Comprehensive Equity at Ohio State (CEOS)
A National Science Foundation ADVANCE Institutional Transformation Grant

Final External Evaluation Report

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EXECUTIVE SUMMARY

This report documents the final summative external evaluation of the five-year Comprehensive Equity at Ohio State (CEOS) program, an NSF ADVANCE Institutional Transformation grant. From 2008-2013, the grant served three academic units at The Ohio State University (OSU): the College of Veterinary Medicine, the College of Engineering, and the Division of Natural and Mathematical Sciences in the College of Arts & Sciences.[1] Key initiatives included leadership development programs for academic administrators, entrepreneurship development, peer mentoring, college-wide action learning team, mentoring circles for faculty, laboratory management training, and research on salary and resource equity. Summary findings from this report follow:

GOAL ACHIEVEMENT: Nine goals were set for CEOS in the original NSF proposal. Four were fully achieved, three were partially met, one was not, and one was not able to be assessed due to lack of data.

1. Increase in women in STEM tenure-track faculty ranks:
   - Comparing Year 1 (Oct. 2008) with Year 5 (October 2012) levels, numbers of intervention constituencies –female and Underrepresented Minority (URM) faculty— grew by 24% and 21% respectively. Comparative numbers of non-intervention constituencies –male and non-URM faculty— declined during these same four years.
   - The composition of OSU female tenure-track faculty in CEOS units shifted upwards from 17% in Year 1 to 21% in Year 5. Notably, the increase between baseline and the final year is slightly greater than the average change in composition seen at other ADVANCE Institutional Transformation grant institutions (Bilimoria & Liang, 2012).
   - Further, the growth in female faculty composition has been larger in CEOS departments, in reference to changes in comparators (seven non-participating OSU STEM and Social and Behavioral Science units).
   - There has been an increase in women in STEM fields at all tenure-track faculty ranks. By specific CEOS college, women have increased in number in all ranks except for tenured faculty in Veterinary Medicine.
2. Increase in women in leadership positions: Comparing Year 1 and Year 4, this goal was partially achieved, with gains in some leadership positions (full professors & chairs and directors), but not others (associate deans and deans).

[1] At the time of submission of the grant, there were four CEOS units, but due to a reorganization of academic units at OSU, there are currently three. The original four CEOS units were the College of Mathematical & Physical Sciences, College of Biological Sciences, College of Veterinary Sciences, and the College of Engineering. However, during the grant's early years, the first two colleges merged to form the Division of Natural and Mathematical Sciences in the College of Arts and Sciences.

3. Retention of female assistant professors: The objective of having zero attrition was not achieved as stated in the proposal. Rates of attrition increased during CEOS, compared to the years prior to the grant.
4. Composition of new hires: Over a third (35%) of new tenure-track hires from 2008-2013[2] were women, surpassing the CEOS objective, with most being pre-tenure faculty. For comparison, this proportion surpasses the percentage of women receiving U.S. PhDs in the physical sciences (29%) and engineering (22%), but not the life sciences (55%) (NSF, 2012).
5. Female faculty of color hires: The CEOS objective was to have six new hires be African-American, Hispanic, Asian-American, or Native-American women. Eleven women of color (3 URM and 8 Asian-American women) were hired over CEOS's five years, surpassing the original goal.
6. Full and endowed chair hires: As anticipated, five female full professors were hired, including two endowed chairs.
7. Promotion from associate to full ranks: The objective of having all 37 female associate professors promoted to full was not achieved as stated in the proposal, but the number of women promoted to full in a CEOS cohort (2005-12) was about twice that of a prior non-CEOS cohort (2002-9).
8. Increased work satisfaction of female faculty: Data are not yet available to assess achievement of this goal over the full five years of the grant. However, in a survey distributed in Year 1 and Year 3 of CEOS, the proportion of female faculty at CEOS units who indicated that they would not want to come to OSU if starting their careers over again nearly doubled, from 12% to 20%. Female STEM faculty dissatisfaction also increased for other constituents of professional well-being, including social and professional relationships with colleagues, comfort with expressing opinions at faculty meetings, and exclusion from informal networks. However, over the three initial years of CEOS, dissatisfaction did drop for other issues pertaining to research resources -- such as start-up funds, lab space, opportunities for collaboration, and access to mentoring. Because mentoring was a key initiative of CEOS, increased satisfaction with access to these relationships is of practical significance.
9. Increased entrepreneurial activity: Data are not available to assess achievement of this goal.

REPORTED OUTCOMES: During my April 2013 campus visit interviews, perceived outcomes that were noted multiple times by participants and attributed to CEOS included:

- CEOS has promoted greater sensitivity to STEM-specific models for hiring, supporting and advancing faculty members through the ranks.
- Several female associate professors who had been in rank for many years were promoted to full.
- REACH was highly successful at attracting women new to entrepreneurial activity.
- Leadership Development Programs were well-organized and evidence-based.

Deans did suggest that it would be useful to have a final "capstone" event, to highlight CEOS's successes, given the multiple synergistic activities on campus.

[2] 2012-2013 hiring data are preliminary.

INSTITUTIONALIZATION: Durable outcomes of the grant that were confirmed at my April 2013 visit included:

- The creation of a new position reporting to the Vice President for Research, Associate Vice President for Gender Initiatives in STEMM.
- Integration of CEOS content into HR/OAA leadership programs.
- Continuation of the Laboratory Management Series in the Office of Research.
- Enactment of several Action Learning Team Initiatives in the College of Engineering.

At the time of my visit in April 2013, the CEOS team was discussing possibilities for institutionalization of the REACH entrepreneurship program. Additionally, enactment of NMS Action Learning Team plans were still being discussed.

In April 2013, plans were not yet articulated to to sustain the following initiatives at OSU:

- Mentoring Circles: Mentoring circles were reported to have low attendance, and given leadership transitions, it was not clear if facilitation could continue to be offered.
- Distinguished Speaker Series: These grants have not been highly utilized and no plans for continuation were discussed.
- Culture Survey: The culture survey was given in 2008 and 2011 and served as a key metric for CEOS reports on faculty climate and workplace satisfaction. However, there have been leadership changes in Human Resources, and therefore, there was not a clear commitment to repeating the survey at the time of my visit. Because a key strength of CEOS, according to OSU faculty and administrators, is its presentation of data, it is particularly important to address how data collection and dissemination can be fully institutionalized at OSU.
- Conference for Postdoctoral Scholars of Color: While the CIC (Big Ten) will continue to offer this conference for two additional years, it will not be hosted at OSU.

Overview of CEOS and External Evaluation

This report documents the final summative external evaluation of the five-year Comprehensive Equity at Ohio State (CEOS) program, a NSF ADVANCE Institutional Transformation grant. The grant serves three academic units at The Ohio State University (OSU): the College of Veterinary Sciences, the College of Engineering, and the Division of Natural and Mathematical Sciences (NMS) in the College of Arts & Sciences.

To plan the evaluation, I reviewed project documents collected since my last external evaluation visit in December 2010. At the March 2013 NSF ADVANCE PI Meeting, I met with Dr. Joan Herbers, PI, and Samantha Howe, Graduate Research Assistant, to plan out the visit. Program evaluation findings are presented in the CEOS Mid-Project Research Report II (April 2012).[3] Therefore, it was decided that the key focus of this final summative evaluation should instead document: (a) outcomes, or if and how the CEOS goals set in the original NSF proposal had been achieved, (b) reported impact of the grant, from the perspective of faculty and administrators, and (c) institutionalization, or durable outcomes of CEOS, as named by OSU faculty and administrators.

On April 4 and 5, 2013, I visited the OSU campus for the final summative evaluation visit. I spoke with the CEOS project team, deans, chairs and units in which key initiatives would be institutionalized. (See Appendix One for agenda.) To enhance validity, all of these discussions were conducted confidentially – i.e., without CEOS team members observing – except when there was a role overlap (e.g., a chair and a CEOS co-PI). In follow-up phone calls, I also spoke with the Vice Provost for Academic Policy and Human Resources, as well as the incoming Provost. After my visit, key indicator data were provided by CEOS for the latest year available, as well as prior years.

The driving theoretical framework for the grant's activities was transformational leadership, which framed CEOS's eight key initiatives:

(1) **Leadership Development Programs**, which were designed to promote transformational leadership among male and female OSU administrators, challenge embedded cultural assumptions held in units, and develop awareness of gender equity issues in STEM. These were offered quarterly from January 2009 through August 2011, on topics such as diverse faculty recruitment and leading change. Deans, chairs and the incoming Provost described these events as engaging and well-organized.

(2) **Peer Mentoring Circles** had the goal of promoting facilitated problem solving, networking, and directed peer mentoring among female faculty. The Circles were previously open only to tenured female STEM faculty and then also became available to clinical and tenure-track faculty.

(3) **Project REACH** was open to tenured female faculty across OSU. The program sought to develop the entrepreneurial capacity of faculty through a four-workshop series. REACH was

[3] Although breadth of participation can best be documented by the internal research team, as another metric of scope, website hits for http://www.ceos.osu.edu/ were provided. Tracking data are not available prior to March 2013, but that month's records indicate that there were 104 unique hits from OSU and 368 external to the campus.

offered on the OSU campus in 2010 and 2011, then was disseminated to a broader audience through a conference on September 23-25, 2012.

(4) **Action Learning Teams**, or intra-college teams that develop a cultural transformation project, began in two CEOS colleges in early 2011. The College of Engineering focused on hiring female senior research leaders, as well as developing an "onboarding process" for all new faculty and a teaching load reduction policy. The NMS team addressed mentoring for associate professors.

(5) In partnership with The Women's Place, CEOS offered the **Laboratory Management Series**. This was comprised of eight workshops on topics such as project management, budgeting, and team building, open to female STEM faculty at all ranks.

(6) A **CIC Conference for Postdoctoral Fellows** was held on May 31-June 2, 2012, with 46 postdocs from historically underrepresented groups, coming from 20 institutions.

(7) The **Distinguished Speaker Series** offered funds to departments who bring "notable minority members of the scientific community to campus for a day of technical talks and discussion with minority STEM students and faculty."

(8) **Research**: In addition to program evaluations, CEOS conducted a research study about resource allocation, examining gender differences for STEM faculty's salaries, start-up packages, lab space, and teaching assignments. These findings, in addition to faculty climate survey results, were disseminated in *Women STEM Faculty at Ohio State: Resource Allocation and Departmental Climate* (April 2012).

OUTCOMES

The following section details the campus outcomes that were concurrent with the span of the CEOS project, from the beginning of Year 1 to Year 5 (Oct. 2008-Oct. 2012). First, I document direct measures of grant outcomes, in alignment with the original goals set in the NSF proposal. The second section presents reported outcomes as noted by OSU faculty and administrators during my visit.

Direct Measures of Outcomes

Key goals for CEOS in the original NSF proposal include (pp. D10-D11):

- Goal 1a and 1b: Faculty and Leadership Composition
  1a: An increase in the presence of women in the STEM fields at all faculty ranks
  1b: An increase in the presence and success of women in faculty leadership positions
- Goal 2: Retention
  Retain all 38 of current female Assistant Professors through to promotion and tenure
- Goal 3: Hiring
  3a: Of the 80 faculty the four colleges expect to hire, one-third should be women; [and] at least 6 of those new faculty should be African-American, Hispanic, Asian-American, or Native-American women
  3b: At least 5 women should be hired at the rank of Professor, with two into endowed chairs
- Goal 4: Promotion
  Encourage all of our 37 female Associate Professors to enhance their dossiers with a view to promotion to Professor
- Goal 5: Climate
  Increased STEM female faculty satisfaction with their professional lives
- Goal 6:
  Increase entrepreneurial activity by 50% among women faculty.

The proposal also noted that other direct measures of the grant's success could include grant proposals submitted, grants awarded and other measures of career success (e.g., membership on editorial boards, review panels, election to office and honors conferred by prestigious societies), and intellectual property products resulting from the individual projects created by REACH participants. Data on these other metrics appear to be collected by CEOS for specific program participants (e.g., REACH faculty) but not program-wide; therefore, they are not described here.

For most goals, where appropriate, these data are analyzed in three ways:

1. Has the goal been achieved, as stated in the grant proposal? (Although CEOS is a five-year grant, data through the beginning of Year 5 are primarily used for these conclusions, given the timing of this report.) In select cases, comparisons are made between outcomes observed

with the CEOS grant and national data to offer a reference point about the status of gender equity in STEM at OSU at this time.

2. In order to draw more robust inferences about the impact of the CEOS grant, are there differences:
   a. in trends by time, i.e., four years before the grant (2004-2008) vs. during the grant's tenure (2008-2013)?
   b. in trends for "intervention constituencies" (i.e., primarily women, but also URM) and "non-intervention constituencies" (i.e., male and non-URM faculty)?
3. Additionally, seven non-CEOS comparator SBS and STEM units were selected by Dr. Joan Herbers (PI) and Dr. Mary Wright (external evaluator) for analysis to better isolate trends that may have occurred regardless of CEOS, due to other OSU initiatives.

Temporal and unit comparisons are not meant to suggest causal claims about the effect of CEOS; however, they can strengthen claims about the grant's effectiveness and impact. All CEOS data were provided by the project team.

GOAL 1: FACULTY AND LEADERSHIP COMPOSITION

The CEOS proposal emphasized two goals faculty and administrative composition, corresponding to ADVANCE indicators #1 and #7. First, the grant hoped to increase the number and proportion of female faculty at all tenure-track ranks. Likewise, a second anticipated outcome of the ADVANCE initiative was to increase the number and percentage of female faculty leaders.

Goal 1a: An increase in the presence of women in the STEM fields at all tenure-track faculty ranks

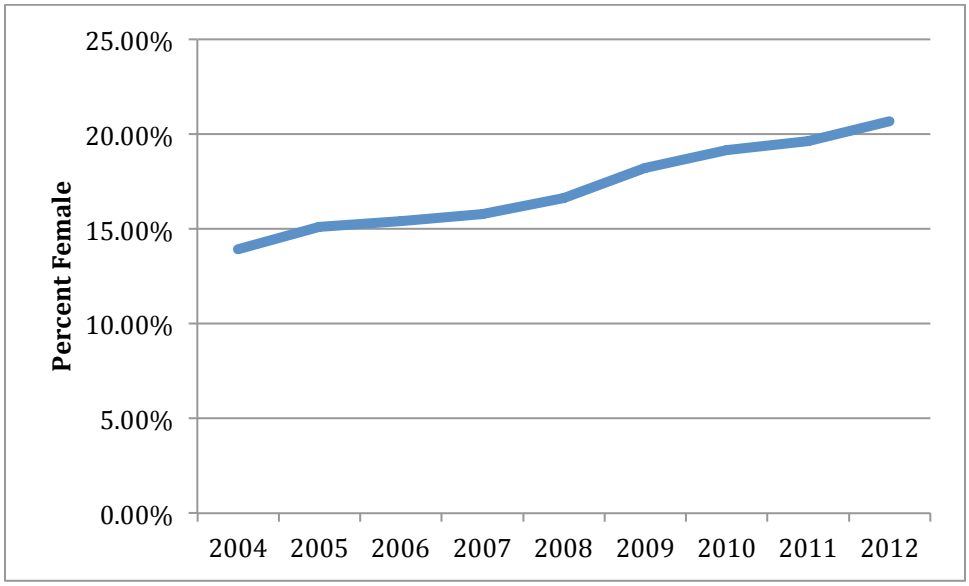
This section presents analyses of female faculty composition data, corresponding to NSF ADVANCE indicator #1. Although not suggested by the grant objective, it also examines changes in Underrepresented Minority (URM) faculty counts.

Changes in Faculty Composition

Prior to CEOS, in 2007, women comprised about 15% of tenure-track faculty in engineering, as well as the biological, mathematical, physical, and veterinary sciences (Figure 1). By the beginning of CEOS's final year (October 2012), female faculty composition grew to over one-fifth (21%) of S&E faculty. Over the span of the grant (October 2008-2012), the composition of OSU female faculty in CEOS units shifted upwards from 16.6% to 20.8%. Notably, the 4.2% increase between baseline and the final year is greater than the average change in female faculty composition seen at other ADVANCE institutions (3.5%) (Bilimoria & Liang, 2012).[4] During the same period, URM faculty composition grew from 3.7% to 4.5%.

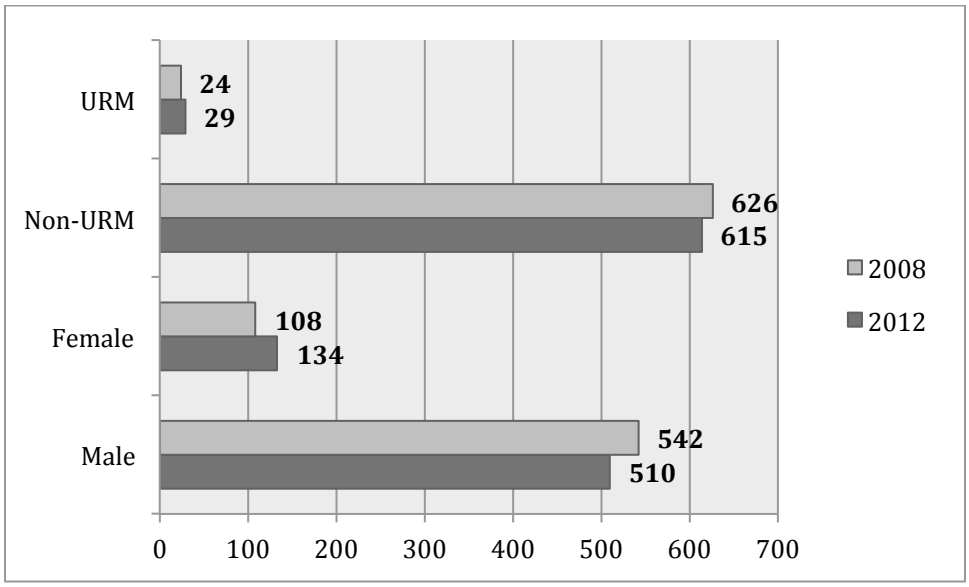
[4] Data are not yet available to make comparisons with the change in the composition of women S&E faculty at research universities nationwide from 2008-2011, but Bilimoria and Liang (2012) report an increase of 13% to 16% from 2001-2006, using Survey of Doctorate Recipients data.

Figure 1: Female Tenure-Track Faculty Composition in CEOS Units, 2004-12



As seen in Figure 2, while the ratio of male to female S&E faculty is still nearly 4:1, comparing early CEOS faculty levels (Fall 2008) with the FTE counts during the final year of CEOS (Fall 2012), numbers of female and Underrepresented Minority (URM)[5] faculty grew, while comparable numbers of male and non-URM faculty declined.

Figure 2: Number of Tenure-Track Faculty in CEOS Units, Year 1 and Year 5, by Gender and URM Status



[5] URM faculty totals were determined by adding the following categories: Black, Hispanic, American Indian, and Two or More Races.

From October 2008-12, the number of female faculty grew by 24.1% and URM counts increased by 20.8% (Table 1).[6] In comparison, the number of male faculty declined by 5.9% during these same four years, while non-URM faculty went down by 1.8%.

Table 1: Percentage Change in Number of Tenure-Track Faculty in CEOS and Comparator Units, by Gender and URM Status

		Female % (No.)	Male % (No.)	URM % (No.)	Non-URM % (No.)
TOTAL CEOS*	2008	16.6% (108)	83.4% (542)	3.7% (24)	96.3% (626)
	2012	20.8% (134)	79.2% (510)	4.5% (29)	95.5% (615)
	% Change in No. (Δ in No.)	**24.1% (26)**	**-5.9% (-32)**	**20.8%(5)**	**-1.8% (-11)**
NON-CEOS COMPARATORS*	2008	26.1% (69)	73.9% (195)	4.9% (13)	95.1% (251)
	2012	30.2% (77)	69.8% (178)	5.5% (14)	94.5% (241)
	% Change in No. (Δ in No.)	**11.6% (8)**	**-8.7% (-17)**	**7.7% (1)**	**-4.0% (-10)**

*Includes CEOS units present in 2008 and 2012. CEOS units pre- reorganization also included: Entomology and Plant and Cell & Molecular Biology (in the College of Biological Sciences), as well as Aerospace Engineering, Mining, and Industrial, Welding and Systems Engineering (in the College of Engineering).
**Includes Pharmacy, Public Health, School of Environment and Natural Resources, and five A&S departments (Anthropology, Economics, Political Science, Psychology and Sociology).

Because these increases may have occurred without the ADVANCE intervention – indeed, Figure 1 indicates that female faculty representation was already on an upward trend before CEOS – faculty composition data were collected for OSU academic units that did not participate in the ADVANCE grant. These comparators are non-participating OSU units that also have a science or behavioral science focus. As Table 1 suggests, CEOS units showed a much sharper increase in the number female faculty (24.1%), compared to a more modest gain in comparators' units (11.6%). Likewise, CEOS units demonstrated greater increases in the number of URM faculty (20.8%), in relation to comparators (7.7%). These distinctive trends strengthen claims that CEOS initiatives positively influenced the growth in female STEM faculty at OSU.

By unit, the number of female faculty in Arts & Sciences and Engineering grew by over 25% in both units, from 2008-12 (Table 2). Veterinary Medicine added two women, for a slightly smaller gain of 10.5%. However, each college showed a dramatically different picture for URM faculty, with the number increasing sharply in Engineering (by 55.6%, or +5), slightly in Arts & Sciences (10.0%, or +1), and declining in Veterinary Medicine (-20.0%, or -1).

[6] Bilimoria & Liang (2012) report that average percentage growth for 19 other ADVANCE institutions was 39.7%. However, because their study includes some very small institutions –which experienced a much larger rate of increase compared to larger universities – the change in composition reported on page 7 is a more appropriate reference point.

Table 2: Comparison of Tenure-Track Faculty Composition, Year 1 (Oct. 2008) and Year 5 (Oct. 2012), by CEOS Unit

		Female % (No.)	Male % (No.)	URM % (No.)	Non-URM % (No.)
Arts & Sciences*	**2008**	17.0% (54)	83.0% (264)	3.1% (10)	96.9% (308)
	2012	22.1% (68)	77.9% (239)	3.6% (11)	96.4% (296)
	% Change in No. (Δ in No.)	**25.9% (14)**	**-9.5% (-25)**	**10.0% (1)**	**-3.9% (-12)**
Engineering*	**2008**	13.8% (35)	86.2% (219)	3.5% (9)	96.5% (245)
	2012	17.4% (45)	82.6% (213)	5.4% (14)	94.6% (244)
	% Change in No. (Δ in No.)	**28.6% (10)**	**-2.7% (-6)**	**55.6% (5)**	**-0.4% (-1)**
Veterinary Medicine	**2008**	24.4% (19)	75.6% (59)	6.4% (5)	93.6% (73)
	2012	26.6% (21)	73.4% (58)	5.1% (4)	94.9% (75)
	% Change in No. (Δ in No.)	**10.5% (2)**	**-1.7% (-1)**	**-20.0% (-1)**	**2.7% (2)**
TOTAL CEOS	**2008**	16.6% (108)	83.4% (542)	3.7% (24)	96.3% (626)
	2012	20.8% (134)	79.2% (510)	4.5% (29)	95.5% (615)
	% Change in No. (Δ in No.)	**24.1% (26)**	**-5.9% (-32)**	**20.8%(5)**	**-1.8% (-11)**

*Includes CEOS units present in 2008 and 2012. CEOS units pre- reorganization included: Entomology and Plant and Cell & Molecular Biology (in the College of Biological Sciences), as well as Aerospace Engineering, Mining, and Industrial, Welding and Systems Engineering (in the College of Engineering).

Finally, looking at gains made by school/college, positive composition shifts were made for CEOS women in all ranks, with the exception of the associate and full ranks in Veterinary Medicine (Table 3). Across all CEOS units, the greatest proportional increase was seen in the junior faculty ranks. In relation to comparators, CEOS units as a whole demonstrated a slightly higher proportional increase in female assistant and associate professors, and a much greater growth in female full faculty.

Table 3: Comparison of Tenure-Track Faculty Composition, Year 1 (Oct. 2008) and Year 5 (Oct. 2012), by Rank and CEOS Unit

		Female % (No.)			Male % (No.)		
		Asst	**Assoc**	**Full**	**Asst**	**Assoc**	**Full**
Arts & Sciences*	**2008**	37.7% (20)	20.5% (15)	9.9% (19)	62.3% (33)	79.5% (58)	90.1% (173)
	2012	47.8% (22)	27.0% (20)	13.9% (26)	52.2% (24)	73.0% (54)	86.1% (161)
	% Change in No. (Δ in No.)	**10.0% (2)**	**33.3% (5)**	**36.8% (7)**	**-27.3% (-9)**	**-6.9% (-4)**	**-6.9% (-12)**
Engineering*	**2008**	20.0% (7)	19.0% (16)	8.9% (12)	80.0% (28)	81.0% (68)	91.1% (123)
	2012	25.0% (12)	24.1% (19)	10.0% (13)	75.0% (36)	75.9% (60)	90.0% (117)
	% Change in No. (Δ in No.)	**71.4% (5)**	**18.8% (3)**	**8.3% (1)**	**28.6% (8)**	**-11.8% (-8)**	**-4.9% (-6)**
Veterinary Medicine	**2008**	26.7% (4)	26.1% (6)	22.5% (9)	73.3% (11)	73.9% (17)	77.5% (31)
	2012	40.0% (6)	27.3% (6)	21.4% (9)	60.0% (9)	72.7% (16)	78.6% (33)
	% Change in No. (Δ in No.)	**50.0% (2)**	**0.0% (0)**	**0.0% (0)**	**-18.2% (-2)**	**-5.9% (-1)**	**6.5% (2)**
TOTAL CEOS	**2008**	30.1% (31)	20.6% (37)	10.9% (40)	69.9% (72)	79.4%(143)	89.1% (327)
	2012	36.7% (40)	25.7% (45)	13.4% (48)	63.3% (69)	74.3%(130)	86.6% (311)
	% Change in No. (Δ in No.)	**29.0% (9)**	**21.6% (8)**	**20.0% (8)**	**-4.2% (-3)**	**-9.1% (-13)**	**-4.9% (-16)**
COMPARATORS	**2008**	37.9% (25)	32.4% (24)	16.1% (20)	62.1% (41)	67.6% (50)	83.9% (104)
	2012	50.0% (32)	30.6% (22)	19.3% (23)	50.0% (32)	69.4% (50)	80.7% (96)
	% Change in No. (Δ in No.)	**28.0% (7)**	**-8.3% (-2)**	**15.0% (3)**	**-22.0% (-9)**	**0.0% (0)**	**-7.7% (-8)**

*Includes CEOS units present in 2008 and 2012. CEOS units pre- reorganization included: Entomology and Plant and Cell & Molecular Biology (in the College of Biological Sciences), as well as Aerospace Engineering, Mining, and Industrial, Welding and Systems Engineering (in the College of Engineering).
**Includes Pharmacy, Public Health, School of Environment and Natural Resources, and four A&S departments (Anthropology, Economics, Political Science, Psychology and Sociology).

In the last CEOS year, female faculty came to represent over a third (37%) of junior faculty, a little over a quarter (26%) of associate professors, but still a small minority (13%) of full professors. A recent study of 10 STEM fields in top 50 departments suggests that CEOS units are now about on par with peer institutions in terms of faculty composition by rank (Nelson & Brammer, 2010).[7]

[7] In the Nelson & Brammer (2010) study, women's representation in the junior faculty ranks ranged from 15% (electrical engineering) to 36% (biological science). Comparable percentages in top 50 departments for associate ranks range from 11% (computer science) to 31% (biological sciences), and for full professors, from 5% (mechanical engineering) to 18% (biological sciences). Again, OSU proportions are within the range set by peer departments, at least within the narrow range of these disciplines.

Goal 1b: An increase in the presence and success of women in faculty leadership positions

A second key goal for CEOS was the increase in the number of female faculty leaders, corresponding to ADVANCE indicator #7. Among CEOS units, the percentage of female faculty chairs grew from 24.0% to 26.3% during the first four years of the grant (Table 4). (Although the absolute number of female chairs and directors actually declined by one from 2008-2012 –likely due to reorganization of OSU colleges— the corresponding number of male chairs decreased by five.) In comparison, mean female chair composition was 11.4% for the same units in the four years prior to CEOS.

Table 4: Leadership Positions: Percent Female (No.) in CEOS Units

	Chairs & Directors	Associate Dean	Dean	Total
Yr4: 2011-12	26.3% (5)	11.1% (1)	0.0% (0)	18.8% (6)
Yr3: 2010-11	22.2% (4)	11.1% (1)	0.0% (0)	17.2% (5)
Yr2: 2009-10	24.0% (6)	25.0% (2)	0.0% (0)	22.2% (8)
Yr1: 2008-09	24.0% (6)	41.7% (5)	0.0% (0)	27.5% (11)
Average per year (CEOS Yr 1-4)	**24.1% (5.3)**	**22.2% (2.3)**	**0.0% (0)**	**21.9% (7.5)**
Pre-CEOS:2007-8	16.7% (5)	33.3% (4)	25.0% (1)	21.7% (10)
Pre-CEOS:2006-7	14.3% (4)	30.0% (3)	25.0% (1)	19.0% (8)
Pre-CEOS:2005-6	10.7% (3)	22.2% (2)	25.0% (1)	14.6% (6)
Pre-CEOS:2004-5	3.7% (1)	37.5% (3)	25.0% (1)	12.8% (5)
Average per year (pre-CEOS)	**11.4% (3.3)**	**30.8% (3.0)**	**25.0% (1)**	**17.0% (7.3)**

As noted in Table 3 (pg. 11), the number and proportion of female full professors also grew from CEOS Year 1 to Year 4, by 20.0%. However, the proportion of female associate deans declined over the CEOS grant years, and there were no female deans in CEOS units from 2008-12.

In sum, regarding faculty and leadership composition goals:

- *Goal 1a was achieved, with CEOS demonstrating an increase in STEM women at all tenure-track ranks. Over the five years of the grant, the growth in female faculty composition has been larger in CEOS departments, compared to other non-CEOS OSU comparator units. By specific CEOS college, there has been an increase in women in the STEM fields at all faculty ranks, except for tenured faculty in Veterinary Medicine.*
- *Goal 1b was partially achieved, with gains in some leadership positions (full professors and chairs & directors), but not others.*

GOAL 2: RETENTION

The second key goal for CEOS, corresponding to ADVANCE indicators #3 and #5, was retention. This objective was particularly ambitious, to retain all assistant professors through to promotion and tenure. Between 2008 and 2012, CEOS data indicate that no women were denied

tenure who came up review. However, three female assistant professors did leave between 2008- and 2012 (Table 5). Across ranks, ten women in CEOS units departed OSU for non-retirement reasons from 2008-12, which was a higher rate of attrition compared to the four years prior to the grant.

Table 5: Voluntary, non-retirement terminations in CEOS units, by rank and gender

	FEMALE				MALE			
	Asst	Assoc	Full	**TOTAL FEMALE**	Asst	Assoc	Full	**TOTAL MALE**
2011	1	3	0	4	0	1	2	3
2010	0	2	0	2	1	0	5	6
2009	2	2	0	4	0	0	4	4
2008	0	0	0	0	0	0	0	0
TOTAL CEOS	**3**	**7**	**0**	**10**	**1**	**1**	**11**	**13**
2007	0	0	0	0	0	0	0	0
2006	1	0	0	1	2	0	0	2
2005	0	0	0	0	2	0	0	2
2004	0	0	0	0	2	0	0	2
TOTAL PRE-CEOS	**1**	**0**	**0**	**1**	**6**	**0**	**0**	**6**

Longitudinal analyses of the 2005-12 cohort performed by CEOS indicate that female attrition rates for assistant professors vary somewhat by college, from 33% in NMS, to 40% in engineering and 57% in Veterinary Medicine. (Rates for men are 10%, 29%, and 20%, respectively.) The cohort analyses indicate that attrition rates were higher for the CEOS (2005-12) cohorts in NMS and Engineering, compared to pre-CEOS cohorts. Additionally, in two CEOS units, attrition rates are higher in comparison to a national survival analysis study of S&E faculty, which showed that 36% of assistant professors were not promoted, with no significant difference by gender (Kaminski & Geisler, 2012).

In sum, regarding retention, goal #2 was not achieved.

GOAL 3: HIRING

The CEOS proposal emphasized three goals related to hiring. First, the grant hoped to have female faculty be one-third of new hires in STEM units. Second, the proposal addressed the number of female hires who should be underrepresented minorities, as well as the number of women joining OSU as full professors and endowed chairs.

Goal 3a: Of the 80 faculty the four colleges expect to hire, one-third should be women.

As stated in the original proposal, the first hiring goal for CEOS was to have one-third of the new hires be female. 123 total new hires were made in CEOS units during Years 1-5 of the grant, and over a third (35%) were women. For the same units, a greater proportion of women were hired during CEOS, compared to the four years prior (Table 6).

Table 6: Total Hires in CEOS Units, Percent Female

	% Female (No.)
Total Hires, 2012-13*	33.3% (2)
Total Hires, 2011-12	35.7% (15)
Total Hires, 2010-11	26.3% (5)
Total Hires, 2009-10	38.5% (10)
Total Hires, 2008-9	35.5% (11)
TOTAL HIRES, CEOS YR1-5*	**35.0% (43)**
Total 2007-8	27.3% (9)
Total 2006-7	40.0% (16)
Total 2005-6	36.2% (17)
Total 2004-5	25.7% (9)
TOTAL HIRES, PRE-CEOS	**32.9% (51)**

*2012-13 data are preliminary.

The vast majority (81%) of the CEOS new hires were assistant professors. As a point of comparison, the overall proportion of women hired (35%) surpasses the percentages of women receiving U.S. PhDs in the physical sciences (29%) and engineering (22%), but not the life sciences (55%) (NSF, 2012).

Goal 3b: At least six of those new faculty should be African-American, Hispanic, Asian-American, or Native-American women.

Goal 3b aspired for six of new female hires to be faculty of color. However, given that the total number of all STEM hires at OSU was more than anticipated (123 instead of 80), a second framing for this goal is to understand if this goal was achieved proportionately (i.e., original estimates suggested that 6 of 80 hires be women of color, or 7.5% of all STEM hires). From October 2008 to May 2013, 11 African-American, Hispanic, Asian-American, or Native-American women were hired, which was 8.9% of new hires made during the grant's five years. (Nine Asian-American women and three female URM were hired.) Therefore, in both absolute and proportional terms, Goal 3b was achieved as stated in the proposal.

Goal 3c: At least 5 women should be hired at the rank of Professor, with two into endowed chairs.

Goal 3c focuses on the rank of new hires, an objective that five women be hired as full professors, and two of these five be brought in as endowed chairs. From October 2008 to April 2013, five women were hired as full professors, and two were endowed chairs, one in Mathematics and the second in Chemistry & Biochemistry.

In sum, regarding hiring goals:

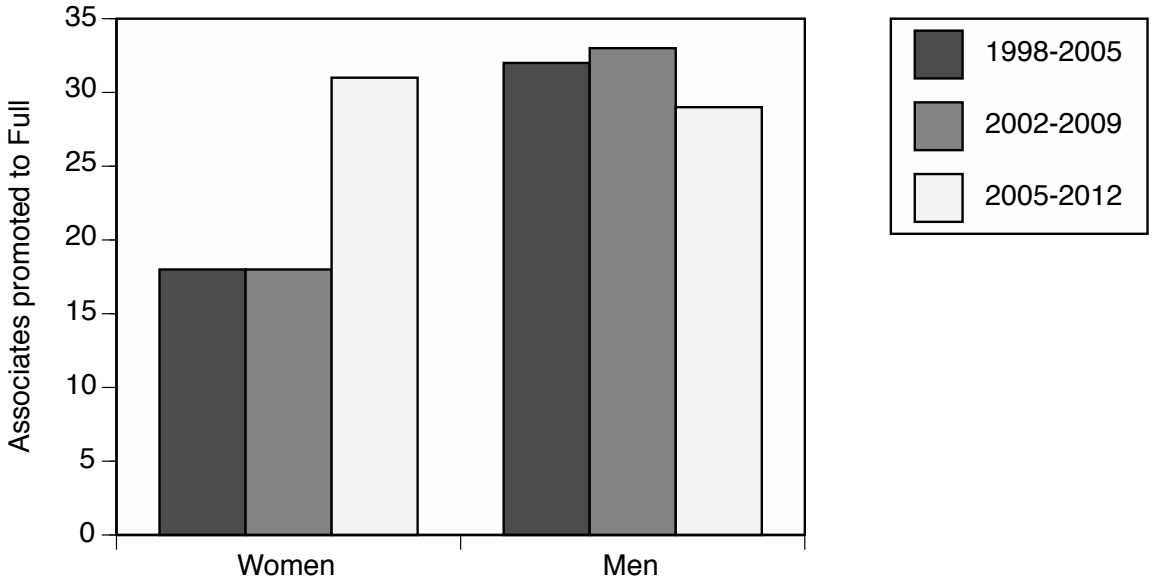
- *Goal 3a was achieved, with over one-third (35.0%) of new hires being women.*
- *Anticipated achievement for Goal 3b was the hiring of six African-American, Hispanic, Asian-American, or Native-American women STEM tenure-track faculty. From 2008-2013, 11 women of color were hired, thereby surpassing the goal.*
- *Goal 3c was achieved. Five full professors (including two endowed chairs) did join OSU.*

GOAL 4: PROMOTION

The fourth CEOS objective aligns with ADVANCE indicator #3 and pertains to promotion outcomes. As stated in the proposal, the objective was ambitious, to encourage all associate professors "to enhance their dossiers with a view to promotion to Professor." CEOS-provided data indicate that all women who came up for promotion to full were successful. However, as noted in Table 5 (pg. 13), some women left OSU before review, and others remained in the associate ranks.

Although all associate professors were not promoted, CEOS analyses do suggest that success rates were better during the grant's tenure, compared to prior years. According to a cohort analysis by PI Joan Herbers, the number of women promoted to full in a pre-CEOS cohort (2002-9) was about half that of the cohort who experienced CEOS for a greater number of years (2005-12) (Figure 3). Additionally, these data indicate that the male-female gap in promotion was narrowed considerably.

Figure 3: Number of associate professors promoted to full professor, by gender and cohort year



GOAL 5: CLIMATE

CEOS's fifth key objective anticipated increased STEM female faculty satisfaction with their professional lives. In 2008 and 2011, OSU implemented a faculty culture survey, which addressed faculty worklife satisfaction and was sent to faculty in CEOS and non-CEOS units. The response rate for tenure-track faculty across the entire university was 47% in both 2008 and 2011. The CEOS response rates were 44% in 2008 (58% for women and 41% for men) and 51% in 2011 (58% for women and 49% for men), return rates which are generally in the range of other ADVANCE institutions (Bilimoria & Liang, 2012). Select survey results were disseminated in *Women STEM Faculty at Ohio State: Resource Allocation and Department Climate* (2012, April),[8] and additional findings were reported in the *CEOS Mid-Project Research Report* II (2012, April). These two reports present select findings on faculty satisfaction with access to resources, professional relationships, workload and stress, and retention. Significance levels are not presented in the reports; therefore, descriptive trends are noted below.

The most holistic measure of satisfaction presented in the report was the question, "If you were to begin your career again, would you still want to come to this institution?" From the beginning to middle of the CEOS grant (2008-2011), the proportion of female faculty at CEOS units who answered "no" nearly doubled, from 12% to 20%. (In contrast, for non-CEOS units, the trend went in the opposite direction, decreasing from 16% to 14%.) Female STEM faculty dissatisfaction also increased for other constituents of professional well-being, including social relationships with colleagues, professional relationships with peers, sense of collegial competency, comfort with expressing opinions at faculty meetings, and exclusion from informal networks.

[8] Available: http://ceos.osu.edu/assets/files/Resource%20Report%20April%202012(1).pdf

However, over the three initial years of CEOS, dissatisfaction did drop for other issues pertaining to research resources – such as start-up funds, lab space, and opportunities for collaboration. Additionally, because a key CEOS initiative was faculty mentoring, it is notable that the percentage of CEOS female faculty who perceived inadequate access to mentoring dropped somewhat (from 57% to 53%), while remaining relatively stable among non-CEOS female faculty (from 49% to 50%).

It will be valuable to assess possible changes over the full five years of the grant, with a subsequent distribution of the survey.

In sum, regarding climate:

- *CEOS female faculty's dissatisfaction increased with many aspects of their professional lives, over the span of the first three years of the grant.*
- *However, female CEOS faculty's satisfaction with access to mentoring did improve, while remaining relatively stable for non-CEOS women respondents.*
- *Data have not yet been collected to assess possible changes over the full five years of grant.*

GOAL 6: ENTREPRENEURIAL ACTIVITY

The sixth key goal was aligned with a signature initiative of CEOS, Project REACH, and sought to increase entrepreneurial activity among women faculty by 50%. According to Julia Carpenter-Hubin, Institutional Research, Ohio State began tracking patents and licenses by gender only in 2012-13 and does not know if this year's data are representative. Kelli Canady, Invention Intake and Compliance Coordinator for Ohio State's Technology Commercialization and Knowledge Transfer Office, is currently charged with the tracking.

In sum, regarding entrepreneurial activity, data are not available to assess if the goal has been met.

Reported Outcomes

The next section describes participants' perception of outcomes, as noted by OSU faculty administrators during my April 2013 visit. These outcomes may be less tangible but are described as important outcomes attributable to CEOS. The research team also has conducted a series of interviews with deans and chairs about what they perceive as the impact of CEOS. Preliminary findings are documented elsewhere ("Preliminary Summary of Deans and Chairs Interviews") but generally align with reports made to me during my visit.

Upper-level administrators in the Provost's Office noted that CEOS has promoted greater sensitivity to different models for hiring, supporting and taking faculty members through the ranks. The project was credited for identifying the particular needs of local cultures of STEM units, which could not fully be addressed through "one university" model (President Gordon Gee's initiative). The incoming Provost, Joseph Steinmetz, indicated that he would be interested in seeing a list of what the project would like to do over the next several years, to see how it could be scaled up campus-wide.

Because of the multiple synergistic activities at OSU around diversity, it was sometimes difficult for chairs and deans to tease out what program could be credited for a particular outcome. Deans suggested a "capstone" event, to communicate successes and lessons learned to the campus community. However, in spite of articulating some difficulty in attributing specific outcomes to CEOS, chairs and deans did note several changes that they credited to the grant. For example, a chair noted how data presented by CEOS was brought back to search committees and had an impact on URM hires. Others described changes in recruitment and annual review processes. Several chairs and deans pointed to examples of long-term associate faculty getting promoted to full and attributed this movement to the work of CEOS. Deans and chairs also praised the leadership of the grant, particularly the way in which data were mobilized effectively.

Other administrators I spoke with during the visit described a perception that deans now scrutinize candidate pools in a way that they had not before. Additionally, because of its postdoctoral scholar initiatives, it was noted that CEOS has added a "new dimension" to diversity work, broadening the focus to future faculty. There was also a perception that female faculty who interacted with CEOS now feel stronger and more supported.

Finally, across institutional positions, there was a clear consensus that REACH was a highly successful initiative, which would not have happened without the intervention of CEOS. Participants observed that the program was successful at attracting women new to entrepreneurial activity, not just those who would have engaged in commercialization efforts anyhow.

INSTITUTIONALIZATION

In this section, I report on sustainability, or if elements of the CEOS ADVANCE grant have been (or are likely to be) institutionalized on campus. This discussion reflects commitments to sustainability made by administrators at the 2013 campus visits, as well as initiatives already in place.

New or Sustained Initiatives

(1) Associate Vice President for Gender Initiatives in STEMM: A key durable outcome of the grant is this new position, created in Fall 2012 and occupied by co-PI Mary Juhas, formerly the College of Engineering Associate Dean for Outreach and Diversity. During my visit to campus, one person I spoke with noted that the position sends a "pretty significant statement to campus." The position reports directly to the Vice President for Research, an institutional position that resonated with all of those with whom I spoke. Although Dr. Juhas is still crafting an agenda, two key pieces of her work will be working on dual career hires and embedding diversity onto the campus's Discovery Theme (cluster) hires.

(2) Leadership Development: CEOS leadership training has been integrated into the HR/OAA leadership programs. During my visit, there was generally widespread affirmation about the wisdom of this integration because it embeds diversity modules in the "normal course of things," rather than as an add-on. (Although most chairs viewed the institutional location positively, a few perceived HR to have a "disciplinary role," which would influence perceptions of the program negatively.) An additional challenge is that these sessions would not be required, and although this also was true of the CEOS-organized sessions, attendance appears to be slightly lower compared to CEOS-run programs. Co-PI Anne Massaro reported that for the Fall Semester workshop, "Recruiting Diverse Faculty," there were 26 attendees, with seven from CEOS units. For the Spring Semester offering, "Faculty Mentoring Practices at Ohio State," there were 19 attendees, with six from CEOS units. (Participation in CEOS leadership programs was not systematically collected but appears to range from 6 to 40.)

(3) Laboratory Management Series: This initiative will be sustained in the Office of Research.

(4) Action Learning Team Initiatives: Although there were no concrete plans to sustain action learning teams, several initiatives developed by the groups are ongoing. The College of Engineering will be implementing an "onboarding" process for new faculty,[9] a new teaching load reduction policy (with tracking), and a focus on hiring female senior research leaders, for which one hire was made thus far. The NMS action learning team recommendations for associate professor mentoring have not yet been implemented division-wide, but the Department of Mathematics plans to do so. The Division of Arts & Humanities, led by a CEOS co-PI, also created an action learning team, which is piloting a mentoring initiative.

[9] Case Western Reserve University's College of Engineering change team developed an innovative "onboarding" model for one of its NSF grants, titled "launch committees." This initiative was extremely successful and may be a model to explore further.

(5) Data Reporting and Tracking of Entrepreneurial Activity: As of 2012-13, OSU has begun tracking entrepreneurial activity by gender. The Invention Intake and Compliance Coordinator for Ohio State's Technology Commercialization and Knowledge Transfer Office is currently charged with the tracking.

Synergistic Outcomes

Although not directly attributable to CEOS, the following durable outcomes are aligned with the work of CEOS and/or attributable to efforts from one of the grant's co-PIs:

- **President and Provost's Council on Women**: Co-PI Jill Bystydzienski served as Co-Chair of the Subcommittee on Dual Career Hiring and Retention, which put forth recommendations on dual career hires in a May 2012 report. (Co-PI Mary Juhas also was on the subcommittee.)

- **Strategic Planning**: Co-PI Valerie Lee, Vice Provost, and Yolanda Zapeda, Assistant Provost, Office of Diversity and Inclusion, are engaged in working with colleges on a "Diversity and Inclusion Global Self-Assessment," which will be followed up by visits from the Faculty Senate Diversity Committee and the Diversity Officers Working Group to refine strategic planning.

- **Policy:** Policy was not a key focus of grant initiatives, given the decentralization of OSU and the existence of some key policies at the start of the grant. However, co-PI Susan Williams, Vice Provost for Academic Policy and Human Resources, has been involved in two key changes that took place during the CEOS grant. First, dossier for faculty to document achievements have been made more reflective of commercialization. The College of Engineering and Veterinary Medicine have made specific changes in the wording of their tenure and promotion policies, making patents about equivalent to a peer-reviewed publication. Second, there was a year-long process to examine policies and processes around promotion to full. In governance documents, there have been changes to allow for more flexibility for tenure metrics (using the Boyer model), and Veterinary Medicine now has non-traditional tracks (e.g., teaching excellence).

- **The Women's Place:** Although not with a STEM focus, this office will focus on implicit bias work next year, thorough its programs and initiatives.

- **Data Dissemination**: Institutional Research will continue to report several key diversity indicators (e.g., faculty composition and doctorates by gender and field) on its website and Strategic Indicators Report. The Women's Place annual report and website also are a key place where data about indicators are disseminated (e.g., percentage of female faculty by rank, gender and salaries).

At the time of my visit in April 2013, the CEOS team was discussing possibilities for institutionalization of the following initiatives:

- **REACH**: During my visit, participants voiced strong agreement that the program was successful and should be continued. Possibilities discussed included locating the program in the Entrepreneurial Scholars Program, an initiative in the Office of Technology Commercialization and Knowledge; a travelling REACH program, which would visit other campuses; and funding the initiative through an NSF PAID Grant.

At the time of my visit in April 2013, there were not plans to sustain the following initiatives at OSU:

- **Conference for Postdoctoral Scholars of Color**: While the CIC will continue to offer this conference for two additional years, it will not be hosted at OSU. To benefit OSU, it will be important for someone (most likely the Associate Vice President for Gender Initiatives in STEMM) to send faculty to do recruiting.

- **Mentoring Circles:** Mentoring circles were reported to have extremely low attendance, and given leadership transitions, it was not clear if facilitation could continue to be offered by the current co-PI doing so, Anne Massaro. However, if this program did continue, The Women's Place has offered meeting space.

- **Distinguished Speaker Series**: These grants have not been highly utilized and no plans for continuation were discussed.

- **Some data analyses:** The culture survey was given in 2008 and 2011 and served as a key metric for CEOS reports on faculty climate and workplace satisfaction. However, there have been leadership changes in HR, and therefore, there was not a clear commitment to repeating the survey. Because a key strength of CEOS, according to OSU faculty and administrators, is its presentation of data, it is particularly important to address how data collection and dissemination can be fully institutionalized at OSU. Other data analyses by CEOS that did not appear to have an institutional home include ongoing salary and resource analyses, faculty flux analyses, and tracking of some policy utilization (e.g., tenure extension clock).

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APPENDIX ONE: Site visit agenda

External Review Site Visit

Day One: April 4, 2013

10:00-11:00 **Prep with Joan Herbers, PI**

11:30-Noon **Meet with Jennifer Evans-Cowley**
Associate Dean for Academic Affairs Administration, College of Engineering

Noon-1:30 **Lunch with CEOS Chairs**

Anita Hopper, Molecular Genetics (absent)

Susan Olesik, Chemistry/Biochemistry

Xiaodong Zhang, Computer Science & Engineering

Stuart Cooper, Chemical/Biochemical Engineering

Michael Oglesbee, Veterinary Biosciences (absent)

Co-PI Carolyn Merry, Civil, Environmental & Geodetic Engineering

Peter Curtis, Evolution, Ecology and Organismal Biology

Bradley Peterson, Astronomy

Rustin Moore, Veterinary Clinical Sciences

Luis Casian, Mathematics

Tina Henkin, Microbiology (absent)

\2:00-2:30 pm Meet with **Anne Massaro**

Director, Organizational Leadership Effectiveness

3:00-5:00 pm Meet with CEOS Deans (individually in 30-minute intervals)

Lonnie King, Dean, Veterinary Medicine

Peter March, Divisional Dean, Natural and Mathematical Sciences

David Williams, Dean, College of Engineering

5:00-6:00 pm Phone call with **Mary Juhas**
Associate Vice President for Gender Initiatives in STEMM

April 5, 2013

10:00-10:30 am	Meet with **Yolanda Zepeda** Assistant Vice Provost for Diversity and Inclusion
10:30-11:00 am	Meet with **Valerie Lee** Vice Provost for Diversity and Inclusion
11:00-noon	Meet with **Julie Carpenter-Hubin** Office of Institutional Research
Noon-1:30 pm	Lunch with **Hazel Morrow Jones** Director, The Women's Place
1:30-2:30 pm	Meet with **Research Team**
2:30-3:30 pm	Meet with **Tom Rosol** (Office of Technology Commercialization & Knowledge Transfer) & **Jean Schelhorn** (Director of Commercialization in the College of Veterinary Medicine)
5:30-7:00 pm	**Debrief Dinner with CEOS team**

April 26, 2013

10:00 – 10:30 a.m.	Phone call with Co-PI **Susan Williams** Vice Provost for Academic Policy and Human Resources

May 16, 2013

10:00 – 10:30 a.m.	Phone call with **Joe Steinmetz** Dean, College of Arts and Sciences (As of July 1, 2013) Executive Vice President and Provost