Interventions in Faculty Recruiting, Screening, and Hiring Processes Enable Greater Engineering Faculty Diversity

Dr. Robyn Sandekian, University of Colorado, Boulder

Robyn Sandekian, PhD, is the Manager of Diverse Faculty Recruiting for the College of Engineering and Applied Science at the University of Colorado Boulder. In this role, Robyn works with hiring committees throughout the College to ensure that faculty searches reach a broad pool of potential applicants and coordinates training offered by the National Center for Women and Information Technology (NCWIT) to identify and reduce implicit bias throughout the search process. In addition, she runs a faculty development and leadership program to recruit and support diverse PhD students who wish to pursue academic positions in engineering or applied science after graduation.

Dr. Sandekian earned B.S. and M.S. degrees in Aerospace Engineering Sciences at CU Boulder in 1992 and 1994, respectively. She went on to earn a Specialist in Education (Ed. S.) degree in Educational Leadership and Policy Studies in 2011 and a Ph.D. in Higher Education and Student Affairs Leadership in December 2017, both from the University of Northern Colorado.

She is a Founding Leader of the American Society of Engineering Education (ASEE) Virtual Community of Practice (VCP) for LGBTQ+ Inclusion in Engineering and a facilitator of Safe Zone trainings for engineering faculty and staff who wish to learn more about how to create inclusive environments within engineering for LGBTQ+ individuals.

Dr. JoAnn Silverstein P.E., University of Colorado Boulder

JoAnn Silverstein is a professor in the Department of Civil, Environmental and Architectural Engineering at the University of Colorado, Boulder. As Associate Dean for Faculty Advancement in the College of Engineering and Applied Science, she is committed to implementing institutional changes to promote equity and inclusion in hiring, compensation and promotion practices for faculty in engineering.

Dr. Silverstein has Bachelor's degrees in Psychology (BA Stanford University), and Civil Engineering (BS, University of California, Davis), and MS and PhD degrees in Civil Engineering from the University of California, Davis. She has been a member of the faculty at the University of Colorado, Boulder since 1982.

Dr. Beverly Louie, University of Colorado, Boulder

Beverly Louie is the Faculty Advancement Research Associate in the University of Colorado Boulder's College of Engineering and Applied Science. Formerly she was the Director for teaching and learning initiatives in the Broadening Opportunities through the Broadening Opportunity through Leadership and Diversity (BOLD) Center, Director for the Women in Engineering Program and senior instructor in engineering courses ranging from first-year projects and chemical engineering unit operations. She holds B.S. and M.S. degrees in chemical engineering from CU, and a D.Phil. in mechanical engineering from the University of Oxford, England. Louie's research interests are in the areas of faculty equity and retention, women's success in engineering, diversity and inclusive practices, teaching effectiveness, and collaborative learning.

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I. Abstract

Recruiting underrepresented faculty into tenured/tenure-track engineering positions has been a goal for many universities for decades. Yet results have been disappointing. Numerous studies discuss interventions that are “best” or “effective” practices, but those activities typically focus on bolstering the portfolios and skills of individuals (“fixing the applicant”) or habits of search committees (“fixing the committee members”) rather than on changing campus recruiting, screening, and hiring processes (“fixing the system”). From the “fixing the individual” perspective, many institutions (including our own) now offer future faculty programs that provide application preparation support for diverse prospective faculty applicants or even more elaborate post-doctoral training. These programs aim to provide *individuals* with additional social and/or academic capital needed to adapt themselves to an existing, some would say broken or dysfunctional, hiring system. Required, or strongly encouraged, implicit bias training for search committee members has also been implemented, but this is a version of fixing the *individual committee members*, not the system. While these programs are valuable, they are not sufficient. Effective interventions need to be sustained over long periods of time and address both levels of change—individual and systemic. Even a desirable systemic change like ensuring diverse representation on faculty search committees or in screening interviews may be beneficial, but the cost is greater service burdens on women and other underrepresented minority faculty who, due to small numbers, already face heavier service loads than their majority, men peers. So, in this study we asked, “What differences have these programs made in the hiring outcomes within our college?”

This case study describes some of the recent interventions implemented at the University of Colorado Boulder (CU Boulder) College of Engineering and Applied Science (CEAS), a predominantly White, *very high research activity* doctoral institution [1]. We present the demographic history of the college’s tenured/tenure-track faculty compared to national averages in the United States, a discussion of changes incorporated into the tenured/tenure-track faculty search processes over the past five years, the hiring results over the past decade, and insights into whether existing interventions appear to have changed recent hiring outcomes. Finally, we discuss how we intend to extend these initiatives, or tailored alternatives, to improve institutional hiring practices for instructional (non-tenure-track) faculty.

Please note that the authors recognize that the following data are presented as if gender were binary and ethnic/racial identities were singular. These descriptors are artifacts of the university’s data collection software and do not match the researchers’ personal understanding of gender or multiethnic and multiracial identities. In our writing, we use binary *gender* designations (man/woman), even when data was presented with *sex* designations (male/female) in original sources. In addition, we recognize that Asian identities are not monolithic, but include people from many cultures who may experience the hiring process differently depending on their country of origin [2]. We also recognize that Asian individuals are numeric minorities in the United States, but Asian-American men are not underrepresented in engineering academia. Therefore, our gender data includes Asian-American women as underrepresented minorities, but our ethnicity data is not gender disaggregated, meaning that our numbers for Asian individuals

include all genders. Finally, faculty sexuality has not, to date, been collected by CU Boulder so it cannot be broadly included in this discussion. Sexuality data collection efforts are discussed.

II. Introduction

A. Faculty demographics in engineering academia in the United States of America

Women (predominantly able-bodied White and some Asian women) have made significant gains within the academic engineering workforce in the United States over the past 40 years [3] and women from underrepresented minority groups (as defined by the National Science Foundation to include Blacks or African Americans, Hispanics or Latinos, American Indians or Alaska Natives, and persons reporting more than one race are minority groups) now earn a greater percentage of bachelor's, master's, and doctorate degrees in science and engineering (S&E) disciplines than underrepresented minority men within the United States [4]. However, those rates of minority S&E degree attainment are still low with women earning 13% and men earning 9% of bachelor's degrees and women earning 5% - 8% and men earning 4% - 6% at the graduate degree levels [4]. Individuals who self-identify at least one disability comprise approximately 9% of the S&E academic doctoral workforce in 2017, which is approximately equivalent to the overall percentage within the general population [5]. Therefore, engineering academia within the United States remains predominantly occupied by able-bodied men of European, Chinese, or South Asian descent [5], especially among the ranks of tenured and tenure-track (T/TT) faculty [3]. At the same time that the percent of all women and underrepresented minority men on all faculties has increased [6], the diversity of faculty in more stable and better compensated T/TT positions has actually declined by almost one-third between 1993 and 2013, from 35.6% to 24.2%. Full time non-tenure-track and part-time faculty representation in higher education has increased from 35.8% to 57.9%. Unfortunately, the trend away from hiring tenure-track faculty is a result of mounting economic pressures on higher education, especially public higher education. These pressures are not likely to decrease, especially now, after the COVID-19 pandemic has begun. Thus, where there have been diversity gains in higher education, the increased entry of all women and underrepresented minority men faculty has been disproportionately into contract (non-tenure track) or contingency (part-time adjunct) positions [7]. Exact employment percentages explicitly within engineering academia are difficult to obtain because the National Center for Science and Engineering Statistics does not disaggregate the doctoral workforce numbers of women, underrepresented minorities, and those with disabilities by discipline beyond S&E or provide a feature making data based on intersectional identities available [8].

B. Approaches frequently used to diversify faculty demographics

Starting in 2001, the National Science Foundation (NSF) funded a program, called ADVANCE, designed to "increase the representation and advancement of women in academic science and engineering careers" in a systemic way [9, para. 1]. Under the auspices of the ADVANCE program, more than one hundred institutions of higher education in the United States and its territories have developed, tested, and disseminated practices intended to transform the academic workplace culture to one that supports more equitable participation and engagement of all those who have attained the prerequisite academic degrees. In the early days of the program, ADVANCE grants focused on institutional transformation, leadership, and fellowship awards.

Many of the practices developed in the early years of the ADVANCE program focused on ways to bolster the knowledge, skills, and abilities of women and other underrepresented individuals who were already employed in the academic workforce. Examples of these retention and advancement programs have included hosting professional development workshops [10], pairing women and/or minority faculty with mentors at or beyond their home institutions [11], [12], [13], identifying the pathways that led certain women to successfully navigate the tenure and promotion process [12] or leadership ladder [14], developing climate surveys [15], and many other interventions. Some interventions focused on “warming the chilly climate for women” by calling attention to inequitable institutional policies and interactional relationships [16] and by providing faculty development opportunities to women and other minorities who would then persist to become leaders and role models [10]. As mentioned, there have been some significant gains in the representation of *some* women in *some* areas of engineering but those successes have been uneven by discipline, across institutions [4]. The authors’ home institution was a beneficiary of one of the early ADVANCE grants designed to drive institutional transformation by providing professional development to early career women faculty in science, technology, engineering, and mathematics (STEM) departments across schools and colleges campus-wide [10]. These efforts to bolster individuals has led to increased representation of White women among campus leadership, but has not led to a significantly more diverse faculty in engineering.

Recommended faculty *recruiting* efforts have involved activities such as revising the text of job advertisements to clarify applicable experience and decrease gendered language [17], broadening the advertising network, embedding diversity champions onto search committees [16], [18] securing additional faculty lines with partial funding from the campus dedicated to hiring individuals from underrepresented groups [19], and securing additional post-doctoral/pre-faculty appointments that provide opportunities for direct transition into tenure-track positions. The CEAS has implemented most of these practices since the campus ADVANCE Institutional Transformation grant was funded in the early 2000s. Again, while these efforts may have been useful for the individual participants, they have failed to transform S&E academia’s macroclimate into one that is equitable or welcoming environment for all, as recently reported in a consensus study report of the National Academies of Sciences, Engineering, and Medicine [20] and in other research [21].

III. The case study institution

The CEAS is the second largest college on the CU Boulder campus and includes approximately 310 T/TT and instructional (non-tenure-track) faculty across 16 departments and academic programs [22]. Approximately 23% of the total faculty identify as women and about 5% of all faculty members identify as underrepresented minorities (which, in the case of engineering includes American Indian/Alaskan Native, Black/African American, Hispanic, Hawaiian Native or Other Pacific Islander, or identifying as two or more races) [23]. Within the CEAS during the past decade, gender and ethnic diversification of the faculty has been slow overall with unevenness across departments and types of faculty appointments. Several departments include so few women or underrepresented minority men faculty that their demographics cannot be reported in a disaggregated format without breaking individual privacy.

At the same time, the student body within the college has become significantly more diverse. The percentages of women undergraduate students has risen from 21% to 29% of the entire

student body and the 2019 entering class of first year students included 45% women. The percentages of students who identify as American Indian/Alaskan Native, Black/African American, Hispanic, Hawaiian Native or Other Pacific Islander, or identifying as two or more races has increased from 8% to approximately 14% of the entire student body, with representation in the 2019 entering class of just over 24% [24]. The demographic changes amongst the student body has led to a reevaluation and refocusing of the college's efforts to diversify the faculty who teach, mentor, and are role models for those students on a daily basis.

A. Inclusive tenured/tenure-track faculty recruiting activities at CU Boulder

Initially, our interventions have focused on improving the T/TT track hiring processes. The ranks of the college T/TT have increased by 16% since 2016, which has provided a unique opportunity to incorporate more inclusive recruiting and hiring practices. Improvements for hiring instructional rank faculty, who are already more diverse than our T/TT faculty, started in 2020.

Figure 1: Approaches Used for Tenure-Track Faculty Recruitment at CU Boulder Since 2015

As shown in Figure 1, some of the T/TT faculty recruiting efforts the CEAS has implemented within the past five search cycles include having:

1. Engaged more closely and thoughtfully with search committees including discussions on implicit bias and crafting the interview experience with candidate care in mind;
2. Expanded dissemination of employment announcements and crafted those announcements to be more inviting to candidates of all genders and ethnicities;
3. Focused on ensuring broad representation of varied identities on search committees;
4. Encouraged scheduling an opportunity for all candidates to engage with the student diversity center staff during their interview—not just the women and underrepresented minority men;
5. Implemented a future faculty program for outstanding diverse PhD students to engage current CEAS faculty;
6. Expanded and formalized a proactive dual career and relocation program; and
7. Drafted a comprehensive T/TT search committee process manual that augments information provided by campus Human Resources.

Due to space limitations, we will only detail two of the most recent efforts here including the new future faculty program and the expanded dual career and relocation program. These programs were initiated in fall 2018 and were designed to both support individual potential and current faculty applicants and change faculty search processes within the CEAS.

1. Future Faculty Development and Leadership Intensive Program

For the past two years (fall 2018, fall 2019), the College has invited domestic doctoral students who self-identify as potential future faculty to visit the CU Boulder campus to learn more about academic careers at doctoral research institutions, including our own. The program, called ACTIVE, encourages community building among individuals who are currently underrepresented in the engineering professoriate, and highlights varied opportunities within academic faculty roles, especially in the CEAS. For this program, underrepresentation was defined broadly to include all women and others who identify as members of minoritized groups including those who identify as Hispanic/Latinx, African American, Native American/American Indian, and Native Hawaiians and other Pacific Islanders; members of the LGBTQIA+ community; first-generation college students; non-traditional age students including veterans; and those from lower socio-economic backgrounds.

The concept for the program was proposed by a group of committed faculty, staff, and graduate students in spring 2018. While the program itself is similar to many others in the United States, the development team focused on key strengths offered by our college in areas of teaching innovations and interdisciplinary research opportunities. We designed a small program that would allow for high levels of interaction and personal mentorship both during and after program participation. The program was initiated to take advantage of the numerous faculty hiring opportunities within the College over the next few years with a goal of enhancing the diversity of the college faculty that has shown nearly stagnant demographics of historically marginalized identities such as majority women and domestic-born persons of color for more than a decade [see Figure 2 and Figure 3]. The program development working group recognized that the college has a once-in-a-generation opportunity to significantly diversify the faculty pool due to the Dean's strategic initiative to increase the size of the T/TT faculty by approximately 50% (from approximately 200 tenure-track lines to 300 tenure-track lines in a 5-year span from 2016 to 2021). The program was intended to provide insight into the faculty hiring process for diverse PhD students and early career post-doctoral scholars from across the nation. Bringing these individuals to the attention of current CEAS faculty on hiring committees provides the college with an opportunity to increase these students' networks with regards to potential post-doctoral placements and/or future faculty searches within the college (or elsewhere) and encourages engagement with CU Boulder. Both of these goals focused primarily on the individual-change level: encouraging individual potential faculty candidates and connecting current and future search committee members with a group of talented academics who may or may not have been otherwise considered as viable candidates for future openings because they were not previously engaged in a professional network with CU Boulder CEAS faculty and/or did not attend an institution higher than CU Boulder on the prestige hierarchy [25].

A longer-term *structural* change to the college's future faculty recruiting process will be to tie participation in these workshops to direct opportunities to complete post-doctoral research at CU Boulder. By funding post-doctoral opportunities at the college level rather than relying on

individual faculty to provide the funding, there is a greater chance that a current or previous program participant could find a research match somewhere in the college's broad portfolio. It would also provide a broader opportunity for all CEAS faculty members—some of whom may not have existing funding for a post-doctoral associate. Another possible structural change in the T/TT faculty recruiting process would be for the Dean to propose at least one new tenure-track position per year through the campus' Strategic, Targeted, and Accelerated Recruitment (STAR) Program. The STAR program provides an entry point for “scholars with the potential to bring to their academic careers the critical perspective that comes from their non-traditional educational background or understanding of the experiences of groups historically underrepresented in higher education” [26, Para. 5]. It includes a campus-level financial commitment of 50% of the faculty salary for a period up to seven years. In this way, the college could leverage existing campus resources to create a new faculty line that has a mandatory requirement for the position to include “contributions to diversity and inclusive excellence to be made by the candidate” [26, Sec. “Recruitment for diversity and inclusive excellence”]. That position would provide an extra opportunity for individuals, such as those who have participated in the ACTIVE program, to seek a tenure-track position within the college.

Of the 29 participants to date, at least five of the most academically senior have followed up with faculty and/or staff whom they met during the program to discuss the potential for a future faculty application, visiting research, or other role in the College. At the urging of current CEAS faculty members, two participants submitted applications to open faculty searches and two have applied to post-doctoral positions at CU Boulder. At least two participants have applied to tenure-track positions elsewhere. Other participants have gone on to industry jobs and post-doctoral positions at academic institutions and national laboratories that will prepare them to join the professoriate within the next few years. The program manager (Sandekian) maintains contact with most of these students and provides them with continued encouragement as they move toward graduation and beyond. In addition, in early spring 2020, the Associate Dean for Faculty Advancement (Silverstein) submitted a budget request for two post-doctoral research positions that would be made available to past-participants. Participant feedback enabled critical review of the content and purpose of the program for future improvement. Finally, the program allowed the College's Faculty Diversity, Equity, and Inclusion (DE&I) team to shine a light on the actual hiring outcomes compared to the Dean's aspirations and provided college administrators with data to highlight the gap between the espoused values and the current faculty recruitment outcomes within the college.

2. Dual Career Hiring and Relocation Assistance Program

Another recent addition to the faculty recruitment portfolio is an expanded and more formalized dual career and relocation assistance program being piloted in the CEAS. CU Boulder has offered dual career assistance for T/TT candidates for many years [26], but the implementation of the policy fell to individual department chairs, often late in the hiring process, with varying success. Also, chairs and candidates may not have been aware of the breadth of opportunities available through the campus-level program. Therefore, in concert with the Provost's office, the CEAS implemented a one-year pilot program with a representative from the Provost's office working in collaboration with the college's Associate Dean for Faculty Advancement. The intent of this program is to improve the candidate's interview experience by showing value to the candidates' spouse, partner, or partner(s), hereafter simply referred to as “partner(s)”, who have

significant input into career decisions. By much earlier engagement of the partner(s), they can gather additional information that may not be available to the candidate during their formal interview due to time constraints or limitations of lawfully asked questions. For example, the partner(s) can engage in discussions and activities surrounding their own employment needs, childcare, schooling, and availability of local religious institutions that are not allowable areas of discussion during interviews, and have more free time to explore the campus, city, and surrounding areas.

As part of the data gathering effort for this pilot, the Manager of Diverse Faculty Recruiting surveyed all 43 new T/TT faculty hires who began employment between fall of 2017 and fall 2018. These faculty were candidates during the 2015-2016 or 2016-2017 hiring cycles, coinciding with the initiation of enhanced faculty hiring processes within the CEAS. This marked the first time that the college surveyed incoming T/TT faculty about their search experiences and also marked the first time that a CEAS survey provided an opportunity for faculty to voluntarily identify their sexual identity(ies) in the demographics section. From the 24 respondents, there was an almost even split regarding whether dual career issues were important to the job acceptance (seven said “extremely”, three said “very”, five said “moderately”, two said “slightly”, and seven said “not at all”). Looking deeper, we found that men respondents rated this issue slightly higher in importance than women respondents with men indicating that this issue was “extremely” (29%), “very” (21%), or “moderately” (14%) important compared to women who indicated it was “extremely” (38%) or “moderately” (25%), but no one answering “very” important. Furthermore, open ended text responses indicated that, as has been reported nationally [27], dual career arrangements were a source of stress for faculty candidates who nevertheless accepted positions in the college [28]. This finding suggests that although a dual career focus was important to some candidates, a relocation assistance was relevant to all candidates since the family unit as a whole would choose to move. Lastly, we knew that the 2018-2019 recruiting cycle included 16 separate faculty searches for 31 potential T/TT positions so the pool of candidates was going to be significantly larger than in recent years and we would have a high impact opportunity to improve college processes and increase recruitment effectiveness by expanding the partner program.

The Dual-Career & Relocation Assistance (DCRA) Program funds the travel expenses of partners during the candidate’s *first* on-campus interview—prior to any employment offers being made to any candidates. Materials pre-delivered to the hotels ensured that candidates and partners received information packages prior to interviews. More than 50 welcome bags were delivered to hotels during the 2018-19 annual hiring cycle. The greatest challenge for that arrangement was ensuring that the search liaisons provided up-to-date information about each candidate including the hotel name and arrival date.

While the candidates are at their interviews, the partners have separate, individualized experiences including the topics of their choosing, managed by a team that is not affiliated with the faculty candidate’s interview. The program coordinator gathers information about their interests in advance using a Qualtrics survey and works directly with them to identify a general activities schedule. For example, the data collection survey offers suggested topics including an area tour with a realtor, childcare, on-campus and/or industry employment opportunities, housing options, schools, and/or sight-seeing (at their own expense). The survey form also includes an open text option to share other interests.

It was expected that fewer than 10% of the candidates would choose to bring their partner(s) along or request other relocation-related information. In practice, nearly 25% of the 83 individuals who interviewed on campus requested some type of support from the DCRA program coordinator. Of the 20 partners who contacted the program coordinator, 14 of the 20 associated faculty candidates were eventually offered appointments formally or informally, and five of them accepted their offers of employment. Two of the partners of the new faculty members also accepted postdoctoral researcher positions arranged for them through the program.

The additional travel cost associated with these partner visits were minimal (less than \$10,000 total or approximately \$500 per partner) and were paid for by the Dean. In addition, the goodwill generated through the program was high as evidenced through continuing discussions with the new faculty members who participated. Although the Provost's office liaison left her campus position in fall 2019, the college's Faculty DE&I team is continuing this program. Early feedback from partners during the 2019-2020 hiring cycle has once again been positive, with one person stating that interactions with the program staff were "very warm and surprising" and "that offering such [support] was a really above-and-beyond gesture on the part of CU" (P. Metzger, personal communication, Feb. 25, 2020). On-campus interviews and partner visits were halted on March 17, 2020 in response to the local outbreak of COVID-19, but the program coordinator maintained contact with the partners who participated before the campus travel ban went into effect as well as those who were scheduled to travel but were unable to do so. If requested by the partner, planned on-campus meetings were shifted to a videoconference format (as were all remaining faculty interviews).

B. Tenured/tenure-track faculty demographics in College of Engineering and Applied Science

Despite multiple programmatic efforts over more than a decade, the demographics of the college's faculty has remained stubbornly unrepresentative of its diversifying student body and the diversifying pool of individuals who are earning the doctoral degrees in engineering and applied science typically required for tenure-track faculty positions in the CEAS.

1. Gender of faculty

Across all CEAS T/TT ranks, the percentage of women faculty has increased by only 5% over the past decade (from 2009-2018). At that rate, it would take more than 40 years to attain parity among genders. Part of the demographic inertia is due to the ratio of men hired as assistant professors compared to women hired into that rank. Even as the overall population of faculty has grown, the rate at which men have been hired within the CEAS compared to women has fluctuated from at lowest, three-men-to-one-woman, to at highest, seven-men-to-one-woman. Nationally in 2009, 21.6% (about five men-to-one woman) of engineering faculty in the United States at the assistant professor level were women [29] whereas by 2018, that percentage had increased to 24.7% (about four-men-to-one woman) [30]. In the meantime, the CEAS had been hiring women assistant professors at a rate lower than the 2009 national average, at around 13% to 18% as shown in Figure 2. That trend has changed only within the last three hiring cycles shown (2016 – 2018) when the rate increased to nearly 35%. In addition to the lower than average rates of new hires at Assistant Professor ranks, since 2006 the college has hired 14 men and 3 women as Associate Professors (18.6%) plus 12 men and 2 women as full Professors

(14.3%). Those rates do not support the college's goal of greater diversification of the faculty pool in a supportable timeframe.

Figure 2: Assistant Professor Hires from 2007-2018, by Gender Percentage

Consequently, the percentages of women T/TT faculty for all ranks have risen slowly, but smoothly, from 17% to 23% as shown in Table I. Though the *percentage* rise for women is greater than that for men over the past decade (with a 71% increase in women faculty compared to a 20% increase in male faculty), this slow trend suggests that past and current methods to increase the gender diversity in the T/TT ranks are unlikely to drive the representation of women significantly upward [31].

TABLE I. 10 Year Comparison of Tenured/Tenure-Track Faculty, by Gender

Job Title	% Women		% Men	
	2009-10	2019-20	2009-10	2019-20
Assistant Professor	27%	29%	73%	71%
Associate Professor*	17%	28%	83%	72%
Full Professor	12%	15%	88%	85%
Distinguished Professor**	33%	40%	67%	60%
T/TT	17%	23%	83%	77%

**Note that this apparently large growth in percentage of women Associate Professors is actually due to a decrease in the overall number of Associate Professors in the College over this timeframe. Between these years, the number of men who were Associate Professors dropped by 7 while the number of women Associate Professors increased by 5.*

***The total number of faculty in this honorific category is small, with 3 in 2009 and 5 in 2019. Therefore, percentages should be considered with caution. When included with the numbers of full professors, the 2019-20 census percentages change to 16.5% for women and 83.5% for men who are full professors (a change in gender differential by $\pm 1.5\%$).*

2. Ethno-racial identities of faculty

The CEAS has been largely unsuccessful in diversifying beyond small increases in White women and international women faculty. The college faculty population of those who self-identify as underrepresented minority (URM) ethnicities (including American Indian, Black, Hispanic, Pacific Islander, or identifying as two or more races) has remained almost flat for the past decade as shown in Figure 3 despite impressive sounding percentage changes. The ten-year increase for 2009 to 2018 was 43% compared to a 26% increase in Not URM faculty (not shown). Although this percentage is large, the *numeric* increase was only three URM-identifying people across all underrepresented ethno-racial categories out of 47 additional faculty over 10 years.

Figure 3: Percent Headcount in CEAS by Ethnicity

% Headcount by URM Status

Ethnicity Category	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
URM	3.9%	3.9%	4.0%	4.7%	4.5%	4.3%	4.7%	5.0%	5.2%	4.4%	5.2%
Not URM	96.1%	96.1%	96.0%	95.3%	95.5%	95.7%	95.3%	95.0%	94.8%	95.6%	94.8%

III. Discussion and next steps

The CEAS at CU Boulder has been implementing many of the activities considered best practices for recruiting T/TT faculty [32] for several years, and is beginning to see positive changes with significantly increasing percentages, albeit still small numbers, of some underrepresented ethnic groups including Hispanic men. However, also notable is the more than tripling of individuals who do not list their ethnicity/racial identity and are therefore shown as “unknown.” It is unclear why those individuals do not disclose their ethnicity, but regardless of the reason, the number of faculty of “unknown” ethno-racial identity is now twice as large as the known number of Hispanic faculty in the college. The reason for this is unclear but two possible explanations could be that international faculty do not know how to identify themselves based on

listed designations or individuals are actively choosing not to identify their ethnicity. The CEAS also has an improving record of recruiting White women faculty. Although we cannot confirm a causal relationship between our efforts and the recent improvement in faculty hiring for one demographic, White women, we do believe that these ongoing recruitment process change efforts have helped to create a culture of greater inclusion in the College and its growing network of future more diverse applicants. Only time will tell if the most recent changes in policies and practices will lead to a breakthrough in demographics of incoming faculty.

In the current competitive faculty hiring environment, earlier identification and networking with promising candidates will be essential to growth of faculty diversity. In the past, individual department chairs have offered T/TT faculty positions with delayed start dates to candidates still completing their PhDs in order to improve our hiring success. Some of these new faculty have reported that the assurance of already having a faculty position has enabled them to focus on completing their doctoral research, submitting publications, and preparing to teach prior to starting their faculty appointment here. On the other hand, several departments within the College seem to unofficially require multiple years of post-doctoral research or a prior faculty appointment as the minimum hiring criteria, or are hiring a large percentage of tenured associate and full professors, both of which have been proven by research and experience to favor applicants who are majority men. New incentives must be developed to further encourage the practice of hiring and mentoring promising scholars (e.g., newly graduated PhDs) across the College and collect data on faculty success at reappointment and promotion to assess its impact. One possible incentive would be to fund several post-doctoral research positions at the college-level, rather than by individual faculty members. This would provide an opportunity for both diverse scholars and current faculty who may not have existing funding for an additional position.

The next phase of revising the college's faculty recruiting, screening, and hiring process will focus on instructional (non-tenure-track, NTT) faculty. Although many of the same guidelines for equitable practices are relevant to all faculty hires, to date there has been less active engagement with NTT search committees. The first step that the Faculty DE&I team will take will be to raise awareness of college- and campus-level support that already exists. This means that NTT search committees will be encouraged to engage with the college's diverse faculty recruitment programs as has become the norm for T/TT searches. Opportunities for engagement will include support to craft job advertisements that include best practices such as inclusive and gender-neutral language, limit required minimum qualifications, and describe broad examples of transferrable knowledge, skills, and abilities that could be applied to the context of higher education instruction. In addition, during formal implicit bias and candidate care discussions committees could actively discuss necessary qualifications as compared to preferred qualifications and be able to justify them as they relate directly to the position being advertised. Also, the college's diversity advertising liaison could share NTT job postings to the same sites that are used for T/TT positions, at the expense of the college, allowing the individual hiring departments to use their limited advertising budget to post in disciplinary-specific venues. Finally, although instructional positions are not currently eligible for financial support for partner hires, the services in place could be extended to those candidates. For example, instructional faculty candidates could have a partner connect with the dual career and relocation assistance resource liaison to learn about similar topics as those discussed with the partners of T/TT candidates. The program could also link candidates with information such as the university's

newly expanded housing down payment assistance program that recently extended shared equity options to instructional faculty and staff that was previously only offered to T/TT candidates [33]

IV. Conclusion

While support for individual faculty candidates in the form of professional development and search committee trainings on implicit bias are a good start, transforming engineering academia into a more diverse and inclusive workplace will require long-term, systemic changes. Interventions in recruiting, screening, and hiring processes will all be necessary to engage a greater portion of S&E graduate degree recipients in the professoriate in a meaningful proportion. This case study, at a single R1 institution, provides one key data point but further research to identify similarities and differences in these processes and outcomes at other institutions is necessary to gain a broader perspective of the current trend. Openness to new practices and ideas with an associated commitment of leadership to providing resources is essential for restructuring the processes and culture of engineering academia that will help to achieve levels of faculty diversity that assure academic success and create an inclusive culture for faculty and students nationwide.

V. References

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