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Project RAISE Goals/Absolute Priorities, Performance Measures and Process Objectives

GOAL/Absolute Priority 1: Student-centered services, tutoring, counseling and student service programs designed to improved academic success, including innovative and customized instruction courses designed to help retain students and move the students rapidly into core courses and through program completion. The following performance measures per grant guidelines will be measured by Project RAISE and serve as the outcome objectives to achieve this goal.	
Performance Measure 1	Project RAISE will result in a 15% increase in Hispanic and low-income students participating in the high-impact practice of undergraduate research from CSUF's regional feeder community colleges.
Performance Measure 2	75% of Hispanic and low-income students who participated in the RAISE Transfer Program (RTP) will be in good academic standing after the first academic year.
Performance Measure 3	Project RAISE will result in a 20% increase in Hispanic and low-income STEM major transfer students on track to complete a STEM degree within three years from their transfer date.
Performance Measure 4	Starting in Year 3, Project RAISE will result in a 20% increase in Hispanic and low-income STEM students who participated in grant-supported services or programs and completed a bachelor's degree.

Process Objectives:

1. Implement RAISE Transfer Program (RTP) to create a sense of community among STEM transfers at CSUF; advise Project RAISE transfer students about the resources available; prepare them for faster pace of coursework; and provide strategies to help them succeed in STEM majors at CSUF.
2. Create a Summer Internship Program at CSUF for RAISE Transfer Program students to prepare them for the STEM workplace and give them an opportunity to take part in a hands-on STEM work experience in industry.

3. Expand CSUF Transfer Resource Center (TRC) services to provide success workshops for the RAISE Transfer Program and all STEM transfer students.

<u>GOAL/Absolute Priority 2 (1)</u>: Increase the number of Hispanic and other low-income students attaining degrees in the fields of science, technology engineering or mathematics. The following performance measures per grant guidelines will be measured by Project RAISE and serve as the outcome objectives to achieve this goal.	
Performance Measure 1	Project RAISE will result in a 20% increase, over the five-year grant period, in the number of Hispanic and low-income full-time STEM degree-seeking undergraduate students enrolled in STEM bachelor's degree programs at CSUF.
Performance Measure 2	Project RAISE will result in a 10% increase in Hispanic and low-income first-time, full-time STEM degree-seeking undergraduate students at CSUF who were in their first year of postsecondary enrollment in the previous year and are enrolled in the current year who remain in a STEM field degree program.
Performance Measure 3	Project RAISE will result in a 10% increase in Hispanic and low-income first-time, full-time degree-seeking undergraduate students graduating with a STEM degree within three years of enrollment at CSUF.
Performance Measure 4	Project RAISE will result in a 10% increase in Hispanic and low-income students transferring successfully to CSUF from a participating two-year institution in the program and retained in a STEM field major.

Process Objectives:

1. Implement an Undergraduate Research Experience at CSUF for RAISE community college students in each year of the project to introduce them to research opportunities and faculty mentors and to excite them about STEM with hands-on experience.

2. Provide CSUF peer advisors at each partner community college each semester to conduct outreach workshops to improve the knowledge of STEM careers, transfer process and research opportunities.

GOAL/Absolute Priority 2(2): Develop model transfer and articulation agreements between two-year HSIs and four-year institutions in such fields. The following performance measures per grant guidelines will be measured by Project RAISE and serve as the outcome objectives to achieve this goal.	
Performance Measure 1	Pilot Transferology at the eight Project RAISE partner community colleges and have 50% of STEM students in those institutions utilizing Transferology by year 5 of the grant.
Performance Measure 2	Develop and implement a STEM Articulation Conference hosted by CSUF and attended by STEM deans, faculty, counselors and staff from the eight Project RAISE partner community colleges, to provide up-to-date information on STEM transfer requirements and develop draft articulation agreements.

Competitive Preference Priority 2: Evidence of effectiveness that meets the conditions set out in the definition of "moderate evidence of effectiveness. Effectiveness of the high-impact practice of undergraduate research experiences for the targeted students in increasing retention and reducing time to degree (see page 13 for discussion).
1) Moon, Hershey & McMahan (2015) found statistically significant results indicating that participation in undergraduate research "brings about positive student change, including timely graduation, improved GPA, and future placement of college graduates in advanced degree programs." http://www.fullerton.edu/analyticalstudies/presentations/AIR_UndergResearch_HIPS_Sunny_vFinal.pdf
2) Nagda, Gregerman, Jonides, von Hippel & Lerner (1998) found that participation in an undergraduate research program increased retention rates for some students. http://www-personal.umich.edu/~jjonides/pdf/1998_6.pdf

Quality of the Project Design: (30 points Maximum)

1. *The extent to which the design of the proposed project is appropriate to, and will successfully address, the needs of the target population or other identified needs (Up to 10 points);*

California State University, Fullerton (CSUF), Orange County, CA's only four-year public comprehensive university that is also a Hispanic-Serving Institution (HSI)—in partnership with

eight of its feeder community colleges, also HSIs—has created the Regional Alliance in STEM Education: Raising the Bar in Transfer, Retention and Graduation Rates (Project RAISE). Project RAISE is a multifaceted program that incorporates new and innovative components while building on lessons learned from CSUF's $(STEM)^2$ (Strengthening Transfer Education & Matriculation in STEM) project (funded via an HSI-STEM grant in 2011). Its aim is to construct a replicable model to increase the number of transfer students who complete degrees in science, technology, engineering and mathematics (STEM) and enter careers in STEM fields. Leveraging existing resources and incorporating new opportunities that are supported by the research literature, it will target Hispanic and low-income community students at CSUF and the eight participating community colleges who have expressed interest in STEM fields and are interested in pursuing STEM bachelor's degrees. In the process it will create a regional consortium made up of CSUF and the participating community colleges and introduce novel components designed to enrich the student learning experience and empower students to streamline their own transfer process. Because CSUF has been the number-one destination for community college transfers among all California public universities for 14 of the last 17 years, Project RAISE, in engaging so many of its feeder community colleges, promises to have significant impact in the region and beyond. It will also add to the knowledge base about effective strategies to meet the needs of Hispanic and low-income students in STEM majors and ensure their timely attainment of degrees.

Project RAISE institutions

***CSUF*:** Orange County's only four-year, comprehensive HSI, CSUF is the second largest university in California and typically the largest of the 23 California State University (CSU) campuses, which grant more than 50% of the state's bachelor's degrees and more than 30% of its master's degrees. It is one of the most diverse campuses in the CSU, with no ethnic majority

among its 38,948 students (fall 2015): Asian/Pacific Islander, 22.7%; African American, 2.3%; Hispanic/Latino, 40.5%; white, 25.4%; multiple race non-Hispanic, American Indian, 0.1%; 4.6%; unknown, 4.4%. Some 43% are Pell grantees, and more than half come from families in which neither parent graduated from college; 72% of Hispanic CSUF graduates are the first generation in their families to earn a college degree. In 2011, the Education Trust recognized CSUF as a national leader in price, quality and accessibility and one of only five institutions (from more than 1,200 four-year campuses examined nationwide) identified as serving low-income students effectively.

CSUF ranks first in California and fifth in the nation in bachelor's degrees awarded to Hispanics (Hispanic Outlook in Higher Education, May 2015). *Diverse Issues in Higher Education* (October 2015) ranks CSUF fifth in the nation in terms of baccalaureate degrees awarded to underrepresented students, based on U.S. Dept. of Education data. Equally significant, the campus has a long history of innovative STEM programs serving underrepresented and low-income students in K-12 and higher education, including projects funded by NSF, NIH, the U.S. Department of Education and the Howard Hughes Medical Institute (HHMI) in the College of Natural Sciences and Mathematics (NSM) and College of Engineering and Computer Science (ECS). In 2014-15, out of 343 graduates in NSM, 90, or 26.2%, were Hispanic. In ECS, out of 292 graduates, 95, or 32.5%., were Hispanic, making 29.1% of STEM graduates from CSUF Hispanic. In 2015-16 NSM enrolled 2,424 undergraduate majors (38% Hispanic) and ECS 3,284 undergraduate majors (27% Hispanic).

***Community colleges*:** All eight Project RAISE partner community colleges—Citrus College, Cypress College, Fullerton College, Golden West College, Mount San Antonio College, Orange Coast College, Santa Ana College, Santiago Canyon College—are HSIs with diverse student

bodies (see Table 1) and send a significant number of students to CSUF each year (see Table 2). CSUF has collaborated with all on various projects over the years, and Citrus, Cypress and Santiago Canyon colleges participated in $(STEM)^2$. Santa Ana and Mt. SAC also participated in an NSF STEP grant aimed at improving transfer student success in STEM.

Table 1: Ethnicity Percentages in Project RAISE Community Colleges

	American Indian	Asian/Pacific Islander	African American	Hispanic/ Latino	White	Two or more	Unknown
Citrus	<1	12	4	60	19	3	2
Cypress		19	6	27	33		5
Fullerton	1	17	3	36	33		
Golden West	<1	29	2	32	31	4	1.7
Mount SAC	<1	21	4	53	13	2	
Orange Coast	<1	22	2	34	33	3	7
Santa Ana	1	12	2	64	14		7
Santiago Canyon	1	9	2	43	27		

STEM transfers to CSUF from these community colleges have fluctuated based on the economic climate in California (see Table 2), which has led to reduced funding in state-supported higher education and impaction in a number of STEM degree programs. With increased awareness among students about the job opportunities available in STEM fields, however, interest in STEM majors has been increasing once again.

Table 2: STEM Transfers to CSUF from Project RAISE Community Colleges, 2010-16

Semester at Entry	Citrus	Mt. SAC	Cypress	Fullerton	Golden West	Orange Coast	Santa Ana	Santiago Canyon	Total
fall 2010	1	9	28	74	24	46	31	38	251
spring 2011	0	13	4	26	4	10	5	5	67
fall 2011	2	6	25	66	16	43	29	30	217
spring 2012	0	6	15	18	8	15	4	5	71
fall 2012	5	15	36	69	20	50	35	31	261

spring 2013	6	1	6	2	1	0	0	0	16
fall 2013	29	10	42	58	35	61	52	38	325
spring 2014	9	0	4	6	1	1	1	6	28
fall 2014	27	15	41	63	21	44	20	31	262
spring 2015	13	3	3	11	8	7	7	9	61
fall 2015	26	10	39	69	28	51	36	52	311
spring 2016	3	11	15	22	7	25	10	10	103

The challenge remains to help these students complete their degrees in a timely manner. As shown in Table 3, students transferring to CSUF from the Project RAISE community colleges in STEM majors take significantly longer to earn their degrees than their peers in other majors.

Table 3: Graduation Rates of STEM and All Students at CSUF, Fall 2009-13 Cohorts

New Undergraduate Transfer Cohort (from Project RAISE community colleges *)	Major at Entry	Number of Students in Cohort	2-Year Graduation Rate	3-Year Graduation Rate	4-Year Graduation Rate
Fall 2007	STEM	124	6.5%	28.2%	50.0%
	ALL	2158	24.7%	53.0%	65.4%
Fall 2008	STEM	117	2.6%	28.2%	48.7%
	ALL	1818	23.9%	55.7%	68.5%
Fall 2009	STEM	139	6.5%	30.9%	48.9%
	ALL	2023	26.3%	58.6%	71.8%
Fall 2010	STEM	251	8.0%	35.5%	49.4%
	ALL	2963	27.6%	58.9%	70.9%
Fall 2011	STEM	217	4.1%	29.5%	52.1%
	ALL	2290	27.9%	61.3%	74.5%
Fall 2012	STEM	261	4.6%	35.6%	
	ALL	2517	28.8%	62.8%	
Fall 2013	STEM	325	5.2%		
	ALL	2996	31.1%		

* Citrus College, Cypress College, Fullerton College, Golden West College, Mount San Antonio College, Orange Coast College Santa Ana College, Santiago Canyon College

Introducing Project RAISE

Origins/Needs Assessment: Project RAISE grew out of a comprehensive needs assessment conducted over multiple sessions during the past year with CSUF and community college

personnel, including the associate deans of the NSM and ECS; the $(STEM)^2$ project director; project managers from the CSUF information technology department; and vice presidents, STEM deans and associate deans and counselors from all eight community colleges. The initial sessions included discussions of the needs on the participating campuses to help raise student awareness of STEM opportunities and to help STEM students succeed in lower-division coursework and transfer to a four-year institution, along with brainstorming about solutions. Additional meetings laid out priorities for the project, based on discussions of the research literature, an analysis of data from $(STEM)^2$ and determination of which $(STEM)^2$ components lent themselves to regional expansion to improve persistence across all nine institutions. The discussions also covered unmet needs and what new components might address them.

In addition, talks took place between the NSM dean, associate dean and director of development; the career specialists for NSM and ECS; the project director for $(STEM)^2$ from CSUF; the director and vice president of workforce development and advocacy of the Orange County Business Council (OCBC); and industry representatives from AT&T, Edwards Life Sciences and the California Air Resources Board, to name just a few, concerning STEM workforce needs in the region and strategies to prepare students for STEM careers.

What emerged was a consensus for a student-centered program that incorporated the most successful elements of $(STEM)^2$—specifically, peer advisors, undergraduate research experiences and the transition program for transfer students arriving at CSUF, modified and expanded for regional implementation—and that also introduced new elements to address the additional needs that surfaced during the planning discussions. These include 1) paid summer internships for students once they transfer to CSUF; 2) “Transferology,” a third-party web-based tool that allows students to ascertain which courses articulate between member institutions; and

3) an annual STEM articulation conference for community college counselors, faculty and deans so they can better advise students about transferring and discuss better models for articulation agreements and draft articulation agreements with CSUF personnel.

Project RAISE Components

Chang et al. (2014) note that campuses can intentionally improve undergraduate success in STEM fields by shaping the experiences of underrepresented students in ways that improve their chances of completing a degree in a STEM field. Project RAISE is seeking to do just that.

The Project RAISE components are student-centered services that have been structured to address the needs of Hispanic and low-income students in STEM fields, both while they are enrolled at the eight feeder community colleges and after they transfer to CSUF, thereby addressing the Absolute Priorities. Each responds to specific issues that have been covered in the research literature, and most are high-impact practices (HIPs)—strategies, programs and activities that have been proven to increase student success (Kuh, 2008) and/or co-curricular strategies specifically for improving STEM education (National Academies, 2016).

Community College Support Activities

Peer Advisors: Engaging students in their studies and their institution has long been shown to be a critical factor in cementing their intention to persist and earn a degree (McClenney, Marti & Adkins, 2012; Kuh, 2016). Building on the success of the $(STEM)^2$ peer mentor program from both mentor and mentee points of view, Project RAISE will create a peer advisor program to connect CSUF students with current or potential STEM students at each of the community colleges, where they will serve as role models, ambassadors, guides and resources before and after the students transfer to CSUF. Specifically, the peer advisors—themselves STEM transfer students who successfully transitioned to CSUF from the community colleges they will be

serving—will conduct outreach to the community colleges, presenting workshops in STEM careers, STEM degree preparation, undergraduate research opportunities, STEM transfer preparation and Transferology. Through these workshops, they will explain the advantages to majoring in a STEM field and to joining Project RAISE. They will also be ambassadors for CSUF's College of Natural Sciences and Mathematics (NSM) and College of Engineering and Computer Science (ECS) at campus outreach events. In addition, the advisors will meet one on one on a weekly basis with the community college students taking part in the Undergraduate Research Experience at CSUF (see below). Once the community college students transfer and become part of the RAISE Transfer Program, the peer advisors will serve as their liaisons to CSUF, advising them on courses and resources and providing a familiar face so they feel at home on campus. The peer advisors, in turn, will gain leadership experience and become part of a broader STEM community that includes the Project RAISE network of faculty, students, administrators and staff. **This component addresses Absolute Priorities 1 and 2(1).**

Undergraduate Research Experience: Undergraduate research has been identified as a high-impact practice (HIP) by the American Association of Colleges and Universities (AAC&U) and makes a difference not only in attracting and retaining STEM majors but also in facilitating learning in the classroom by introducing students to what science research careers might entail (Kinkead, 2003; Lopatto, 2003). It is especially helpful for underrepresented students (Hurtado et al., 2014). By increasing students' ability to feel, think, behave and be recognized by faculty and others as a "science person," underrepresented students stand a much better chance of believing in their abilities to succeed in the sciences (Carleone & Johnson, 2007). They are subsequently more likely to identify with a STEM field and view it as an important aspect of their self-identity, which in the long run enhances their chances of persisting.

The benefits of undergraduate research were readily apparent in $(STEM)^2$, where the vast majority of community college students taking part in the paid Summer Research Experience (SRE) transferred successfully to CSUF. Moreover, compared to the general STEM transfer class, all those who participated in the SRE and transferred to CSUF excelled academically (Dean's List, 3.0 GPA and higher) after their first semester at CSUF and persisted in their STEM majors at a higher rate. Based on pre/post surveys, participants gained insights into both discipline-specific research methods and general life skills. Some 86% reported that they were "very likely" to seek other STEM research experiences, and 81% planned to continue to participate in $(STEM)^2$ activities at their community college and CSUF.

Project RAISE's Undergraduate Research Experience will be similar to the $(STEM)^2$ program, only it will be expanded to students at all eight partner community colleges and specifically target Hispanic and low-income students. [$(STEM)^2$'s SRE was open to a broader student population, although more than half were Hispanic.] Like the $(STEM)^2$ program, it will be eight weeks and include a $5,000 stipend for participating students, to help alleviate the financial pressure that might otherwise drive them to take menial summer jobs instead of taking part in the research experience. At the end of the program, participants will present their research at the Summer Research Symposium hosted by the College of Natural Sciences and Mathematics. **This component addresses Absolute Priority 1 and Competitive Preference 2.**

Competitive Preference Priority 2
The urgent need to broaden the participation of students from underrepresented groups in STEM fields is well documented—see, for example, reports from the National Science Foundation (2014), American Institutes for Research (2012), and the National Academies (2007, 2010). As part of a national committee tasked with identifying research priorities to address this challenge,

George, Neale, Van Horne, and Malcom (2001) point out that existing research shows that college-level STEM academic support programs can increase retention of underrepresented minorities. A recent report by the National Academies (2016) further confirms that co-curricular activities, such as peer tutoring and research experiences, provide support to students that help mitigate the many barriers to obtaining STEM degrees.

In addition, a study of STEM intervention programs found that student-centeredness, community-building and collaboration help to effectively aid retention and completion of underrepresented students in STEM fields (Dyer-Barr, 2013). These findings also parallel the research on high-impact practices (HIPs), which shows a positive association between these practices—including first-year seminars, undergraduate research and internships—with student learning and retention. High-impact practices share several traits: "They demand considerable time and effort, facilitate learning outside of the classroom, require meaningful interactions with faculty and students, encourage collaboration with diverse others, and provide frequent and substantive feedback" (Kuh, 2008).

These traits also mark the cornerstones of the programmatic components of Project RAISE as students progress through the pathways from the partnering community colleges to CSUF. This approach is especially promising, as Finley and McNair (2013) found for transfer students, Hispanic students and first-generation students. Their comparison of various underserved groups with traditionally advantaged groups in a national sample shows that engagement in multiple HIPs can create "equity effects" that benefit students in traditionally underserved groups (Finley and McNair, 2013). This research also shows that first-generation, transfer and Hispanic students have significantly higher gains than their counterparts who did not participate in any high-impact practices (Finley and McNair, 2013).

Two studies from the What Works Clearinghouse provide further evidence of the merits of the Project RAISE model and the value of the Undergraduate Research Experience as an essential part of this model. The first study examined the impact of undergraduate research as a high-impact practice at the same institution—CSUF (Moon, Hershey, & McMahan, 2014). http://www.fullerton.edu/analyticalstudies/presentations/AIR_UndergResearch_HIPS_Sunny_vFinal.pdf This quasi-experimental study used Propensity Score Matching to compare students who participated in research with non-participants over 11 years. More than one-third of these students were Hispanic. Moon et al. (2014) found statistically significant results indicating that participation in undergraduate research "brings about positive student change, including timely graduation, improved GPA, and future placement of college graduates in advanced degree programs." Similarly, in a quasi-experimental study that examined the impact of participation in the University of Michigan undergraduate research program on retention, Nagda, Gregerman, Jonides, von Hippel & Lerner (1998; http://www-personal.umich.edu/~jjonides/pdf/1998_6.pdf) found that participation in a undergraduate research program increased retention rates for some students. While this effect was strongest for African American students, there were also positive trends for Hispanic students who participated in the program in their sophomore year. This difference was attributed to the adjustment challenges experienced by this particular population of Hispanic students because the majority came from out of state and didn't have their family support network close (Nagda et al., 1998). These findings further provide promise for the undergraduate research program as part of Project RAISE because the CSUF population will not have the same isolation challenges and will have experiences more similar to the sophomore students in the Nagda study.

Transferology: Many community college students lose credits when they transfer because courses they took are not accepted by the four-year institution. In one study, 14% of transfer students had less than 10% of their credits accepted, and only 58% of transfer students had more than 90% of their credits accepted. As the percentage of credits transferred increased, the likelihood of attaining a bachelor's degree also increased (Monaghan & Attewell, 2014).

While California has made progress toward reconciling the patchwork of articulation agreements that have long existed between community colleges and the CSU, STEM fields have tended to lag behind non-STEM fields. This is largely because community college students are often advised to complete lower-division general education requirements rather than the STEM prerequisites they need to advance toward a bachelor's degree. As STEM curricula are extremely hierarchical, the lack of prerequisites presents a significant barrier to progress to degree.

To empower the community college students to determine for themselves which courses will transfer to CSUF STEM degrees, Project RAISE will build on work that CSUF and the community colleges have already done to improve ease of transfer by piloting Transferology, a nationwide, web-based tool developed by CollegeSource, Inc. Member institutions provide articulation information and catalog descriptions on their course offerings, which allows Transferology to search the data to show which institutions will accept which courses for transfer or at least show a strong chance of equivalence. Students can also request additional information from an institution and find courses at another institution that may be transferred back to the institution they currently attend. The program is free for use by students and counselors.

Transferology will give Project RAISE community college students immediate, free access to the information they need to determine if their courses will transfer, empowering them and easing the burden on the community college counselors, who carry very large caseloads.

By piloting Transferology with the Project RAISE community colleges, CSUF will be able to evaluate it and determine how it can help students select courses that are transferrable the university. **This component addresses Absolute Priority 2.**

STEM Articulation Conference: Creating and sustaining effective partnerships between two-year and four-year institutions was one of the greatest challenges that attendees of the Summit on Community Colleges in the Evolving STEM Education Landscape (National Research Council and National Academy of Engineering, 2012) reported facing. And at a May 2016 conference for community college counselors at CSUF, attendees expressed a strong desire for more information about articulation, upcoming enrollment issues, admission standards and more.

Similarly, counselors at CSUF's feeder community colleges have repeatedly said that because of delays in updates to ASSIST.ORG, a master database that manages articulation for California community colleges, it is not always clear what they should be telling their STEM students to take in order to prepare for transfer. To help clarify this critical information and ensure institutional progress toward creating consistent articulation agreements, CSUF will host an annual conference for representatives from the Project RAISE community college partners to discuss STEM articulation with faculty and administrators from admissions, the CSUF colleges of Natural Sciences and Mathematics (NSM) and Engineering and Computer Science (ECS). STEM deans, faculty and counselors from the community colleges will be invited to attend. The conference will be a cost-effective way to share the latest updates about course articulation and associate degrees for transfer, as well as engage in dialogue about new models for articulation agreements and begin drafting new agreements. It will also create networking opportunities that will enable the community college representatives to get to know the CSUF personnel who can answer their questions. **This component addresses Absolute Priority 2(2).**

CSUF Support Activities

RAISE Transfer Program (RTP): Transfer students' GPA historically drops after their first semester—what is sometimes termed "transfer shock." Some researchers (Holahan et al.,1983; Laanan, 1996, 1998) have linked it to institutional differences in size, location, academic rigor and competition among students. Others have looked at social and psychological factors.

Co-curricular programming can affirm students' self-perceptions of competence (Gandara and Maxwell-Jolly, 1999; Hurtado et al., 2009; Mabrouk & Peters, 2000) and sense of community in the college setting—factors that have often been cited as contributing to persistence and attainment of a degree, particularly for underrepresented students.

The RAISE Transfer Program is a multipronged effort designed to extend the success of $(STEM)^2$'s transition program to students transferring to CSUF from the eight Project RAISE community colleges. Its purpose is to ease the transition to the university for STEM majors, helping to orient them to CSUF resources, culture and expectations; gain skills for academic success (e.g., time management, library, study skills); and become part of a STEM transfer student learning community/support network. Students will be assigned peer advisors to help them make the transition by providing advice on courses and campus resources. RTP students will get priority registration for classes, (a much-coveted benefit), ensuring that they are able to enroll in the courses they need to advance toward their STEM degrees in a timely manner.

RTP components include 1) a mandatory two-day STEM orientation the summer before transferring, including an orientation for family members, so they understand the expectations and career prospects for the student and can better support him/her; 2) meetings with peer advisors throughout the year; 3) meetings with a graduation specialist and career specialist as needed throughout the year; 4) and attending at least three co-curricular sessions such as active

membership in a CSUF STEM club, supplemental instruction, faculty office hours, etc. RTP students will have access to CSUF's Transfer Resource Center, which will become their "home" on campus—a place to gather, meet with peer advisors, attend workshops and receive tutoring. **This component addresses Absolute Priority 1.**

The RTP builds on the success of the $(STEM)^2$ transition program, which was reflected in the GPAs of participants. A comparison of four cohorts of $(STEM)^2$ transition program participants to the overall CSUF STEM population showed that two cohorts' first semester GPA drop was approximately 40% less than that of the overall STEM transfer group, and the other two cohorts actually showed an increase in average GPA after their first semester.

Summer Internship Program: Participation in hands-on work experiences related to one's STEM discipline enhances the academic experience (Perna, Cooper & Li, 2007), as students apply what they have learned in the classroom to real-world situations and gain an improved understanding of their field (Jaeger et al., 2008). Internships also help students learn the norms of science, and decrease feelings of marginalization by integrating them into the STEM community (Hunter, Laursen & Seymour, 2006).

In partnership with the Orange County Business Council, Project RAISE will facilitate paid ten-week summer internships in STEM fields for 30 RTP participants after their junior year. The Orange County Business Council will promote the internships to their members and help place interns, while the NSM and ECS career specialists from the CSUF Career Center will help prepare students for the internships through workshops in interview skills, resume writing, etc. While these workshops will be open to all STEM transfer students at CSUF, the internships will be reserved for RTP students, and those who are selected for internships will receive more intensive training. **This component addresses Absolute Priorities 1 and 2(1).**

2. *The inclusion of a thorough, high-quality review of relevant literature, a high-quality plan for project implementation, and the use of appropriate methodological tools to ensure successful achievement of project objectives (Up to 5 points);*

Literature Review

Nationally, 71% of Hispanic students entering community colleges intend to transfer to a four-year college or university, but, only 7% to 10% succeed in transferring, making community colleges a significant source of Hispanic STEM student attrition (Sólorzano, 2005). Community college students switch out of STEM majors at a higher rate than their peers at four-year institutions (28% vs. 22%), and only about 20% of STEM community college students attained any STEM credential six years after enrollment.

Just as multiple factors are driving these figures, there are numerous possible remedies. Any initiative will fall short, however, without a mutual sense of responsibility and commitment by community colleges and universities for ensuring the transition and success of women and ethnic minorities in STEM disciplines (Jackson, Starobin & Laanan, 2013).

Challenges

***Financial and family issues*:** A recent study (TICAS, 2016) found that 61% of California community college students come from very low-income families (earning less than $30,000 annually), and 45% are the first in their families to attend college. For Hispanic students pursuing STEM degrees, financial concerns, which "appear to drive college choices" (Malcom, Dowd & Yu, 2010), are "one of the most salient reasons that their attrition in STEM fields [is] higher than among whites" (Seymour & Hewitt, 1997, as cited in Muesus et al., 2011; Anderson & Kim, 2006). Research has also shown that parental support and encouragement is one of the most important indicators of students' education aspirations (Fann et al., 2009). However, parents of first-generation Hispanic students are not as likely as those of their college-educated peers to

understand the college environment or the supportive role they could play in assuring their student's success (Tornatzky et al., 2006).

***Lack of community college transfer services*:** One California study found that only 14% of Hispanic California community college students transferred to four-year colleges, compared to 29% for whites (Moore & Shulock, 2010). Difficulty in transferring is a prime barrier to bachelor's degree completion; therefore, reducing structural barriers between two- and four-year colleges is necessary to increase STEM degree attainment rates (Melguizo & Dowd, 2009).

***Lack of sufficient community college infrastructure to facilitate transfer and articulation*:** Disjointed and confusing articulation agreements can negatively impact transfer rates, and in STEM fields specifically, distinguishing between prerequisite courses for STEM majors and those offering technical skills for other majors is confusing (Tornatzky et al., 2006). Effective transfer programs require a well-developed technical infrastructure that includes information and tracking systems and articulation databases (Rifkin, 1996).

Lack of engagement at transfer institution: When students feel connected and involved with their institutions, they are more likely to persist and graduate (Pascarella & Terenzini, 2005), but most institutions give far less attention to transfer students than to their native students (Kuh et al., 2005). Consequently, transfer students often do not know the resources available to them and the opportunities for involvement in campus activities. Roberts and McNeese (2010) found a statistically a statistically significant difference in student involvement/engagement based on whether a student was native to a university or transferred there from either a junior/community college or a four-year college/university.

Effective Strategies

***Undergraduate research*:** The high-impact practice of undergraduate research accomplishes multiple aims for underrepresented students. It is, for instance, a particularly successful method of extending financial support to Hispanic STEM majors in a way that improves achievement by providing them with paid research positions (Malcom, Dowd & Yu, 2010; Merisotis & Kee, 2006). Participating in research programs aimed toward STEM majors also positively correlates with academic performance, persistence, graduate school enrollment and STEM career choices, especially for underrepresented students (Barlow & Villarejo, 2004; Davis & Finelli, 2007; Museus et al., 2011; Nagda et al., 1998; Malcom, Dowd, & Yu, 2010; Gates, 2010).

***Transition programs*:** Programs and services that support transfer students are of paramount importance (Jackson, Starobin & Laanan, 2013). Transfer student orientations, mentoring programs, undergraduate research programs and opportunities for engagement with peers and faculty in extracurricular activities have proven to be beneficial for transfer adjustment and satisfaction of women and underrepresented minorities (Jackson & Laanan, 2011; Johnson, 2011; Ong et al., 2011). Jackson and Laanan (2011) indicate that transfer students viewed participation in transfer student orientations as a key facilitator in adjustment to a university.

***Transfer partnerships between institutions*:** Consistent articulation agreements are essential to achieving a seamless transfer of STEM students at community colleges to four-year institutions (Zinser & Hanssen, 2006). But articulation agreements alone may not be sufficient. Effective and efficient transfer requires a comprehensive and collaborative effort of all key constituents at community colleges and four-year institutions. Transfer partnerships that reach beyond articulation agreements, such as active collaboration of community college and university faculty, campus visits by university faculty for interaction with potential transfer students at

community colleges, and joint undergraduate research programs, are critical to the ability of community colleges to increase transfer rates (Kisker, 2007).

***Mentoring*:** Peer and faculty mentoring has been linked to persistence of women and underrepresented minorities in STEM fields (Johnson, 2011; Ong et al., 2011) and to better adjustment of transfer students in STEM fields (Packard et al., 2011; Reyes, 2011).

***Summer internships*:** STEM-related work experiences can also strengthen students' commitment to their major and have a positive influence on persistence if the students decide their major coincides with their career interest (Jaeger et al., 2008). Those who participated in cooperative education had higher final GPAs and were more than five times as likely as non-participants to persist in their STEM major (Jaeger et al., 2008). Internships can also lead to employment after graduation (Do et al., 2006), especially for underrepresented students (Inroads, 1993), as they help students build a professional network (Do et al., 2006) and better prepare them for their first STEM job (Jaeger et al., 2008).

***Technology*.** One barrier to STEM transfer student success is lack of appropriate advice (Monaghan & Attewell, 2014). Millennial students, as digital natives, however, need a different model of support in college, and student services providers need to create new solutions for their needs. They also need to develop virtual counseling tools and extend the existing customer service model using technology and new formats (Rivera & Huertas, 2007). Therefore, a strong case can be made for a technological solution to address the advice students need to identify correct articulated prerequisite courses to complete their STEM degrees more quickly.

Project Implementation

Implementation of Project RAISE will be carefully orchestrated, with the components for community college students rolled out first, followed by those for students who have transferred

to CSUF (see Table 4 for timeline). A Project RAISE website will be established to consolidate information about the program and will include links to the NSM and ECS websites. An e-newsletter will keep all constituents up to date and alert them to new opportunities.

Peer advisors will initially be recruited from among students who have completed the $(STEM)^2$ transition program, then from those who have completed the RAISE Transfer Program. Successful students with excellent interpersonal and communication skills will especially be sought. The transition coordinator will be responsible for recruiting, selecting and training the peer advisors, who will be paid hourly and given a mileage reimbursement for travel to present their workshops at the community colleges. The peer advisors will also be matched with students in the Undergraduate Research Experience and RAISE Transfer Program.

The **Undergraduate Research Experience** will be publicized to potential participants in three ways: 1) via the peer advisors, who will conduct workshops on undergraduate research opportunities and benefits at the community colleges; 2) through community college faculty and staff; and 3) via email from the CSUF fall admissions list, which includes those who applied to CSUF in a STEM major from the eight community colleges. This list is available starting each December, and students will be recruited for the URE between January and April for the following summer. Four spots will be available from each community college, for a total of 32 researchers per summer. Candidates will be required to fill out an application, including a faculty recommendation, and write an essay explaining why they want to take part in the URE. GPA and lab experience will also be factored in. They will be screened by the community colleges and the transition coordinator, and potential matches will be confirmed with CSUF STEM faculty. The project director and transition coordinator will oversee recruitment, selection and program implementation, including matching students with faculty mentors.

The peer advisors, along with the transition coordinator and a representative from CSUF's information technology division, will present workshops about **Transferology** at each community college for students and interested counselors. These workshops will show participants how to use the tool. Community college counselors will also learn about Transferology at conferences and help with training the students. Project RAISE staff will then track its usage by the community college students.

The PIs, project director and administrative assistant will be responsible for planning the **STEM Articulation Conference**. Activities will include a meet and greet with CSUF STEM faculty, key personnel from the CSUF Office of Admissions and Records and community college STEM faculty, counselors and deans; panel discussions featuring NSM and ECS faculty, administrators and staff, as well as panels with the community college science and engineering deans and counselors; information sessions providing updates on CSUF admissions requirements, impactions and enrollment targets; discussions about issues regarding STEM articulation agreements; and a presentation of Transferology.

STEM transfers from all eight Project RAISE community colleges will be eligible for the **RAISE Transfer Program**, which they may take part in during their first year after transferring to CSUF. In order to qualify, they must attend a mandatory two-day orientation in the summer before they enroll at CSUF including a bilingual family day to better inform families of the challenges facing first-generation college students. Participants will be identified via the CSUF fall admissions list and peer advisor workshops. The application process will include completing a web-based or e-mailed application. During the academic year, participating students must receive advising by their major department; meet with their peer advisor, the graduation specialist for their college (to ensure efficient time to graduation) and the career specialist for

their college; join a STEM club and attend meetings; and attend academic enrichment sessions such as supplemental instruction, faculty office hours, seminars and workshops in order to receive priority registration. The academic success coordinator will be responsible for implementing the RTP.

Candidates for the **Summer Internship Program** will be recruited from the pool of RTP students. CSUF will screen the candidates based on the needs of participating businesses (e.g., majors, software skills, classes taken, etc.) and make recommendations for interviews. Interns will be paid but will not receive academic credit for their internship. The project director and academic success coordinator will oversee the program, with assistance from the NSM and ECS career specialists, who will train the prospective interns in interview skills, resume writing, etc. The Orange County Business Council will market the program to members, help match member needs to intern skills and help members see the program's workforce development potential.

Methodological Tools to Achieve Project RAISE Objectives

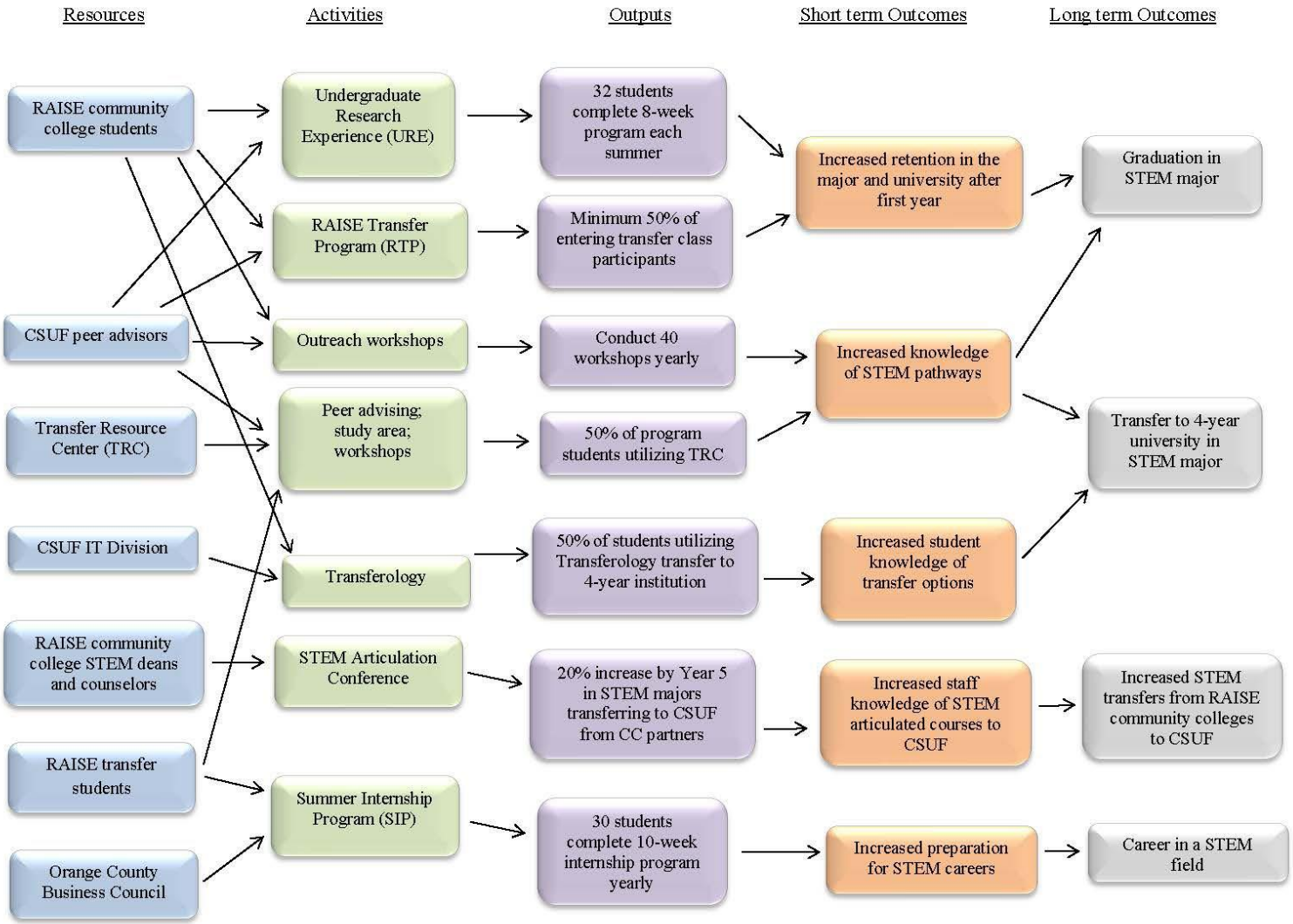
The external evaluator will design a mixed methods evaluation tailored for each program component. Data collection for the Undergraduate Research Experience and the Summer Internship Program will consist of pre/post student surveys, pre/post focus groups, student journal reflections, post-program mentor surveys, and participant observation each summer. In addition to a quasi-experimental study, the RAISE Transfer Program will be evaluated each semester through pre/post student surveys, student journal reflections and participant observation. Evaluation of peer advisors will be conducted through a self-assessment survey at the end of the first semester and a focus group at the end of the second semester, as well as through an annual spring survey completed by the Project RAISE participants, which will provide feedback about all aspects of the program, including the community college workshops.

The implementation of Transferology will be measured by utilization rates by students and counselors at the participating community colleges and through interviews with users to obtain feedback on the ease of use and usefulness of the system. The STEM Articulation Conference will be evaluated through a post-program survey and participant observation. Document analysis and additional methods will implemented as needed to ensure a comprehensive assessment of the Project RAISE program. Data collection instruments will be developed based on existing instruments, validated when possible, and informed by relevant literature as the project commences. After data collection of each component, appropriate data analysis methods will be used, e.g., paired samples t-tests, correlations, cross tabulations, regression, qualitative coding, etc. Findings will be shared regularly with the project team and documented in the annual report.

3. *The extent to which the proposed project is supported by strong theory (as defined in the notice) (Up to 5 points)*

Project RAISE is grounded in the theory that a selection of high-impact practices and other proven activities, provided to a continuum of students beginning at all eight of CSUF's HSI feeder community colleges and extending through transfer to CSUF and graduation, will improve academic success, increase retention and accelerate time to degree and entry into careers. It represents a major expansion of specific elements from $(STEM)^2$, CSUF's previous HSI-STEM-funded program, with the addition of new, innovative elements intended to streamline the transfer process, shorten time to degree and provide a trajectory toward a STEM career. See Figure 1, Project RAISE Logic Model.

Figure 1: PROJECT RAISE LOGIC MODEL



4. *The extent to which the proposed project represents an exceptional approach to the priorities established for the competition. (Up to 10 points)*

As the product of a true regional alliance, Project RAISE offers a unique and powerful strategy for reaching and serving the target populations. It is both comprehensive and focused, combining a constellation of proven approaches, including several HIPs, as well as novel approaches, and applies them broadly to STEM students at eight different community colleges, empowering them with knowledge and ensuring that the students have a common and highly supportive experience upon arrival at CSUF. Moreover, in addressing the needs of the target students from their entry into higher education, via community college, through their transition to CSUF and into the workforce, it provides the kind of "wraparound" continuity that will help assure the success of the participants and achieve the Absolute Priorities. It can be replicated wherever there is a critical mass of two-year and four-year institutions seeking to increase the number of STEM degree holders they produce and willing to collaborate to achieve a common goal.

Project RAISE also offers a model for expanding what began at CSUF as a small program, with two community colleges in an NSF-funded STEP grant (TEST:UP), into a larger program, with three community colleges in $(STEM)^2$, to a far-reaching regional collaboration. Moreover, through CSUF's participation in the CSU HSI-STEM Network, the project will contribute knowledge to the network's multi-site summative evaluation and the annual STEM Network Summit, which is a forum for disseminating information on effective practices in serving students, sharing evaluation strategies and exploring the intervention success of high-impact practices being implemented by the CSU. With the potential for system-wide replication in the largest state university system in the country, Project RAISE will also encourage other state university systems throughout the nation to follow suit, especially states with large Hispanic populations.

Quality of Project Services: (Up to 20 points)
The quality and sufficiency of strategies for ensuring equal access and treatment for eligible project participants will be considered. This includes:

1. *The extent to which services to be provided by the proposed project reflect up-to-date knowledge from research and effective practice (Up to 10 points); and*

As noted in the Quality of Project Design section, the project activities and services have been developed based on recent studies and/or foundational research on persistence in STEM majors among Hispanic students and underrepresented and low-income students generally. They have also been built upon the recent successes of CSUF's $(STEM)^2$ project, which has provided compelling evidence that undergraduate research experiences, a transfer program like the RTP and improved advising, particularly from peers, all work. Over the past three years, for example, CSUF has improved its six-year graduation rate from 51% to 63%, and for STEM transfers the average time to degree completion has been reduced by almost one full year.

Project RAISE services include both proven and novel activities, and the program as a whole is consequently expected to achieve its goals and objectives and successfully address the Absolute Priorities. It also addresses Competitive Priority 2.

***Undergraduate Research Experience (URE)*:** An established and much-studied HIP that will introduce community college students to research in STEM fields, build their confidence about their abilities, clarify their graduate school or career plans and develop their identity in their field. Significantly, for the target population, it will also provide much-needed financial support during the summer. Consequently, it is anticipated that the URE will have a similarly positive impact on grades, transfer and graduation rates for the participants as the $(STEM)^2$ program's summer research experience.

***Peer Advisors*:** Peer mentoring/advising is a time-tested strategy for engaging students and improving achievement. Project RAISE peer advisors will connect with STEM students or

potential STEM students at each of the community colleges, where they will serve as role models, ambassadors, guides and resources before and after the students transfer to CSUF. In this way, they will help engage the transfer students and build a STEM community once they transfer to CSUF—elements that are associated with persistence and degree completion.

***Transferology*:** The pilot of Transferology will draw on today's students' status as digital natives and their comfort level with online resources. It will empower the community college students to determine which courses will transfer to CSUF STEM degrees, bypassing the outdated database that counselors currently wrestle with.

***STEM Articulation Conference*:** CSUF has ample evidence that the information that will be presented at this annual conference is in great demand by counselors at its feeder community colleges. The conference will be a cost-effective way for CSUF faculty and administrators from admissions, NSM and ECS to share the latest updates about enrollment targets, impactions, course articulation and associate degrees for transfer with community college deans, faculty and counselors, as well as engage in dialogue about new models for articulation agreements and begin drafting new agreements. It will benefit the community college students in the short term, when their counselors and faculty are better informed and establish networking relationships, and in the long term, as the new agreements are adopted.

***RAISE Transfer Program (RTP)*:** The RTP will ease the transition from community college to the university for STEM majors, helping to orient them (and their families) to the CSUF campus, resources, culture and expectations; gain skills for academic success (e.g., time management, library, study skills); and become part of a STEM transfer student learning community/support network. These are all activities that have been shown to improve persistence, and their benefits have been borne out by the results of $(STEM)^2$'s transition program.

***Summer Internship Program (SIP)*:** Another proven HIP, the Summer Internship Program will help up to 30 RTP students annually apply learning from their classroom and laboratory experiences to an actual STEM workplace between their junior and senior years. The paid internships will provide financial support and help the students build a professional network and acquire the skills needed to find jobs in STEM after graduation.

2. *The likely impact of the services to be provided by the proposed project on the intended recipients of those services (Up to 10 points).*

Because the Project RAISE services and activities are based on proven strategies and practices, they are expected to significantly increase the number of Hispanic and low-income students in STEM majors at the eight partner community colleges who are engaged in their studies, persist in their STEM majors, are empowered to successfully transfer to CSUF or another four-year institution, graduate in a timely manner and enter STEM careers.

All will benefit from contact with the peer advisors, who will provide them with much-needed information about STEM degree preparation and STEM transfer preparations, thereby helping them identify and achieve their academic and career goals. Those who take part in the Undergraduate Research Experience will receive financial support in the form of a stipend and gain hands-on experience in their field and the confidence that they can succeed. They will also be mentored by the faculty member whose lab they work in and by a peer advisor. Together, these experiences will help them persist in their studies, clarify their post-baccalaureate plans and transfer to CSUF or another four-year institution in a STEM major.

Once at CSUF, the students who take part in the RAISE Transfer Program are expected to become rapidly acclimated to the campus and engaged as part of a supportive STEM community. They will enjoy support from their families, who will learn about the advantages of a STEM degree and career at a family day orientation, and those who participate in the Summer

Internship Program will gain work experience in a STEM field, professional contacts and much-needed financial support.

The peer advisors themselves will gain an increased sense of community as STEM students and future professionals and valuable leadership experience.

Significance: (Up to 20 points)

In determining the significance of the proposed project, the following factors are considered:

1. *The potential contribution of the proposed project to increase knowledge or understanding of educational problems, issues, or effective strategies (Up to 5 points);*

With its eight community college partners, plus CSUF and the Orange County Business Council, Project RAISE is a program of considerable magnitude and has the potential to demonstrate the feasibility of a large, regional collaborative to increase the success of Hispanic and low-income students in STEM fields, across institutions. It will create a model for broad-based collaboration among two-year and four-year institutions and businesses and determine the efficacy of this particular mix of services in supporting the target population and facilitating their transfer from community college to a four-year public university and into the workforce.

The pilot of Transferology will help ascertain this tool's value to community college students and counselors. The STEM Articulation Conferences will help formalize and streamline the process of standardizing articulation agreements between the community colleges and CSUF and enable community college counselors and faculty to properly advise their students.

CSUF is also uniquely positioned to propagate the program's success. It has a proven history of envisioning and institutionalizing successful interventions, ensuring, for example, that the HIP of Supplemental Instruction was baseline budgeted on campus after its success was proven with data; CSUF was then made a center of excellence for the 23-campus CSU system to

demonstrate how to start, grow and institutionalize a successful SI program. It intends to do the same for Project RAISE.

Findings from Project RAISE—its individual components as well as the program as a whole—will be published in journals such as *Learning Assistance Review*, *League for Innovation in the Community College: Learning Abstracts* and *Community College Journal of Research and Practice*, and will be featured in regional and national conference presentations; they will also contribute to discussions at the CSU systemwide Network STEM Summit and support a publication from the CSU summative evaluation.

2. *The likelihood that the proposed project will result in system change or improvement (Up to 15 points).*

Project RAISE has been developed with the long-term aim of addressing identified needs of STEM students at CSUF and the eight community colleges. Community college transfer services will be enhanced through the peer advisor outreach workshops at the community colleges. The inadequacy of IT infrastructure to facilitate transfer and articulation will be addressed through Transferology. The need for stronger transfer partnerships and consistent articulation agreements will be addressed through the STEM Articulation Conference. The RAISE Transfer Program will offset the lack of engagement that transfer students at CSUF typically experience. The Undergraduate Research Experience will provide this high-impact practice to a broader range of Hispanic and low-income students, with the tremendous benefits it brings. Peer advisors will provide valuable mentoring to the transfer students, and the Summer Internship Program will help students acquire the skills they need to enter the STEM workforce in Orange County and regionally. It will help provide a diverse and qualified STEM workforce to sustain and accelerate economic growth in Southern California.

The goal is to institutionalize these components at the eight community colleges and CSUF, which is an entirely realistic aim, given CSUF's impressive track record of improvements in educational outcomes for its students. With closing the achievement gap, reducing time to graduation and providing all students with at least two HIPs embedded in its strategic plan, the university has made significant progress toward achieving those objectives. Over the past three years, for example, the achievement gap for CSUF transfer students has been reduced by 10.4%, with the graduation rates of underrepresented students actually edging out those of non-underrepresented students. The campus, which now has the second-highest six-year graduation rate in the CSU, achieved this milestone in just three years—two years faster than its target.

In time, just as CSUF institutionalized Supplemental Instruction through student success fees and CSU Chancellor's Office contributions and became a center of excellence for the CSU system after the intervention's value was proven through grant-funded programs, it is expected that Project RAISE's successes will be treated the same way. Project RAISE promises a viable model for STEM transfer and large-scale regional collaboration for all 23 campuses in the CSU, the largest state university system in the country, which also has one of the largest Hispanic populations in the country.

And beyond California, it has enormous potential to effect change wherever a university and its feeder community colleges desire to collaborate on improving STEM transfer and graduation rates for underrepresented and low-income students, especially other state university systems with large Hispanic populations, such as those in Texas, Florida and New York.

Quality of the Management Plan: (Up to 10 points)

1. *The adequacy of the management plan to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, timelines and milestones for accomplishing project tasks (Up to 5 points).*

CSUF and the collaborating community colleges have extensive experience in managing STEM projects and grants. CSUF is committed to providing the PIs', career specialists' and graduation specialists' time; designated space for orientations; research lab facilities; meeting rooms and office space to facilitate successful implementation of Project RAISE. CSUF will also provide a STEM Transfer Resource Center (TRC) to host RTP workshops and meetings between peer advisors and transfer students and to give them a place to gather to foster a sense of community. Oversight of the Transferology web-based articulation system will be provided by the CSUF Division of Information Technology. CSUF has letters of commitment from each collaborating community college and the OCBC (see Other Attachments—Letters of Collaboration).

An advisory board and project management team will oversee Project RAISE. The management plan will ensure extensive collaboration among all partners and staff, producing a streamlined, functional structure that achieves the objectives of the project on time and within budget. Program policies and procedures will promote effective administration with built-in monitoring and reporting systems to ensure sound management and efficient project operation.

The Project RAISE Advisory Board will meet once each semester (fall, spring, summer) at CSUF. It will consist of:

- A member from each community college
- Representative from the Orange County Business Council
- IT staff representing Transferology
- External evaluator
- Career specialists (NSM & ECS)
- Graduation specialists (NSM & ECS)
- CSUF Project Management Team

The CSUF Management Team will meet weekly and will consist of:

- Principal investigators
- Project director
- Transition coordinator
- Academic success coordinator

- Administrative assistant

Responsibilities of Key Personnel

The **principal investigator (PI), Dr. Mark Filowitz**, associate dean of the College of Natural Sciences and Mathematics, and the **co-PI, Dr. Susamma Barua**, associate dean of the College of Engineering and Computer Science, will supervise and provide any necessary support for the **project director, Dr. Maria Dela Cruz,** who will be responsible for the overall management and success of the program. Both PI and co-PI will work closely with CSUF and community college administrators to facilitate the model articulation agreements and provide guidance to the **project director** and **external evaluator, Dr. Karen Kim,** in assessing the outcomes of the project and in making decisions about how well the project services are producing expected outcomes.

The **project director** will be responsible for administration and management of all activities, including supervising, hiring, evaluating and training most non-academic staff; managing the project budget; and developing and implementing all programs and services; she also will oversee data collection to analyze and evaluate project components and for preparing U.S. Department of Education and internal reports.

The **administrative assistant** will assist the project director and coordinators (see below) in carrying out the day-to-day duties associated with implementing the project. S/he will play a lead role in organizing the annual STEM Articulation Conference.

The **external evaluator** will work closely with the project director and the PIs to design data-collecting procedures; assess all quantitative and qualitative data; and develop a data-driven process to refine, reshape or redirect Project RAISE activities so that project goals, performance measures and process objectives are met and adequately reported annually.

The Project RAISE **transition coordinator** will hire, train and supervise peer advisors. S/he will implement outreach activities, including career workshops and transfer degree workshops at the RAISE partner community colleges that are designed to familiarize students with educational, transfer and career opportunities in STEM disciplines. S/he will also coordinate the Undergraduate Research Experience (URE) program.

The Project RAISE **academic success coordinator** will develop and coordinate the RAISE Transfer Program and Summer Internship Program. S/he will work closely with CSUF graduation specialists from the NSM and ECS to implement parts of the RAISE Transfer Program. In addition, the academic success coordinator and CSUF career specialists from NSM and ECS will assist with the Summer Internship Program. **Student peer advisors** will provide firsthand knowledge of the transfer experience to community college students via workshops, as well as mentoring to the students in the Undergraduate Research Experience and RAISE Transfer Program. A **programmer analyst** from the CSUF information technology division will oversee the implementation and assess usage of Transferology.

Table 4: Comprehensive Management Plan

Activity/Task	**Person(s) Responsible**	**Milestones**
October/November 2016		
Post job descriptions for transition coordinator, academic success coordinator/ administrative assistant	M. Dela Cruz (project director)	Staff hires by December 2016
Subcontracts executed for all community colleges, Chancellor's Office and external evaluator	M. Dela Cruz, administrative assistant	Subcontracts signed and fully executed per guidelines
Evaluation instruments created and data collection processes developed	K. Kim (external evaluator)	Instruments and data collection procedures by December 2016

Project RAISE Advisory Board meeting	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	Plan for first meeting to occur in December 2016
Post job descriptions for peer advisors	M. Dela Cruz (project director)	Peer advisors hired by December 2016
Develop Project RAISE brochures to inform the CSUF campus community	M. Dela Cruz (project director), RAISE staff	Brochures to be completed by December 2016
Develop Project RAISE website	M. Dela Cruz (project director), RAISE staff	Website completed by December 2016
January 2017		
Peer advising training and planning	Transition coordinator	Peer advisors trained in mentoring techniques and workshops for Project RAISE partner community colleges
Identify faculty hosting Project RAISE students in Undergraduate Research Experience	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	Faculty placements identified by February 2017
Project RAISE Advisory Board meeting	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	Plan for meeting to occur in April 2017
Plan Transfer Resource Center (TRC) workshops with campus partners	Academic success coordinator	Dates for spring workshops established
Visit Summer Internship Program sites	M. Dela Cruz (project director), academic success coordinator	First program sites established by March 2017
Start recruiting students for Undergraduate Research Experience	Transition coordinator	Applications developed and distributed by January 2017
Spring 2017		
Workshops at the community colleges (STEM careers, transfer process, research opportunities)	Peer advisors, transition coordinator	Minimum of 3 workshops per campus per semester
Transferology introduced at the community colleges	CSUF IT, transition coordinator	Workshops completed by May 2017

Selection of Summer Internship Program students	Academic success coordinator	Students selected by March 2017
Planning for STEM Articulation Conference	Administrative assistant, M. Dela Cruz (project director)	Reserve conference site for fall 2017 STEM Articulation Conference
Publish spring issue of Project RAISE newsletter	Administrative assistant, M. Dela Cruz (project director)	Distributed online to Advisory Board members and CSUF campus partners by May 2017
Recruit RAISE Transfer Program students	Academic success coordinator, peer advisors	Applications developed and distributed by March 2017
Summer 2017, 2018, 2019, 2020, 2021		
Undergraduate Research Experience (URE) commences	Transition coordinator	32 students participate
Summer Internship Program (SIP) commences	Academic success coordinator	Summer 2017—pilot 8 to 10 students; years 2 to 5, 30 students participate
RAISE Transfer Program (RTP) orientation	Academic success coordinator	Mandatory for all RTP students to attend
Surveys and data collection with program students and faculty	K. Kim (external evaluator)	Collected by August of each year
Peer advising training and planning	Transition coordinator	Peer advisors trained in mentoring, and workshops for partner RAISE community colleges
Project RAISE Advisory Board meeting	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	To occur every August with NSM Summer Research Symposium
Plan Transfer Resource Center (TRC) workshops with campus partners	Academic success coordinator	Dates for fall workshops established
Fall 2017, 2018, 2019, 2020		
Subcontracts executed for all community colleges, Chancellor's Office and external evaluator	M. Dela Cruz (project director), administrative assistant	Subcontracts signed and fully executed per guidelines

Project RAISE Advisory Board meeting	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	Plan for meeting to occur in December
STEM Articulation Conference	M. Dela Cruz (project director), administrative assistant, M. Filowitz (PI), S. Barua (co-PI)	To occur every fall semester
Workshops at the community colleges (STEM careers, transfer process, research opportunities, Transferology)	Peer advisors, transition coordinator	Minimum of 3 workshops conducted per campus per semester
Publish fall issue of Project RAISE newsletter	Administrative assistant, M. Dela Cruz (project director)	Distributed online to Advisory Board members and CSUF campus partners by December/January
Identify faculty hosting Project RAISE students in Undergraduate Research Experience	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	Faculty placements identified by February
Plan Transfer Resource Center (TRC) workshops with campus partners	Academic success coordinator	Dates for spring workshops established
Start recruiting students for Undergraduate Research Experience	Transition coordinator	Applications developed and distributed by January 2017
RAISE Transfer Program (RTP)	Academic success coordinator	Monitor RTP student participation
Spring 2018, 2019, 2020, 2021		
Project RAISE Advisory Board meeting	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	Plan for meeting to occur in April
Peer advising training and planning	Transition coordinator	Peer advisors trained in mentoring techniques and workshops for partner RAISE community colleges
Identify faculty hosting Project RAISE students in Undergraduate Research Experience	M. Filowitz (PI), S. Barua (co-PI), M. Dela Cruz (project director)	Faculty placements identified by February

Publish spring issue of Project RAISE newsletter	Administrative assistant, M. Dela Cruz (project director)	Distributed online to Advisory Board members and CSUF campus partners by December/January
Planning for STEM Articulation Conference	Administrative assistant, M. Dela Cruz (project director)	Reserve conference site for a fall STEM Articulation Conference
Workshops at the community colleges (STEM careers, transfer process, research opportunities, Transferology)	Peer advisors, transition coordinator	Minimum of 3 workshops conducted per campus per semester
Selection of Summer Internship Program students	Academic success coordinator	Students selected by March 2017
RAISE Transfer Program (RTP)	Academic success coordinator	Monitor RTP student participation

Project Budget

All Project RAISE budget line items are directly related to project goals and objectives. The budget (Table 5) draws on the considerable experience of the principal investigators and key personnel. The full-time project director, Dr. Maria Dela Cruz, will be managing a complex project with eight community colleges, multiple businesses (for the Summer Internship Program) and oversight of an external evaluator and programmer analyst. In addition, she will supervise three full-time staff members: an administrative assistant, transition coordinator and academic success coordinator. These three staff members will have expertise in developing and coordinating the STEM Articulation Conference, peer advisors, RAISE Transfer Program, Undergraduate Research Experience and Summer Internship Program. The external evaluator, Dr. Karen Kim, will be responsible for the overall project evaluation. Dr. Dela Cruz and Dr. Kim both have extensive experience in managing and evaluating STEM grants and currently have these parallel roles in $(STEM)^2$, the funded HSI-STEM grant at CSUF.

In addition to the Project RAISE yearly evaluation, CSUF is participating in a California State University (CSU) systemwide summative evaluation of programs supported by the Department of Education HSI Title III programs, with a view toward sharing experiences to maximize systemwide impact. The budget costs include participation in an annual two-day summit held at the CSU Chancellor's Office and a multi-site evaluation, whereby members of the network will also support and participate in a multi-site summative evaluation of project impact designed around What Works Clearinghouse standards. CSUF has agreed to use a much lower than normal IDC rate of 15% so that maximum financial support can be directed toward successful achievement of the program objectives. Also, 2% of the operating budget will contribute to the Chancellor's Office multi-site evaluation of the CSU campuses engaged in Department of Education HSI Title III grants.

The travel allocation includes travel to national conferences. Staff and peer advisors will receive a mileage allowance for travel to partner community colleges. Supplies will include materials for workshops, orientations, mentoring, summer research projects and program events. Students participating in summer research projects will be paid a $5,000 stipend, and faculty mentors will receive $1,500 in supplies to support the student research.

The budget will adequately support of the project design and meet the needs and objectives of the project. Requested items are reasonable, cost-effective and comparable to market value or lower for Orange County, California. Moreover, through Project RAISE, these resources will have a significant impact on the educational success, transfer and eventual degree attainment of Hispanic and other low-income students in STEM fields.

Table 5: Project RAISE Budget Overview (Year 1)

Personnel	
Project director	95,000
Administrative assistant	40,000

Academic success coordinator	55,000
Transition coordinator	55,000
CSUF IT—Transferology—program analyst/part-time	65,000
Fringe benefits (full time staff)	152,592
Peer advisors (student assistants)	70,000
Personnel & Fringe Subtotal	**532,592**
Travel/Mileage	**20,000**
Other Direct Costs	
STEM Articulation Conference	5,000
Undergraduate Research Experience—student stipends	160,000
Undergraduate Research Experience—faculty lab supplies	48,000
Program events	20,000
Staff development	5,000
Office operational costs	5,000
Other Direct Costs Subtotal	**243,000**
Subcontracts	
Summative evaluation services	20,000
External evaluator	70,000
Citrus College	20,000
Cypress College	20,000
Fullerton College	20,000
Golden West College	20,000
Mt. SAC	20,000
Orange Coast College	20,000
Santa Ana College	20,000
Santiago Canyon College	20,000
Subcontracts Subtotal	**250,000**
Total direct costs	1,045,592
Indirect costs (15%)	126,089
TOTAL	1,171,681
Total 5-Year Amount	5,790,903

2. *Extent to which time commitments of the project director and principal investigator and other key personnel are appropriate and adequate to meet the objectives of the proposed project.*

The PIs, **Dr. Mark Filowitz,** associate dean of the College of Natural Sciences and Mathematics, and **Dr. Susamma Barua**, associate dean of the College of Engineering and Computer Science,

are each committed to 5% time for Project RAISE and have performed successfully in previous STEM projects with this allocation. Dr. Filowitz was the PI for an NSF STEP grant focused on STEM transfer student success (TEST:UP: Talent Expansion in Science and Technology—An Urban Partnership, 7/1/08-6/30/13) and has been part of the management team for CSUF's current HSI-STEM program, $(STEM)^2$, which has also been focused on STEM transfer student success. Dr. Barua currently coordinates academic support services such as peer mentoring/tutoring, academic counseling, cohort-based learning community and professional development workshops for the ECS Academic Catalyst for Excellence (ACE) Scholarship program (S-STEM: Scholarships in Science, Technology, Engineering, and Math grant, 2010–present). She coordinated summer research activities for students from Cypress College under an NSF CCRAA STEM grant (2009 and 2010) and implemented the activities for the Interdisciplinary Enhancement for Science, Math, and Engineering Majors component of the NSF-funded CSUF Undergraduate Reform Initiative.

The project director will devote 100% of her time to this project, with assistance from a 100% time administrative assistant; a 100% time transition coordinator and a 100% time academic success coordinator to meet the project goals, performance measures and objectives. The project director, Dr. Maria Dela Cruz, has worked in higher education for over 25 years, in all three systems of public higher education in California (CSU Long Beach and Fullerton, UC Irvine and Saddleback College). Of her 25-plus years of professional experience, Dr. Dela Cruz has spent over 13 years working with students in STEM disciplines, including the past five years as $(STEM)^2$ project director (U.S. Department of Education, Title III, Part F).

Quality of the Evaluation Plan: (Up to 20 points)

In determining the quality of the evaluation plan, the following factors are considered:

1. The extent to which the goals, objectives, and outcomes to be achieved by the proposed project are specified and measurable (Up to 5 points);

Dr. Karen Kim will serve as the external evaluator for Project RAISE. Dr. Kim has extensive program and grant evaluation experience with national, regional and local programs, with specific research and evaluation experience in STEM college pathways since 2003. Most recently, she was the external evaluator for CSUF's HSI-STEM grant, $(STEM)^2$, and principal investigator of a National Science Foundation study of undergraduate women and computing. Dr. Kim will conduct a comprehensive formative and summative evaluation of all project components that 1) employs a detailed evaluation plan that will monitor progress with respect to the program's goals, performance measures and objectives; 2) utilizes a mixed methods approach to obtain data on all aspects of the program that will allow the project team to track progress toward goals and to refine project plans as needed, and 3) evaluates the efficacy of the program through a quasi-experimental study so that lessons learned about the project can be shared with institutional and project partners as well as the broader educational community.

Project RAISE is guided by two primary goals: 1) to implement a coordinated suite of student-centered service programs that will improve academic success and promote retention and timely completion of STEM degrees by Hispanic and low-income students, and 2) to increase the number of Hispanic and low-income students attaining degrees in STEM fields. In order to track progress toward these goals, the evaluation plan will monitor progress with respect to both the performance measures and process objectives, which are aligned with the two primary goals. This will include analysis of institutional data as well as specific data collection for each Project RAISE program component. (See Table 6, Evaluation Plan, for a full list of outcome and process objectives, benchmarks, methods and timeline.)

Analysis of Institutional Data: Building on an existing process developed with the CSUF Office

of Institutional Research and Analytic Studies (OIRAS), the evaluator will obtain institutional data to track progress on program objectives and performance measures. In Year 1, these data will be used as a baseline to establish Year 5 targets. Specific benchmarks for each program objective and performance measure will be set based on the final Year 5 targets. Each year, annual growth rates will be calculated to determine if results are on track to achieve Year 5 objectives. Increases in Hispanic and low-income student transfer, enrollment and retention in STEM majors as well as GPA will be tracked each semester. All other performance measures will be tracked and reported annually. Student participation in Project RAISE activities will be monitored by program staff and included in the annual reporting.

Evaluation of Program Components: The evaluator will design a mixed methods evaluation tailored for each program component. Data will be triangulated using multiple measures and partitioned according to whether a student belongs to Hispanic and/or low-income categories. Indicators of progress toward achieving objectives will be: 1) numbers of Hispanic and low-income community college and transfer students participating in programs designed to engage STEM students and connect them with STEM careers (e.g., peer advising, summer research experiences, RAISE transfer program, workshops, summer internships); 2) increases in numbers of Hispanic and low-income community college students transferring to a four-year institution as STEM majors following outreach workshops, utilization of the Transferology system, and peer advising efforts; 3) increased retention of Hispanic and low-income transfer students in STEM majors at CSUF; 4) increases in the number of Hispanic and low-income transfer students in good academic standing after the first year after transferring to CSUF; and 5) increased graduation of Hispanic and low-income STEM majors. Student outcomes—including students' academic abilities and STEM-related skills, attitudes and beliefs, interests and motivations, as well as

insights about students' program participation—will be gathered through a combination of self-assessments, focus groups and surveys each semester.

2. *The extent to which the methods of evaluation are thorough, feasible, and appropriate to the goals, objectives, and outcomes of the proposed project (Up to 5 points);*

The evaluation will employ a mixed methods approach, including both quantitative and qualitative data collection to study the program from multiple vantage points (Creswell & Clark, 2011)—allowing for triangulation of the data to gain a thorough understanding of the program implementation (Creswell, 2008; Wolcott, 1992). This approach will enable the evaluator to assess specific project objectives related to each program component as well as the impact of the program on Hispanic and low-income STEM students. Data collection for the Undergraduate Research Experience and the Summer Internship Program will consist of pre/post student surveys, pre/post focus groups, student journal reflections and participant observation each summer. Post-program mentor surveys will obtain feedback about these programs and assessments of student mentees from participating faculty and internship mentors. In addition to a quasi-experimental study (described in section 3 below), the RAISE Transfer Program will be evaluated each semester through pre/post student surveys, student journal reflections and participant observation. Evaluation of peer advisors will be conducted through a self-assessment survey at the end of the first semester and a focus group at the end of the second semester. An annual spring survey completed by Project RAISE participants will provide feedback about all aspects of the program, including the community college workshops, peer advising and community-building activities. The implementation of Transferology will be measured by utilization rates by students and counselors at the participating community colleges and through interviews with users to obtain feedback on the ease of use and usefulness of the system. The STEM Articulation Conference will be evaluated through a post-program survey and participant

observation. Document analysis and additional methods will be implemented as needed to ensure a comprehensive assessment of the Project RAISE program. Data collection instruments will be developed based on existing instruments, validated when possible, and informed by relevant literature as the project commences. After data collection of each component, appropriate data analysis methods will be used—e.g., paired samples *t*-tests, correlations, cross tabulations, logistic regression, qualitative coding, qualitative comparative analysis, etc.

Through ongoing formative evaluation, the evaluator will assess the project's progress with respect to the original proposal and will provide feedback so that adjustments can be made when needed. Interim findings will be shared regularly with the project team and relevant institutional partners and documented in the annual report. The evaluation plan will follow reporting guidelines, and an annual report will be submitted each year and a final summative evaluation prepared at the end of the project. This summative evaluation will focus on identifying changes from the baseline data as well as progress toward each program objective. In addition, findings from the study component of the evaluation will be prepared for publication. with the goal of meeting the standards for submission to the What Works Clearinghouse. The evaluator will communicate with stakeholders throughout the process, providing updates on key findings and changes that should be considered, to ensure that their needs are being met and to address any potential problems. Ongoing meetings will take place between the PIs and the evaluator throughout the project no less than quarterly and as often as once a month. These sessions will be used for planning data collection and providing ongoing feedback about program evaluation findings and recommendations for program improvement. The evaluator and PIs will also disseminate evaluation findings through national and regional conferences as well as through publications.

3. *The extent to which the methods of evaluation will, if well implemented, produce evidence about the project's effectiveness that would meet the What Works Clearinghouse (WWC) Evidence Standards with reservations (Up to 10 points)*

A study that meets the guidelines of the What Works Clearinghouse Evidence Standards with reservations will be conducted to examine the impact of the RAISE Transfer Program on student learning outcomes. More specifically, a quasi-experimental study will be conducted to explore the effects of participation in the RAISE Transfer Program on students' retention, length of degree completion and GPA at the time of graduation. The RAISE Transfer Program is an especially important topic of study because it is a key element of the program that has potential for replicability in other institutions and because it will be a valuable contribution to the body of literature in the What Works Clearinghouse. Because students in the RAISE Transfer Program have diverse backgrounds, the study will use Propensity Score Matching to compare participants with non-participants with similar characteristics at the beginning of the program. Propensity Score Matching is an effective way to design a quasi-experimental study because it mimics some of the characteristics of a randomized control trial (Austin, 2011). Furthermore, post-matched control groups (DeAngelo & Hassan, 2009), and specifically Propensity Score Matching (Slovacek, Whittinghill, Flenoury &Wiseman, 2012), have been found to be effective ways to assess the impact of participation in undergraduate research programs for students from underrepresented groups. For this study, Propensity Score Matching will be used to compare RAISE Transfer Program participants with non-participants from the CSUF OIRAS database, reducing existing differences between these two groups and paying careful attention to reduce selection bias by ensuring equivalence of baseline characteristics and making statistical adjustments if needed. Using logistic regression, comparisons between the RAISE Transfer Program group and the matched comparison group will be made to compare retention rates,

mean time to degree and mean GPA at the time of graduation. Interim analyses will be conducted annually in Years 2-4 to identify and report statistically significant findings. The evaluator will conduct a full analysis in Year 5, as this will yield the largest sample sizes and therefore the greatest opportunity for using this method to compare participants with non-participants. Findings from this study will be informed by relevant literature and theory and developed into at least one manuscript designed for broad dissemination and submission to the What Works Clearinghouse.

CSU HSI-STEM Network

In addition to the evaluation efforts described above, Dr. Kim and the Project RAISE PIs will also participate in a broader effort led by the California State University (CSU) system, the CSU HSI-STEM Network. As the largest postsecondary educational system enrolling one of the largest populations of Hispanics and underserved STEM students in the nation, the CSU is committed to identifying and implementing evidence-based interventions and innovative solutions that improve student persistence and completion outcomes among its high-need STEM student populations. As part of this proposal, CSUF is committing to remaining part of the CSU HSI-STEM Network. The current summative evaluation being conducted by the Center for Evaluation and Educational Effectiveness (CEEE) at CSU Long Beach of the seven HSI-STEM grants awarded to CSU campuses during the last funding cycle has highlighted both the potential and benefit of collaboration to stringently test promising and validate proven practices that promote resilience and academic success in high-need students and racial/ethnic minorities at scale across the 18 CSU HSI-STEM campuses. The CSU Chancellor's office has committed to continuing to act as a clearinghouse for sharing information and providing summative and

formative evaluations from CSU campuses that remain successful in HSI-STEM activity funded by the Department of Education. CSUF's role as a continuing member in this effort will include:

1. ***Network STEM Summit***: Participation in an annual two-day summit held at the CSU Chancellor's Office. The summit will provide a forum to disseminate information on effective practices in serving students, share evaluation strategies and explore the intervention success of high-impact practices being implemented by the CSU. At least two participants (e.g., the project director, evaluator and/or principal investigator) from Project RAISE will attend each summit.
2. ***Multi-Site Evaluation***: Members of the network will also support and participate in a multi-site summative evaluation of project impact designed around What Works Clearinghouse standards. The evaluation will focus on one to three interventions common across groups of projects (e.g., undergraduate research and mentoring programs) to facilitate robust data analysis. Identifying the foci of the evaluation will be a major part of the Year 1 summit, once it is clear which projects have been funded across the CSU. Years 2-4 of the multi-site evaluation will include formative components to document implementation lessons as well as preparation for the summative analyses. Years 4 and 5 will then focus on the summative studies that document the impact of the intervention(s). Partners in this evaluation have agreed to dedicate up to 2% of their total budget to this evaluation, with the final percentage to be determined based on the number of projects funded.

As an indication of its commitment to this venture, the CSU Chancellor's Office will support the network by hosting the annual summit and providing hospitality during the meetings. The results and best practices drawn from the multi-site evaluation will be shared with the 23 campuses in the CSU system as well as the Department of Education.

Table 6: Evaluation Plan

Goal	Performance Measures	Benchmarks	Data and Methods	Timeline
GOAL/Absolute Priority 1 **Student centered services, tutoring, counseling and student service programs designed to improve academic success, including innovative and customized instruction courses designed to help retain students and move the students rapidly into core courses and through program completion.**	*Performance Measure 1:* Project RAISE will result in a 15% increase in Hispanic and low-income students participating in the high-impact practice of undergraduate research from CSUF's regional feeder community colleges.	Change in enrollment in each program annually	Tracking of participation from program staff with evaluator	Annually – each fall
	Performance Measure 2: 75% of Hispanic and low-income students who participated in the RAISE Transfer Program (RTP) will be in good academic standing after the first academic year.	Change in number of students who have a GPA of 2.0 or greater	CSUF institutional data	Annually – each fall
	Performance Measure 3: Project RAISE will result in a 20% increase in Hispanic and low-income STEM major transfer students on track to complete a STEM field degree within three years from their transfer date.	Change in enrollment annually	CSUF enrollment data	Annually – each fall
	Performance Measure 4: Starting in Year 3, Project RAISE will result in a 20% increase in Hispanic and low-income students who participated in grant-supported services or programs and completed a bachelor's degree.	Change in enrollment in each program annually Change in STEM student graduation annually	Tracking of participation from program staff with evaluator CSUF college graduation data	Annually – each fall
Process Objectives for Goal 1	1. Implement RAISE Transfer Program (RTP) create a sense of	Number of students participating	Pre/post surveys Journal reflections Participant observation	Fall and spring semesters each year

	community among STEM transfers at CSUF; advise Project RAISE transfer students about the resources available; prepare them for faster pace of coursework; and provide strategies to help them succeed in STEM majors at CSUF.		Quasi-experimental study	
	2. Create a Summer Internship Program at CSUF for RAISE Transfer Program students to prepare them for the STEM workplace and give them an opportunity to take part in hands-on STEM work experience in industry.	Number of students participating	Pre/post surveys Pre/post focus groups Journal reflections Participant observation Mentor surveys	Each summer
	3. Expand CSUF Transfer Resource Center (TRC) services to provide success workshops for RAISE Transfer Program and all STEM transfer students.	Number of workshops Number of students participating		Fall and spring semesters each year
GOAL/Absolute Priority 2 **(1) Increase the number of Hispanic and other low-income students attaining degrees in the fields of science, technology engineering or mathematics**	*Performance Measure 1:* Project RAISE will result in a 20% increase, over the five-year grant period, in the number of Hispanic and low-income full-time STEM degree-seeking undergraduate students enrolled in STEM bachelor's degree programs at CSUF.	Change in enrollment annually	CSUF enrollment data	Annually – each fall

	Performance Measure 2: Project RAISE will result in a 10% increase in Hispanic and low-income first-time, full-time STEM field degree-seeking undergraduate students at CSUF who were in their first year of postsecondary enrollment in the previous year and are enrolled in the current year who remain in a STEM field degree program.	Change in persistence annually	CSUF persistence data	Annually – each fall
	Performance Measure *3*: Project RAISE will result in a 10% increase in Hispanic and low-income first-time, full-time degree-seeking undergraduate students graduating with a STEM degree within three years of enrollment at CSUF.	Change in STEM student graduation annually	CSUF college graduation data	Annually – each fall
	Performance Measure 4: Project RAISE will result in a 10% increase in Hispanic and low-income students transferring successfully to CSUF from a participating two-year institution and retained in a STEM field major.	Change in STEM transfers annually	CSUF transfer data	Annually – each fall
Process Objectives for Goal 2	1. Implement an Undergraduate Research Experience at CSUF for RAISE community college students in each year of the project to introduce them to research opportunities and faculty	Number of students participating	Pre/post surveys Pre/post focus groups Journal reflections Participant observation Faculty mentor surveys	Each summer

	mentors and to excite them about STEM with hands-on experience .			
	2. Provide CSUF peer advisors at each partner community college each semester to conduct outreach workshops to improve the knowledge of STEM careers, transfer process and research opportunities.	Number of workshops conducted Number of students participating	Peer advisor fall survey Peer advisor spring focus group Annual Project RAISE participant survey	Fall and spring semesters each year
***GOAL/Absolute Priority 2*(2) Develop model transfer and articulation agreements between two-year and four-year institutions in such fields.**	*Performance Measure 1:* Pilot Transferology at the eight Project RAISE partner community colleges and have 50% of STEM students utilizing Transferology by Year 5 of the grant.	Number of students participating	Tracking utilization rates Interviews with users to obtain feedback	Fall and spring semesters each year
	Performance Measure 2: Develop and implement a STEM Articulation Conference hosted by CSUF and attended by STEM deans, faculty, counselors and staff from the eight Project RAISE partner community colleges, to provide up-to-date information on STEM transfer requirements and develop draft articulation agreements.	Number of articulation agreements developed	Post-conference survey Participant observation	Annually – each fall