c:** Develop a reward application structure for early CHIIE participation	• # of department head/chairs attending training (A&P) • CHIIE training includes leadership-specific content (P) • # of department heads/chairs applying for early participation awards (P) • Heads/chairs satisfaction with relevance of CHIIE training (P)	• A sense of urgency and importance amongst university leadership (A&E) • Deans and department chairs/heads are supported in developing and implementing DEI efforts (A&E)	• Review evaluation processes for DEI efforts • Post-training interviews with leadership on satisfaction with training • Review plans for implementation of DEI efforts • Interviews with leadership focused on how/if they have adopted strategies

***Note:** Reporting period of (A) = Annual; (P) = Periodic; (E) = End of project. All data will include analyses on both minoritized and non-minoritized women and men faculty.

5.2 External Summative Evaluation

The external summative evaluation will determine the efficacy of the program in meeting the project goals and outcomes as outlined in the project logic model. Specifically, summative evaluation activities will focus on the immediate and potential lasting impact of the project's change model (i.e., the combination of program components). To do this, the summative evaluation will focus on measuring outcomes in the logic model related to (1) the adoption of DEI strategies by Deans, Department Chairs/Heads, and faculty members, (2) the numbers of minoritized and non-minoritized women applying for and being retained in faculty positions, and (3) the recognition and use of support structures by minoritized and non-minoritized women faculty. Further, the summative evaluation will seek to assess the extent to which the change model components have been institutionalized within existing CSU programs and structures.

6.0 Communication Strategies

6.1. Internal Communications.

For internal communication, we will create a dashboard hosted on the Provost's office website. From that dashboard, we will link to different units hosting programs, resources and institutional

data. Most programs will be strategically placed in existing structures around the university. The STRIDE program will have a website on the Equity & Equal Opportunity pages, the CHIIE program will be placed with the VP for Diversity offerings, and the Advocates and Allies program will be housed at the Provost's office and on that website. An annual progress report will be shared with the Internal Advisory Board and posted to the website. Articles for the CSU paper, *The Source*, will highlight activities on a quarterly basis.

6.2. Broad Dissemination.
Activities, findings and lessons learned will be shared externally with the External Advisory board and in attendance at meetings such as the Advance Research Coordination (ARC) Network biannual meeting and NCORE. We aim to publish our findings in peer reviewed journals such as the *Journal of Diversity in Higher Education*, *The Journal of Higher Education*, *Studies in Higher Education* and STEM journals with a broad focus to also reach STEM faculty directly (e.g., *BioScience*, *BAMS*, *Science*). Publications will be shared with the ARC network's Mendeley group. We will also target opportunities that will help us reach leadership at other institutions of higher education, for example co-PI and Vice Provost for Faculty Affairs Sue James can share with the Advisory Committee on Faculty Affairs of the APLU.

7.0 Commitment and Sustainability
CSU is deeply committed to the project across multiple offices as evidenced by:
1. Creation of a new CSU STEPs office within the Office of the Provost to house resources and tracking of training of P&T Committee Chairs and members, including the new position of a project manager (see below).
2. Integration of new training opportunities and new webpages focused on improved equity in recruitment housed out of the Office of Equity & Equal Opportunity offered by two new permanent staff members.
3. Data collection to better understand and address retention issues. A new permanent staff member housed in the Vice President for Diversity Office will support this effort and rigorous qualitative data analysis long-term.
4. Data "equity checks" as a regular report out of the Office of Institutional Research and Planning Effectiveness, analyzing the demographics of applicant pools and retention/loss of faculty members.
5. Commitment has also been demonstrated by the multiple programs and resources supported university-wide, as described in *3.0 Equity Efforts and Problem Analysis*
6. Accountability is built-in for the main equity efforts focused on recruitment, retention and leadership support.
7. Our Internal Advisory Board and the lead PI include the Chair and Vice Chair of the Faculty Council, who can help shepherd code changes for relevant items through the Faculty Manual and Code. As the Code is treated essentially like law, and thus changes to it can only be rolled back (or better, improved upon) with clear, deliberate effort.

8.0 Project Management
To foster sustainability, our implementation and management plans deliberately build upon existing structures that will promote accountability and guide institutionalization of the activities. The daily running of the project will be the responsibility of the lead PI Hufbauer and the project manager, with collaboration and oversight from the key personnel and the Internal Advisory Board (see below). The role of project manager is a new, permanent position that will start with a focus on implementation of the CSU STEPs activities and shift towards a long-term focus on faculty equity and diversity university wide. The project manager will work out of the new CSU STEPs office housed within the Provost's Office. This position will initially be funded largely through this grant, with the salary shifted to CSU base budget over time. The PI and project manager will execute the activities in collaboration with the lead internal evaluator, co-PI

Sample McMeeking, and the activity teams. We will meet every month with the project co-PIs, who comprise our Executive Committee, and once/semester with the STEPs Internal Advisory Board described below. Teams managing and implementing specific activities are as follows.

STRIDE: PI Hufbauer, VP Prieto (see letter), new EEO employees.
Evaluation (WAGES, VIDS): PI Hufbauer, co-PI Fischer, Marsha Benedetti (see letter)
Data Collection: co-PI Sample McMeeking, senior personnel James, Archibeque-Engle, Novak, VP Prieto (see letter), new EEO employees, new VP for Diversity employee
Advocates and Allies: co-PI Dean, senior personnel Archibeque-Engle
Leadership support: co-PI Dean, co-PI Balgopal, senior personnel Archibeque-Engle

Table 4. Timeline

Tasks	Year 1			Year 2			Year 3		
	Fall 21	Sp 22	Su 22	Fall 22	Sp 23	Su 23	Fall 23	Sp 24	Su 24
(1) STEPS start-up (hiring personnel)									
(2) Adapt STRIDE									
(3) Adapt WAGES & VIDS									
(4) Adapt Advocates and Allies									
(5) Adapt Leader Support and Dept. Grants									
Advisory Boards Mtgs (Interal/External: I/E)	I	I&E		I	I&E		I	I&E	
Evaluation (Internal/External: I/E)	I&E	I	I&E	I	I	I&E	I	I&E	I&E
Publication									

8.1 Internal advisory board.
Our Internal advisory board will meet twice a year to provide feedback on implementation of activities and help shape the program institutionalization. Feedback will come in the form of conversations, and a one-page summary of insights, ideas and perspectives. Members are chosen for their perspectives on the university, and as a crucial group of leaders to keep informed and have buy-in on the activities and goals. Members will include the Provost (**Dr. Mary Pederson**), the Vice President of the Office of Equity, Equal Opportunity and Title IX (**Diana Prieto, JD**), the Vice President for Strategy (**Janelle Beavers, JD**), the Vice President for Diversity (**Roe Bubar, JD**, interim), the Chair of Faculty Council (**Dr. Sue Doe**), the Vice Provost for Planning and Effectiveness (**Dr. Laura Jensen**), the Deans of the colleges who represent most of the STEM departments (**Dr. James Pritchett**, Agricultural Sciences; **Dr. David McLean**, Engineering; **Dr. Lise Youngblade**, Health and Human Sciences; **Dr. John Hayes**, Natural Resources; **Dr. Jan Nerger**, Natural Sciences; **Dr. Mark Stetter**, Veterinary and Biomedical Sciences). If there is turnover in the people filling those roles, this will be a duty of the new incumbent.

8.1 External advisory board.
The External advisory board will meet in-person in year 1 and 3, and virtually in year two to consult and provide input on the project activities. Prior to the annual meetings, a report will be provided to the board members on our progress and activities. The External Advisory Board will include: **Dr. Erika Marín-Spiotta**, Lead PI on the ADVANCEGeo Partnership, co-PI on an ADVANCE PAID award and a Professor of Geography at UW Madison; **Dr. Rebecca Barnes**, co-PI on an NSF supported Improving Undergraduate STEM Education project, co-PI on the ADVANCEGeo Partnership, and an Assistant Professor at Colorado College; **Dr. Adrienne Minerick**, lead PI on an ADVANCE Adaptation grant to Michigan Tech, Professor of Chemical Engineering and Assistant to the Provost for Faculty Development. In addition to direct interactions, the External Advisory Board will provide annual written feedback and suggestions. This feedback will go to the PIs, as well as the internal and external evaluators.

9. Intellectual Merit
By adapting evidence-based practices to improve gender equity, and implementing them with rigorous internal and external evaluation, we will be able to make important contributions to the

literature on how to improve and change university structures, culture and climate. Using a mixed-methods approach, we will leverage the power of quantitative and qualitative data, to deeply understand what programs lead to effective and lasting change and how. Our findings will make important contributions to organizational change, DEI and STEM literature.

10. Broader Impacts

We present an ambitious set of programs and practices to adapt. As such the broader impacts from the work will be substantial, and benefit other universities working towards institutional change and equity in STEM. We are confident in our ability to successfully implement our ambitious goals given the considerable institutional support (with 4 positions being added and becoming permanent over time), and given the preparatory work CSU has done towards diversity, equity and inclusion for faculty. This project, using evidence-based approaches, should lead to improved representation and career success and satisfaction, with a particular focus on minoritized women in STEM. Improved faculty representation and support will improve climate and resources for undergraduate and graduate students, and in the long run should enhance the pipeline of people choosing academic STEM fields.

11. Prior NSF Support

NSF1930650 to Hufbauer (2019-2022, $698,977). *BEE: Understanding Evolutionary Rescue. Intellectual Merit*: Understanding how to rescue populations from extinction following environmental change using a model diploid organism. *Broader Impacts:* 9 undergraduates, 2 graduate students and 1 postdoc are receiving training and mentoring. All are women but one, 3 of the women are women of color. NSF1540794 to Balgopal (2016-2021, $948,642). *Empowering Scholars and STEM Teachers*. *Intellectual Merit:* Examining the impact that place-based pedagogy training for undergraduate STEM majors has on abilities to design and implement curriculum that integrates STEM content, high-leverage teaching practices, and social justice. *Broader Impacts:* Improving recruitment and retention of STEM teachers in high-needs school districts. This project has supported 24 undergraduates, 5 graduate students, 5 in-service teachers, produced 5 conference presentations, and 2 publications thus far (Wright *et al.* 2019; Weinberg et al. in press). HRD-1835055 to Fischer (2018-2021, $289,259) *NSF INCLUDES: Leveraging Field-Campaign Networks for Collaborative Change. Intellectual Merit:* Implemented intervention programming to prevent harassment in earth science field campaigns. *Broader Impacts:* Eliminating sexual harassment is essential to broadening participation as it is overwhelmingly perpetrated against women, members of the LGBTQ community, and people of color, in domains dominated by men. There is one paper currently under revision (Fischer *et al. in revision*). DUE-1431795 to Fischer (2014-2020, $1,411,731), C*ollaborative Research: Improving the recruitment and persistence of women in the Geosciences: Exploring deliberate mentoring approaches aimed at undergraduate students*. *Intellectual Merit*: Recruited STEM undergraduate women to nurture persistence in the geosciences. Longitudinal quasi-experimental and randomized experimental studies provide evidence for an intervention that causes growth in the development of stronger networks of mentors and role models, which in turn promotes scientific identity. *Broader Impacts*: 1) Promoting Diversity in STEM via a program model and website; 2) *Broad Dissemination t*o the geoscience and educational psychology communities; 3) *Enhancing Infrastructure for Research and Education* by building a U.S. network spanning two geographic regions and a diversity of institutions. This study produced high-impact publications (Hernandez *et al.* 2017, 2018, 2020). 2013318 to Fischer (2020-2025, $1,198,285) *Collaborative Research: PROmoting Geoscience Research Education and SuccesS (PROGRESS) Intellectual Merit:* Given the effectiveness of PROGRESS, we will scale-up PROGRESS to include new regions, more diverse types of higher-educational institutions, and broadened participation of women from minoritized groups. *Broader Impacts:* This project will reach 2000 students from 7 U.S. regions.