UC DAVIS
UNIVERSITY OF CALIFORNIA

Implementation Plan for the 2020 Initiative

Year 1: 2013-2014

Executive summary

The decision to move ahead with the 2020 Initiative was formally announced in March 2013 in a public statement by Chancellor Katehi. Over the next seven years, it is anticipated that the campus will grow by about 20% in undergraduate enrollment above the levels of Fall 2011, and will experience coordinated growth of a similar magnitude in most other aspects of the university's operations. In this planning document, we discuss that growth in a defined set of operational areas: undergraduate enrollment, graduate enrollment, faculty, staff and physical infrastructure. In reality, each of these areas is integrated closely with the others, and the most critical challenge will be to manage growth in an integrative manner that maximizes opportunities, anticipates and responds to challenges that may arise, and culminates in a university that is not just larger but also stronger and better situated to lead the world in creation and application of new knowledge.

We expect that the growth process will be highly iterative, and that the plan will adapt nimbly to changing circumstances as the initiative proceeds. The increased emphasis on enrollment of students from around the globe under the 2020 Initiative will also lead to a much more internationalized campus, which will generate important opportunities but also challenges, as the campus adapts to levels of international enrollment not seen before in the history of UC Davis.

During the months leading up to the decision to proceed with the 2020 Initiative, and in conjunction with the university's commitment to provide a solid foundation for growth, significant investments were made in several campus programs. One area of major investment was in the Office of Admissions, to ensure that the campus would be able to recruit a strong group of students from around the state, nation and world and thus create a deep pool of prospective students supportive of initial enrollment goals. A second area of significant investment was in bottleneck courses for which insufficient offerings could potentially limit student progress to their degrees, to ensure that increased enrollments would not have a negative impact on the student experience. A third area was in student advising for students in each of the colleges and divisions, with a goal of ensuring student success. A fourth area of investment was in resources to support the experience of international students, to ensure that we would be prepared to support both the personal and academic experiences of these students, who sometimes face unique challenges, at the same high standards as our other students.

Two particularly critical areas of investment remain as we begin the process of growth in our undergraduate and graduate enrollments: investments in personnel (faculty and staff) and investments in infrastructure, including classrooms and research space. These very expensive investments will be made simultaneously with the growth in enrollment, which is providing the revenue to support them, meaning that some transient accommodations will be required in the interim. It is urgent that hiring and construction begin quickly, but it is also critical that planning for these be careful and comprehensive, given that both will have significant impacts for decades to come.

Success of the 2020 Initiative will require the assistance and input of a very large number of faculty, staff and students in dealing with the challenges that will arise across campus. There are significant

opportunities for positive change inherent in the growth process, but also some challenging circumstances; a high degree of creativity will be important in finding sustainable solutions that support both growth and increased quality.

The implementation plan is organized according to major aspects of 2020-related growth, including undergraduate enrollment, graduate enrollment, faculty hiring, staff hiring, and physical infrastructure (teaching, research, student and campus life).

2013-14 Action plan

The additional dimension that the 2020 Initiative brings to the standard planning and operational activities of the campus is growth. Some aspects of this growth are already fairly clear at least at the campus level, e.g., the trajectory in undergraduate admissions needed to achieve the final growth target for 2020. Other aspects, such as the magnitude of increases in graduate enrollment; the distribution of both new enrollments and new faculty among the various colleges and schools; the investments in staff required to support growth; and the precise nature of the classrooms, research spaces and other infrastructure to be constructed remain areas of active discussion and planning. For the coming year (2013-2014), we anticipate the following major actions to be undertaken:

Undergraduate enrollment

- Recruit, admit and enroll an increased number of highly qualified students in accordance with the 2020 enrollment plan.
- Continue to develop strategies to increase recruitment and yield activities, with major goals being to increase the diversity of origin of our international students, and to continue recent trends in recruiting and enrolling increased numbers of under-represented students from California.
- Analyze the relative performance and academic behavior of our 2011 and 2012 cohorts of international students and direct resources to address any challenges evident from the analysis.
- Analyze the pattern of distribution of international students among the various colleges, and increase engagement between the Provost and colleges/divisions about plans for growth in enrollment and faculty hiring.

Graduate Enrollment

- Engage with the Provost's Implementation Advisory Committee for Graduate Education and other relevant groups including Graduate Council in developing an outline for growth in graduate education, and implement initial recommendations.
- Engage with all the professional schools to determine their capacity to partner in the enrollment growth aspects of 2020; this will involve graduate education (and in some cases the professional degrees in a narrow sense), but may also involve teaching undergraduates, participation in one or more of the "initiatives", etc.

- Undertake prospective analysis of future TA needs, including an assessment of current demand for TA positions by the extant graduate student population, and align with plans for graduate education

Faculty hiring

- Complete searches for new faculty authorized for 2013-2014, with concurrent analysis of the relationship between net hiring and 2020 enrollment growth to date.
- Authorize searches/reauthorize continuing searches for 2014-15 to produce a net gain (after separations are taken into account) in ladder faculty that takes into account enrollment growth.
- Initiate individual and group discussions with college deans and faculty focused on aligning college budgets with increased rate of hiring in excess of separations.
- After consulting broadly, devise the criteria for the first of the three "New Initiatives" [placeholder name] calls during the life of 2020, send out the call, appoint a committee to advise the Provost on which proposals to pursue, and authorize these searches along with the college/division/school searches so that these positions too can be searched in 2014-2015 for arrival starting July 1, 2015

Staff hiring

- Complete hiring of staff to support international students (SISS, advising) and ongoing analysis of future needs in this area.
- Complete consultation with all deans, unit directors and vice chancellors identifying staff positions critical for supporting growth

Physical Infrastructure

- Initiate and complete a general space audit of the campus, in order to support discussions on the balance between new construction and remodeling/repurposing/renovation in supporting 2020 growth.
- Move forward with discussions regarding new classroom space through construction or remodeling; make decisions and begin construction in alignment with budget projections.
- Move forward with discussions across campus regarding space planning for 2020 growth, including specifically plans for the next science (STEM) building, aligning 2020 program needs with budget projections.
- Move forward with discussions about development of additional office and studio space for non-STEM hires and additional staff.
- Develop growth plans for campus infrastructure in collaboration with all deans, unit heads and VCs, with a specific focus on identifying the most critical bottlenecks that will develop in the initial phases of growth.

General issues

- Appoint the 2020 Implementation Advisory Committee to review progress and provide accountability on an ongoing basis.

- Provide by September 1, 2014 the first progress report on 2020, including enrollment, hiring, construction and budget.

The background for each of these action items or "deliverables" for 2013-14 is to be found in the text that follows, including details about the parameters that bear on the various types of growth and expansion under 2020, the likely phases of growth throughout the entire initiative, the way we will approach ranges and rates of growth, and the interactions between the various aspects of growth that must be kept in mind as we traverse the coming years.

Introduction

At the 2011 Fall Convocation, Chancellor Katehi proposed the idea of responding to challenges facing the university through planned growth rather than further cuts. By leveraging the infrastructure and capacities of the campus to achieve greater financial stability while simultaneously enhancing the national and international diversity of our student body, we could benefit our academic mission, becoming a better, stronger and more impactful version of our current state by 2020.

In November 2012, the Joint Report of the 2020 Task Forces was released to the campus (http://chancellor.ucdavis.edu/local_resources/pdfs/joint%20-report%20-2020-task-forces.pdf). In this report, the task forces endorsed the idea of campus growth, with the understanding that the campus would follow three general principles in its implementation of the 2020 Initiative:

(1) That the campus should adhere closely to the Academic Senate (BOARS) doctrine of "compares favorably," i.e., that the admitted national and international students compare favorably to California residents competing for admission.
(2) That the campus should ensure that the quality of the student experience will be enhanced by the growth in student enrollment and that the necessary investments in staff, faculty and facilities should be made in a timely fashion to ensure this outcome.
(3) That growth in enrollment should proceed only if a model could be implemented that resulted in increased financial stability of the university (i.e., no "growth for the sake of growth") while adhering to principles 1 and 2.

After further consultation by the Provost, Advisor to the Chancellor and Provost Ken Burtis, and Associate Executive Vice Chancellor Karl Mohr, among others, with the Academic Senate, other campus constituencies and local community leaders, the Chancellor announced in March 2013 that the campus would move forward with the 2020 Initiative. In alignment with the recommendations of the joint task force, the campus has initiated a more detailed planning process for the initial increases in enrollment under the 2020 process, and has begun making investments described below specifically targeted at shoring up the foundations of campus units that will be critical for supporting the growth in campus enrollment

Although we will keep careful track of the impact of 2020 growth and investments targeted to support that growth, it will not always be possible to distinguish "2020" actions and investments from the ongoing operation of the university, and that it is as is should be. Indeed, in many cases the challenges inherent in 2020 growth may lead to investments and improvements that would have been eventually undertaken even without growth, albeit in an accelerated fashion. Enrollment management and faculty hiring are both standard aspects of university operations, and the mechanics of these processes will not differ, except in magnitude, between 2020-related actions and those that would occur in the normal course of business. Thus, the primary impacts of the 2020 Initiative on campus planning will be in developing targets for net growth in campus operations over the coming years, and in assuring that the appropriate investments are made to support the general principles stated above. It is important to remember, however, that the 2020 process is not independent of many challenges and issues that the university continues to face. Although 2020 revenues are currently projected to exceed the investments needed to support the proposed growth, the overall campus budget remains significantly dependent on uncertain future revenues from state general fund support and student tuition, as well as rising fixed costs associated with factors such as retirement benefits and health care. Net revenues from the 2020 growth will no doubt be helpful in stabilizing the financial situation, but may or may not be sufficient to address all future challenges.

The 2020 Initiative will be iterative in nature, both in planning and implementation. Every year, decisions about the following year's student enrollment and associated growth will be responsive not only to the final targets envisioned for 2020, but also to annual metrics and outcomes that demonstrate the ongoing success of the campus in developing the human and physical resources necessary to support growth while ensuring student success and the excellence of the university.

The growth envisioned in the 2020 Initiative will impact essentially every aspect of campus operations, including undergraduate enrollment, graduate enrollment, faculty and staff hiring, demand on classrooms, research lab space and offices, and the general infrastructure associated with student and campus life (housing, dining, transportation, utilities, recreation, safety, health, etc.). Literally no aspect of campus operations will be unaffected, and it will be critical to anticipate impacts and address them as efficiently as possible while the initiative proceeds.

The operations of the campus are intricately interwoven, and although it is possible to discuss implementation of growth from the specific perspectives mentioned in the previous paragraph, as is done in this report, it will be critical to try to anticipate the less obvious consequences that may arise in one aspect of operations due to changes in another. With sufficient planning many of these consequences may be predicted and either embraced or mitigated, as appropriate, but others may not, which is why implementation planning will remain an iterative and dynamic process, with annual readjustments to ensure that the guiding principles are adhered to. It is likewise important to note that external events beyond the control of campus stakeholders may influence the trajectory of 2020-related growth – new areas of research, changing social trends, political events around the world, to name a few – and the campus will need to be flexible and nimble to respond to them. Change is sweeping higher education, and although the 2020 process neither accelerates nor decelerates the rate of change, it

does give us some additional tools and resources with which to respond to the forces of change and shape an ever-evolving UC Davis in the years to come.

The implementation plan presented below begins with the one variable that can be determined in advance with the greatest certainty: undergraduate enrollment. The process by which freshman and transfer students are admitted is complex but straightforward and the expertise of the admissions and institutional analysis staff results in a fairly high degree of accuracy in delivering new and continuing student enrollments close to the targets that are agreed upon each year. Thus, a set of undergraduate target enrollments can be proposed that extends to 2020 and provides a basis from which to discuss other aspects of implementation. Based on undergraduate enrollment growth, it is possible to discuss many other contingent aspects of growth, from growth in the number of faculty and classroom seats to research space and staff hiring, among others. In many cases, however, planning for these aspects of growth will be dependent on decisions yet to be made that will reflect the complex array of priorities and plans of the university and of its many academic and administrative units, priorities and plans that involve parameters distinct from undergraduate enrollment.

For example, research space for biology and engineering faculty is dramatically different from that used by faculty in most of the humanities and humanistic social sciences, requiring a much greater investment of time and capital to deliver. Specific long-term planning for construction of space to support new faculty thus depends on projecting the number of faculty to be hired in each discipline, which itself depends on many variables, including campus and college-level strategic and academic plans and visions, the particular pattern of growth of both undergraduate and graduate student enrollments in that discipline, the budgetary consequences of growth in different areas, large-scale growth in philanthropic support for specific disciplinary areas, retirements and many other factors. As a consequence, detailed plans for some aspects of 2020-related growth must await decisions yet to be made addressing these factors. One could theoretically develop a plan based on a specific assumption; for example, absolutely proportionate growth in every discipline to that currently extant at UC Davis. Indeed, this was the heuristic model used of necessity for the initial estimation of the financial consequences of various 2020 enrollment scenarios presented in the Joint Report of the 2020 Task Forces. However, since in reality these decisions will be based on factors in addition to total student enrollment, it is important that the discussions leading to these decisions not be unduly influenced by the development of specific plans based on any single, arbitrary model. Therefore, for the purposes of this document, the implementation plan will focus more on process than on detailed projections, particularly for years beyond 2014, and will address some of the discipline-dependent second-order needs generated by enrollment growth (e.g., construction of research space) in more general terms. This process itself already invites units to think carefully about how they propose to grow and thus already promotes strategic focuses and emphasis, with differential investment of resources, within existing units. In addition, the process will, as described below, also include subroutines that will permit and invite faculty to propose yet broader shifts in emphasis and balance at and above the level of college/school/division. Investments in some of these areas will follow after a vetting process also referenced below.

The plan as presented below is organized according to major aspects of 2020-related growth, including undergraduate enrollment, graduate enrollment, faculty hiring, staff hiring, and physical infrastructure (teaching, research, student and campus life). For each aspect, as appropriate, the current status is noted, followed by a description of recent investments in preparation for growth, plans for the coming year, ideas about the following year and a description of the process for determining actions in the later years. Over the years, and as subsequent annual implementation plans are produced, the long introductory section required in this first iteration of the plan can be expected to become shorter as the language of "projection" and "possibility" yields to reports on the specifics of the growth, in all dimensions, that has been achieved.

Undergraduate student enrollment

The most straightforward variable addressed by the 2020 Initiative is undergraduate enrollment growth, which is the primary (but by no means sole) determinant of all other aspects of growth under the 2020 Initiative. Even as we acknowledge the complexity of the admissions process, growth of undergraduate student enrollment is the predominant and most predictable and immediate source of new revenue that will support growth and significantly internationalize the campus.

It is proposed under this plan that the three-quarter average enrollment of undergraduates at UC Davis be increased to approximately 28,850 students, which represents a growth of 5000 students above the number enrolled in 2011-2012. Between 2011 and 2020, the total percentage of national and international undergraduate students on campus is envisioned to rise from just over 4% (it is estimated at 7% for Fall 2013) to approximately 19%, with the absolute numbers of students rising by about 500 California students and 4500 national and international students. The supplemental tuition paid by the latter group (currently $22,878 per year) will help stabilize the financial future of the university, and the diversity of this group with respect to their place of origin will provide our California students with a richer campus cultural environment and enhance the quality of their undergraduate experience, indeed, of all our experiences.

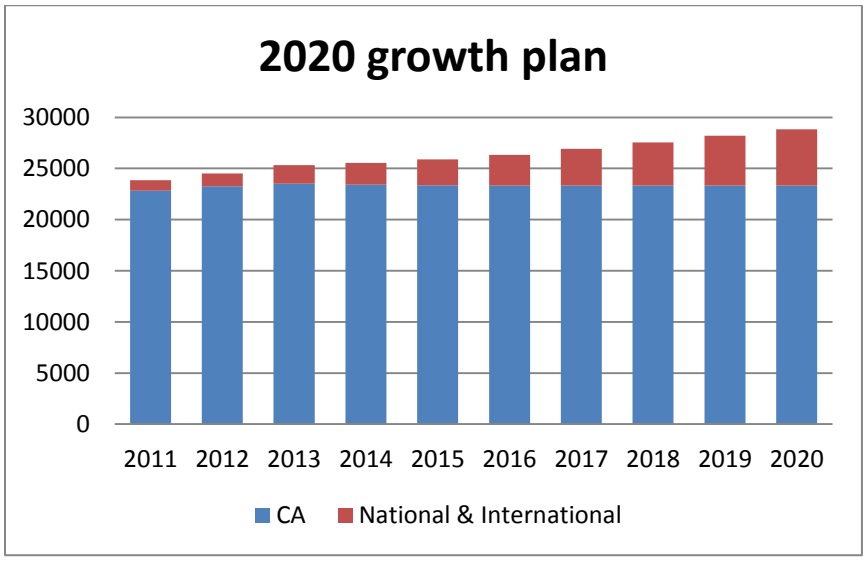


Figure 1. Total three quarter average enrollment proposed for UC Davis under the 2020 plan

The 2020 task forces were deliberate in their decision to propose that an increase in the proportion of national and international students at UC Davis occur through growth rather than displacement of California students. This effort to sustain the enrollment of California students reflects the commitment of the campus to educating the state's residents, despite the fact that we do not receive all the funding for our current cohort of California undergraduates that traditional formulas used by both the state and the university ought to have guaranteed. Indeed, UC Davis has enrolled the greatest number of California resident students among the UC campuses in the Fall of each of the past three years (Figure 2), and takes pride in that distinction even if some may regard it as imprudent given state underfunding.

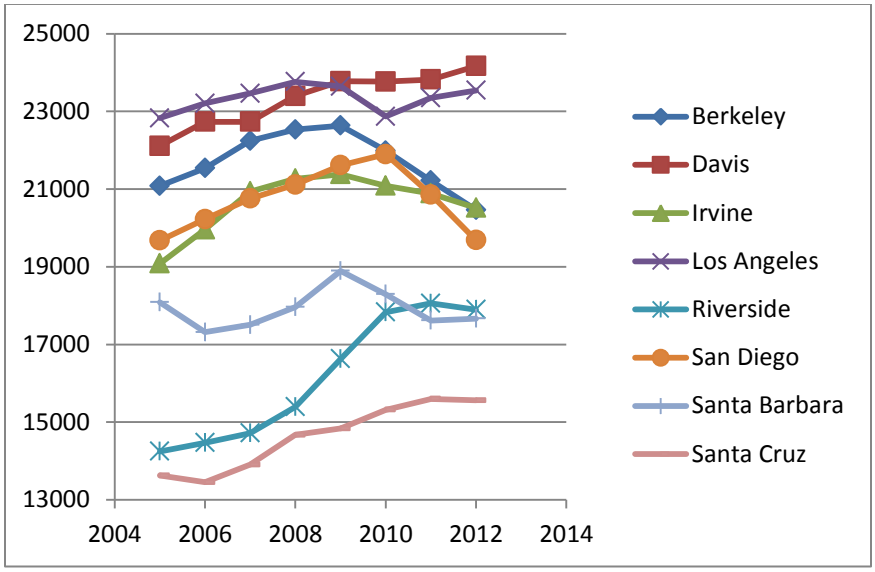


Figure 2. Fall enrollment[1] of resident (California) undergraduates from http://legacy-its.ucop.edu/uwnews/stat/

[1] During this period, California undergraduate enrollment at UC Merced rose from 831 to 5319.

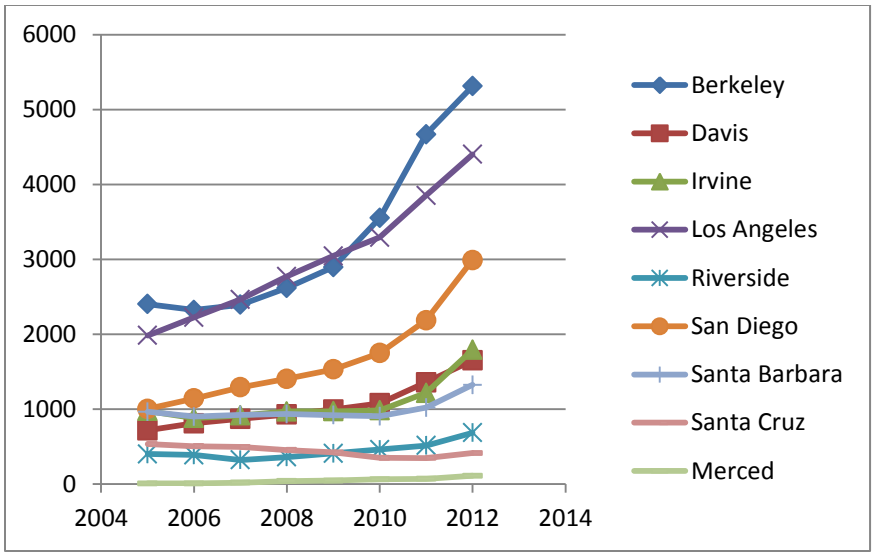


Figure 3. Fall enrollment of non-resident (national and international) undergraduates from http://legacy-its.ucop.edu/uwnews/stat/

As noted in Figure 3, almost all of the campuses in the UC system have been increasing their enrollments of national and international undergraduates over the past decade; not all, however, have done so against a backdrop of sustained access for California residents (Figure 2).

Undergraduate enrollment levels are determined in a complex process that begins shortly after the admissions process is completed for the previous year. During the year, the Office of Undergraduate Admissions initiates recruitment activities to generate the pool of applicants from which the next year's new students will be chosen. The goal is to optimize the excellence and diversity of each successive year's entering classes, using a wide array of approaches to recruitment of applications and a holistic review process (http://admissions.ucdavis.edu/admission/freshmen/fr_selection_process.cfm).

Targets for undergraduate enrollment each year are set through multiple discussions between several groups and individuals representing the central administration, the colleges, the Academic Senate (including the Committee on Admissions & Enrollment), Undergraduate Admissions and the Division of Budget & Institutional Analysis in Administrative and Resource Management. Factors taken into consideration include aspirational targets (e.g., planned growth for freshman and transfer students), capacity (by discipline), budgetary ramifications, and the depth of the applicant pool (how do the target numbers sought relate to the size and quality of the pool of students applying?). In this respect, it is gratifying to report that the average SAT of admitted freshman international students increased from 1880 in 2011, to 1918 in 2012, to 1935 in 2013.

Through an iterative process, final target numbers are determined for each college, and the Office of Admissions endeavors to realize these targets through the recruitment, review, yield and enrollment processes. California, national and international applicant pools differ with respect to the fraction of

those who apply who are admitted (selectivity), as well as the ratio of those who enroll to those who are admitted (the "take rate"); it is worth noting that California students accept offers of admission and enroll at a higher rate than international students. The Office of Admissions and staff in the Division of Budget & Institutional Analysis (BIA) work closely together to model the process and manage admissions to achieve the enrollment targets put forward each year.

The proposed 2020 enrollment targets are based on total undergraduate student enrollment (Figure 1), but there is a complex relationship between enrollment of new freshman and transfer students each year and the total enrollment of undergraduate students on campus at any one time. Total campus enrollment is dependent on multiple variables, including the number of new students who enroll, the number who persist and the number who depart through either graduation or withdrawal (the latter including those who transfer to other institutions). The behavior of different student cohorts varies significantly; e.g., each class level and each major persists at different rates, and transfer students differ in behavior from those who enter as freshmen. Furthermore, if an unexpectedly large or small cohort enrolls in a particular year, there is an impact on future new enrollments for several years as that class works its way through the system (i.e., a "pipeline" effect). All these factors must be accounted for to model the numbers of new students to admit and enroll each year to achieve total campus enrollment targets.

Based on recent student patterns of enrollment and persistence, one can model the number of annual entering freshmen and transfer student numbers that would need to be enrolled to achieve the stated final goal of the 2020 Initiative (Figure 4). It is important to keep in mind that this model must be adjusted each year to account for any deviations in outcomes in the preceding year.

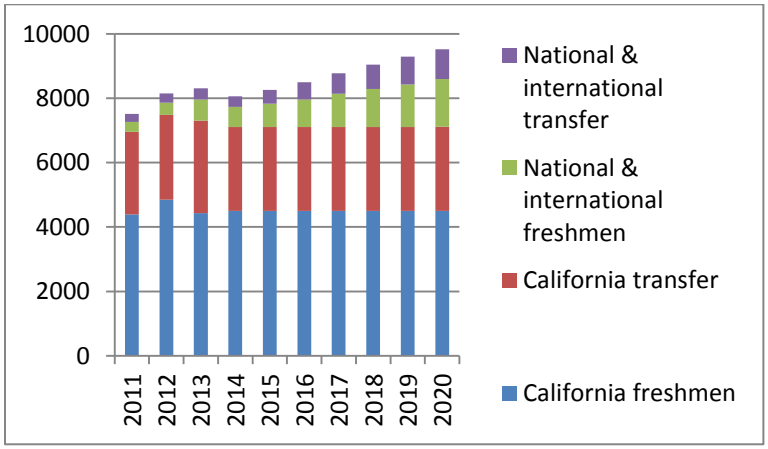


Figure 4. A model for Fall enrollment that achieves the 2020 goals of 4500 additional national/international students and 500 additional California students (three-quarter average undergraduate student enrollment) by 2020.

Many variables can impact enrollment numbers from year to year; for example, the unexpected jump in enrollment of California freshman students in Fall 2012 (Figure 4; blue bar) was the result of an unanticipated increase in the take rate of admitted students, perhaps resulting from more aggressive

yield activities but possibly also an effect of the continually rising reputation of UC Davis. Comparing Figures 1 and 4, it is useful to note that although total enrollment of California students is modeled to rise by 500 students from 2011 to 2020, actual Fall admissions of California undergraduates rose dramatically in 2012 but then falls and remains relatively constant, while still yielding 500 additional students in total enrollment over the 2011-2020 interval (Figure 3). As the campus experiments with new approaches to recruitment of national and international students, and as other practices are modified, it can be expected that similar unexpected events may occur in the future, making adjustments in subsequent years necessary to keep our growth pattern trending to the proposed end state. We are also, like many institutions, seeking to improve time-to-degree rates, already on the rise; to the extent we make further progress in this area, numbers of admits may need to be adjusted upwards to replace students who are graduating earlier than now, although if we improve retention rates, we will lose fewer students before graduation. Suffice it to say: this is a complex and interactive process, requiring tactical responses based on good data and sophisticated analysis.

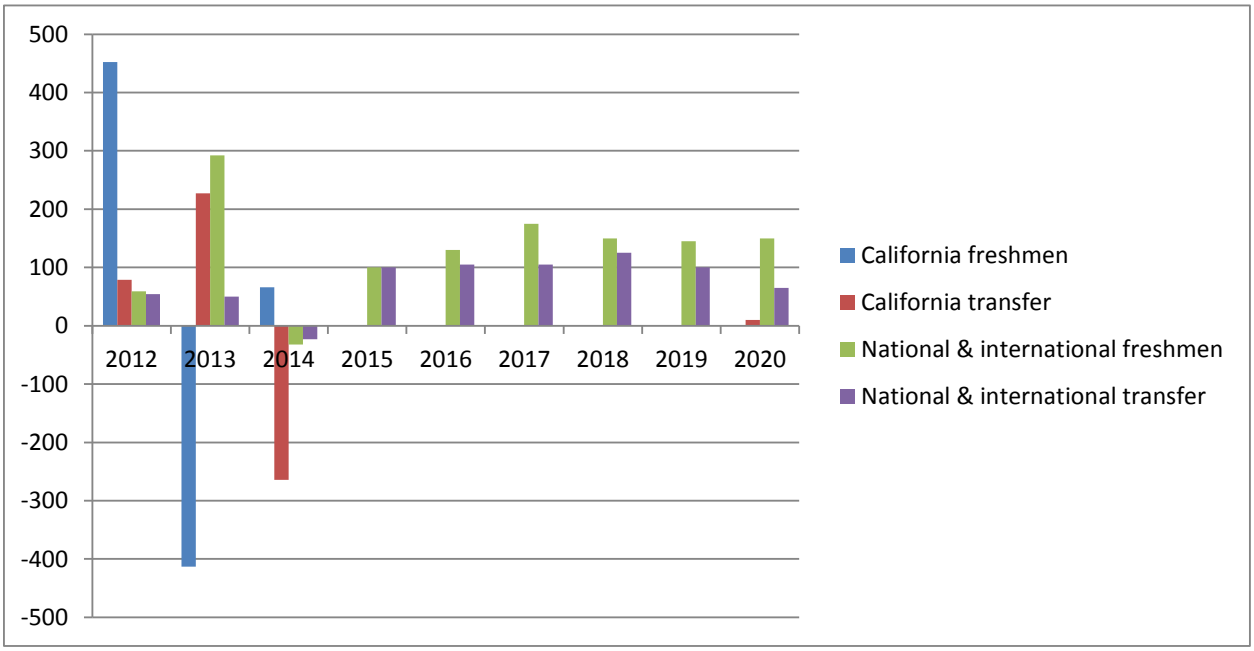


Figure 5. Proposed year over year growth in the fall quarter enrollment of all freshman, only national/international freshman, all transfers or only national/international transfers.

Different aspects of enrollment , for example total campus enrollment, total international student enrollment, total enrollment of students paying supplemental tuition, new freshman enrollment, new transfer student enrollment, fall enrollment vs. three quarter average enrollment, are of greatest relevance to various priorities. For example, the total campus enrollment of supplemental tuition-paying students (national and international) is most relevant to determining the financial impact of these students on the campus budget. Alternatively, total international student enrollment is more relevant to internationalization goals, to planning for the necessary level of staffing in the Services for International Students and Scholars (SISS) office, and to efforts to improve advising services for international students where national students are less likely to require special assistance. For the staff putting on orientation

programs, the fall enrollment numbers of all new students are most critical, whereas for other general student services, the more relevant number might in some cases be the three-quarter average total enrollment, since these programs support all students, and because using fall quarter numbers might overestimate the average need for services due to the decline in student enrollment as each year proceeds. For groups trying to strategically plan program augmentation to accommodate increasing student numbers, year over year growth might be most critical (Figure 5). For example, the model predicts that in 2016, there will be 130 more national and international freshman students and 105 more national and international transfer students enrolled at UC Davis than there were the year before. As noted above, unexpected factors can sometimes create the need for adjustments in following years: e.g., increased yield activities led to an unanticipated growth in California freshmen in 2012, which required a downward correction in the number of California freshmen in 2013 to maintain levels at the intended target (Figures 4 and 5).

Because of the natural variations from year to year, in describing progress towards achieving the undergraduate enrollment goals of 2020, it is most useful to focus on the long-term goal (growth in total enrollment of 500 California students and 4500 national/international students by 2020). However, the rate of approach to that goal remains a critical variable in assuring that investments necessary to support those students are made in a timely fashion.

While overall growth in undergraduate enrollment at UC Davis is relatively straightforward to model, the proportion of growth that might occur in different disciplines is a more complex issue. The models presented above do not specify the undergraduate enrollment growth that will occur in specific colleges or majors, which may reflect an array of variables including:

- Academic plans at the university and college level
- The depth and quality of the applicant pool in different disciplines
- Capacity issues in specific disciplinary areas related to faculty and/or infrastructural resources (e.g., lab classrooms, studio spaces)
- Disproportionate demand for specific majors, particularly among international students, who will comprise the greatest fraction of new growth in undergraduate enrollment, but not limited to them, for U.S. students (whether California or national students) may start to trend in new directions based on their perceptions of their need to compete for jobs in certain fields
- The possible impact of new majors, e.g., an undergraduate business major if developed

The majority of these variables are independent of the national origin of the new students admitted each year. However, given that the great majority of the “new” students represented by 2020 will be international students, it is perhaps useful to consider how the current academic choices of these students compare to their California peers. Understanding these differences will be helpful in projecting and accommodating the impact of the growth in undergraduate enrollment that will occur, particularly in certain key majors. Note also the use of the word “current”: as we further diversify the international students according to their country of origin, we may see the pattern of major choice evolve.

The most commonly chosen first majors of entering international freshmen and California freshmen are presented in Table 1 for majors comprising over 2% of that cohort. It is notable that there are some significant differences between these populations: e.g., 15% of entering international freshmen are Economics majors, compared to 3% of California freshmen. In addition to other specific differences, six of the most common majors for international students do not appear in the top choices for California students; the converse is true for five other majors.

2013 projected 1st majors above 2% for freshman international students	Approx. %	2013 projected 1st majors above 2% for freshman California students	Approx. %
Economics	15	Biological Sciences	10
Undeclared—Social Sciences	8	Biochemistry and Molecular Biology	5
Mathematics	6	Animal Science	5
Biological Sciences	6	Undeclared—Life Sciences	5
Undeclared—Physical Sciences	5	Neurobiology, Physiology, and Behavior	5
Biochemistry and Molecular Biology	3	Undeclared/Exploratory Program	5
Civil Engineering	3	Psychology	3
Electrical Engineering	3	Economics	3
Mechanical Engineering	3	Undeclared—Social Sciences	3
Applied Mathematics	2	Undeclared—Humanities	3
Psychology	2	English	2
Undeclared—Life Sciences	2	Undeclared—Physical Sciences	2
International Relations	2		

Table 1. Most common majors for international and California entering freshman students

It is important to note that the absolute numbers of students involved in these issues is still a minority of the total students enrolled, and will remain so, since the undergraduate population will remain less than 20% international students. However, since the majority of the growth until 2020 will be international students, understanding the impacts of this variable will be important in developing strategies to accommodate that growth and certain programs are already calling for, and receiving, assistance in responding to the demands now being made upon them.

This issue can also be considered at the level of the colleges and divisions by including all possible majors. Figure 6a depicts the number of California, national and international freshman students enrolling in each college, based on projections for 2013. While the total number of entering California freshmen (4600) is much larger than the number of entering international freshmen (390) at this early stage in the 2020 process, there could be significant impacts on student distribution among colleges if current trends continue. Of particular note is the greater proportion of international freshmen choosing to matriculate in MPS and DSS, and lesser proportion in CBS, CAES and HARCS, relative to California freshmen (Figure 6b). These differences are much less significant among transfer students (Figure 7) which somewhat reduces the overall impact on distribution of new students. However, by the end of the 2020 Initiative, these differences, if not modulated in some way, will have measurable results on student distribution among the colleges and divisions. The Provost is engaging in discussions with all colleges

and divisions and specifically seeking to know how those units not yet experiencing proportionate growth in international students might think about highlighting majors and programs that would attract more such applicants to their college or division.

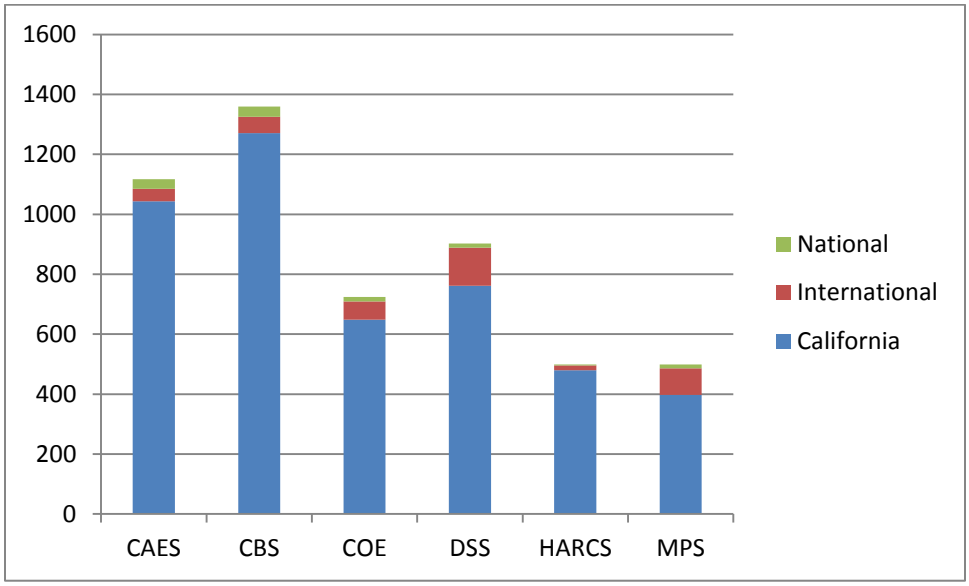


Figure 6a. Projected number of California, national and international freshman enrollees by college for Fall 2013.

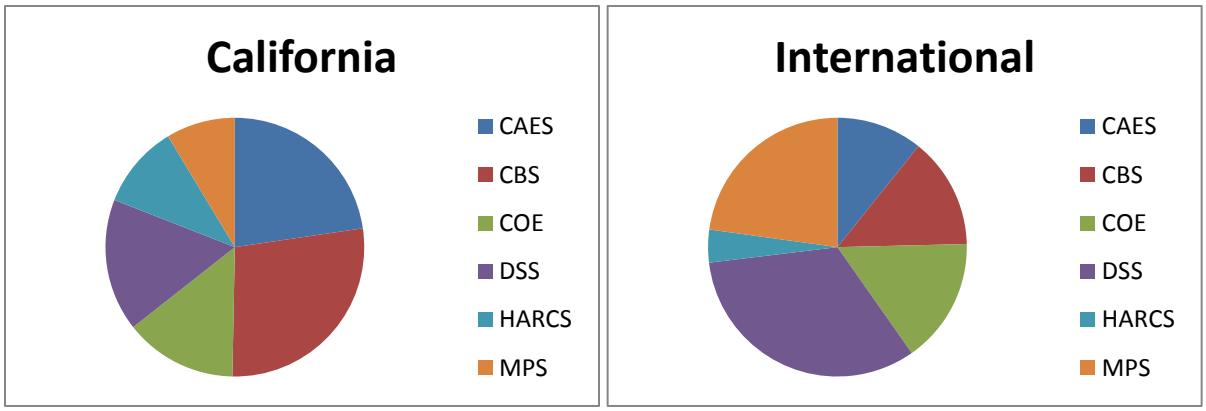


Figure 6b. Projected distribution of incoming California and international freshman enrollees between colleges for Fall 2013.

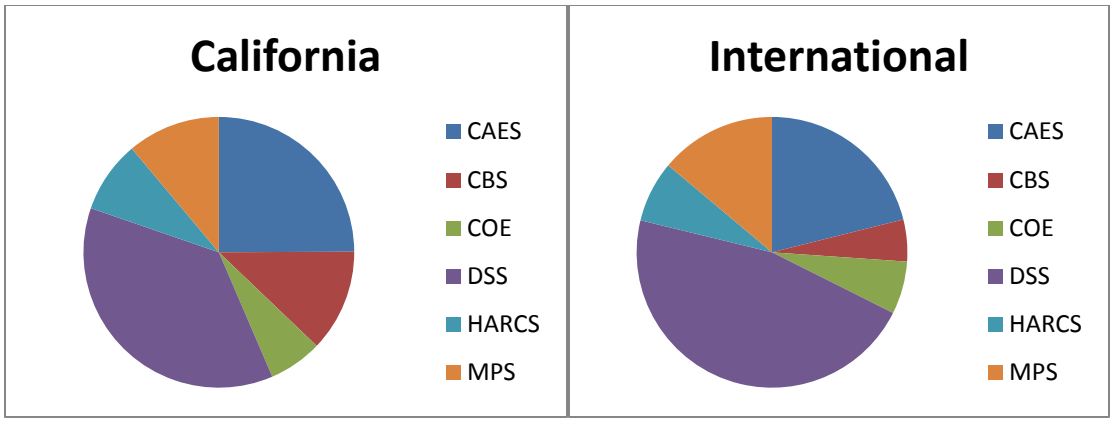


Figure 7. Projected distribution of incoming California and international transfer enrollees between colleges for Fall 2013.

As the 2020 Initiative moves forward, each year will provide a new opportunity to assess any significant impacts on the balance in new and total enrollments among the colleges and divisions, and for the central administration, deans, senate leadership and faculty to discuss what changes might be desirable, and to take action. This can be done in many ways, included directed recruitment efforts in particular disciplines, differential admission of national and international students in specific disciplines, and perhaps most effectively through augmenting the yield activities of specific departments and colleges. It will be important to take an active rather than a passive approach to guiding the trajectory of enrollment growth across the disciplines.

It will be important for planning purposes to understand the behavior of our international student cohort after their matriculation at UC Davis. Many students who begin their studies in one college complete their degrees in another, particularly among those who enter as freshmen. It is too early to know whether the migration of international students between colleges and divisions will be similar to that seen in the historical data for a predominantly California student body, but these trends will be followed carefully in the coming years so that the data can be used effectively in growth planning.

Even more important for planning purposes is to remember that students take a significant fraction of their courses from colleges and divisions other than that in which their major resides. For example, on average, students in the College of Engineering take 42% of their total student credit hours within Engineering, but 27% in the Division of Mathematical and Physical Sciences and 12% in the Division of Social Sciences. Using this type of data, developed for the work of the task forces, it is theoretically possible to model the teaching impacts that will occur with specific changes in the mix of undergraduate students between majors. Although course enrollments are only one factor in determining faculty hiring, such models may nonetheless prove useful in drawing attention to particular challenges before they become problematic.

An additional issue that must be carefully addressed is the impact of the 2020 process on the diversity of the incoming class with respect to underrepresented and socioeconomically disadvantaged students.

Since the initiative is growth-based and will not have a negative impact on the total number of California students admitted, continued and increasing efforts to recruit and retain diverse students should be successful in sustaining recent increases in enrollment of diverse students. Indeed, the current data for fall 2013 indicate that once again the number of students from underrepresented groups will increase as a percentage of all domestic (California and national) undergraduates at both the freshman and transfer levels; by 1.9 percentage points (to 24.1% from 22.2%) at the freshman level and by 3.4 percentage points (to 25.2% from 21.8%) at the transfer level. It is important to note that without the financial resources provided by the increased number of national and international students paying supplemental tuition, the university might be compelled to reduce its overall enrollment, which would almost certainly reduce the enrollment of underrepresented students.

Graduate student enrollment

The relationship between the 2020 Initiative and graduate student enrollment has been a topic of active discussion over the past year. In the Joint Report of the 2020 Task Forces, no explicit models regarding graduate student enrollment were presented, other than to note there would certainly be growth in graduate student number associated with the growth in the number of ladder rank faculty. The sense of task force members was that increasing total campus enrollment of graduate students beyond the growth that would occur naturally with increased faculty numbers was predominantly an issue of financial support, and that 2020 might assist in reaching aspirational goals in this respect through the investments of some of the revenues in excess of costs gained through 2020 growth. However, no explicit targets were proposed.

Independent of the 2020 Initiative, the campus is in the early stages of a major effort to increase the strength of graduate education at UC Davis. Graduate students play an enormously important role in the research and teaching missions of the university, and graduate education plays a critical role in helping society meet the challenges of the future.

One way to measure the university's excellence in graduate education is in terms of increasing the ratio of graduate students to undergraduates at UC Davis over the coming years. To accomplish this goal will require rates of growth in graduate enrollment in excess of the rate of growth associated with the 2020 process. A recent presentation by the Vice Provost of Graduate Education & Dean of Graduate Studies noted that in Fall 2012, UC Davis student enrollment was distributed as follows: 79% undergraduate, over 14% graduate and over 6% professional students. If the campus were to aspire to change these proportions to 70%, 20% and 10% respectively by 2020, against the backdrop of 2020-related undergraduate enrollment growth, it would require a growth of over 88% from present graduate enrollment over an eight year period, which would be a challenging target to achieve. A more realistic path might be to imagine, for the time frame of 2020 at least, growth to 75%, 17%, and 8%, respectively, acknowledging that within the increase in graduate students there might be disproportionate growth of stand-alone or professional masters relative to PhD programs.

Current estimates for growth in graduate student enrollment provided to UCOP in the campus LREP (Long Range Enrollment Plan) are roughly based on aspirational targets self-reported by graduate programs and groups. The growth rate proposed on this basis exceeds by approximately two-fold the 20% undergraduate growth rates (and by implication graduate growth rates) proposed in the 2020 plan. There are reasons, however, to think that there may be growth beyond the merely proportional, especially with the inclusion of significant growth in master's degree programs. UC Davis has particular depth and strength in many areas where a master's credential is in increasing demand, and the expansion or development of such programs would align with our mission of assisting the state and its citizens. It is worth noting that this may provide revenue for the doctoral graduate students, since traditionally students in such stand-alone or professional masters programs are not afforded the same access to financial aid as either undergraduates or academic graduate students.

In addition to their critical role in faculty research programs, graduate students also make essential contributions to our teaching mission, both as mentors to undergraduate students participating in research as well as in their traditional role as teaching assistants (TAs). The quality of instruction in many of our courses is dependent on the availability of outstanding TAs, and the growth in undergraduate enrollment under 2020 will thus create an immediate need for an increased number of graduate students. In addition to their role in working directly with undergraduates, TAs also support faculty in their teaching, and in the process, gain experience that will be invaluable to many as they seek positions in academia after gaining their degrees. Finally, TA positions play an important role in providing financial support to graduate students.

Accommodation of increased demand for graduate student TAs will require two distinct types of alignment with undergraduate enrollment increases. First, there must be quantitative alignment: if graduate enrollment growth lags undergraduate growth, a shortfall may occur. Second, there needs to be some qualitative alignment between the disciplinary growth of the graduate student population and the disciplinary focus of additional courses that must be taught to a growing student population; these two are not necessarily linked. The specific rate of growth in graduate enrollment may be influenced by multiple factors, including growth in faculty research programs, increasing faculty commitment to graduate education, the emphasis placed on graduate education in the faculty merit and promotion system, financial support for students available from the colleges and campus, and the quality and size of the applicant pool. Only a subset of these factors is directly related to the growth in undergraduate enrollment under the 2020 Initiative, including the growth in graduate student enrollment that will naturally occur as the number of research faculty on campus increases, and the need for additional TAs to support the education of an increased undergraduate population. Additionally, the revenues generated through increased supplemental tuition from national and international undergraduates are a potential source of support for graduate education. Additional new revenue may come, as noted above, from new or expanded professional masters programs, though the creation of these must be done carefully and thoughtfully and approval for new programs will never come quickly.

A major goal for the coming year will be to carry out a systematic effort to develop the ideas discussed above into an implementable plan for enhancing graduate education under the 2020 Initiative. This

effort will engage the entire faculty in graduate programs across campus, along with the Provost & EVC, the Vice Provost of Graduate Education & Dean of Graduate Studies, the Provost's Implementation Advisory Committee for Graduate Education, Graduate Council and the elected representatives of the Graduate Student Association (GSA) in an intense discussion of current aspirations for graduate education and strategies to achieve those aspirations. Groups with an interest in opportunities to increase and expand their programs will be encouraged to develop specific plans to do so, and to collaborate with the Provost in finding funding solutions to support this growth. The new budget model and graduate tuition revenue distribution model that will be finalized by the end of calendar 2013 to take effect in July 2014 will allow units to better understand some of their options for creating stand-alone graduate programs. Given the increasing demand for graduate degrees, especially masters, in many jobs, it may be that more faculty will want to extend UC Davis' influence and impact by developing a broader graduate footprint than we now have in disciplines across the campus.

Faculty hiring

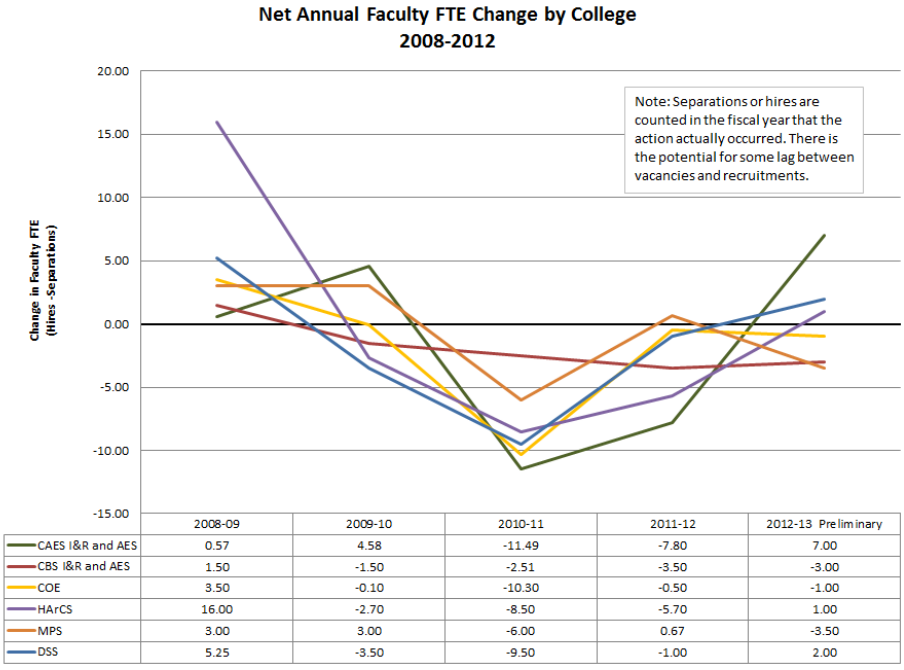
Overview. One of the underlying premises of the 2020 task forces was that growth in undergraduate enrollment would be associated with a corresponding increase in the number of faculty, so as to maintain student-faculty ratios and the quality of the UC Davis educational experience overall. While an essential part of the 2020 plan, aligning the size of the faculty with the growth of the campus is a very complex process, involving many important factors in addition to student enrollment. In order to develop rough and preliminary cost estimates, the Joint Report used a strictly proportional model for faculty hiring, assuming that we would maintain current student-faculty ratios and that all disciplinary areas would grow at the same rate. While useful for developing first-order cost estimates at a macro level, this approach did not capture the majority of the factors that enter into strategic decisions about faculty hiring, including the academic plans, strategic visions and new research initiatives of the university and its schools and colleges.

Although the many variables involved make it difficult to predict the precise long-term distribution of net new faculty positions among the various colleges and schools and their departments by 2020, it will still be important to develop and monitor metrics that ensure the maintenance of a high quality educational experience for our students as the campus grows, and to ensure that that the basic premise that the 2020 Initiative will increase financial stabilization of the campus is upheld. The teaching load estimates and cost modeling mechanisms described in the Joint Report will provide useful tools for evaluating the impact of the actual trajectory of faculty hiring on delivery of courses, and will also allow the costs associated with hiring faculty to be compared to the revenue generated from enrollment-driven increases in tuition and supplemental tuition.

The growth related to the 2020 Initiative is commencing in the context of faculty hiring practices reflecting several years of budget cuts in response to reduced state support, as well as the introduction of a new budget model for the university. During this transitional period, it can be difficult to clearly distinguish which actions (e.g., faculty hiring plans) are related to past and ongoing budgetary pressures and which are related to 2020. Nonetheless, it is critical that all parties involved maintain a focus on net

2020-related growth in student numbers, so that planning proceeds in a timely fashion to maintain educational quality. To this end, it is important to understand the current situation and recent history with respect to faculty hiring, the plans for the 2013-14 year, ideas regarding the 2014-15 year and the process for future planning.

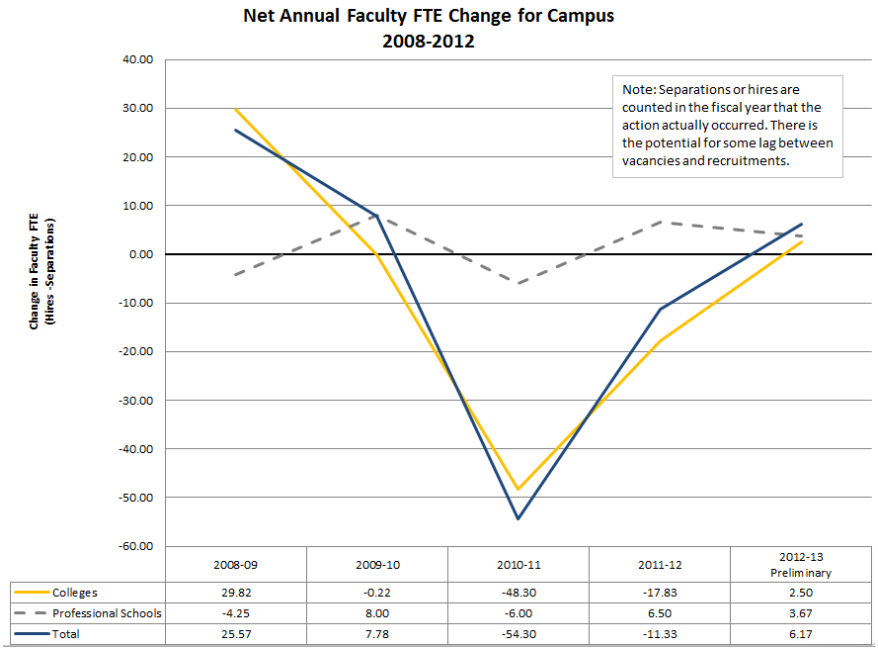
Current data on faculty hiring and separations, by college. From 2008 to 2011, in response to budget cuts necessitated by declining state support and rising fixed costs, each of the six colleges/divisions (CAES, CBS, COE, DSS, HARCS, MPS) reduced faculty hiring relative to faculty separations (retirement, resignation, death) leading to a net annual decrease in faculty FTE for most colleges in most years. Annual net faculty hiring reached a low in 2010-11 with an average net loss of 8 faculty FTE per college (Figure 8).



	2008-09	2009-10	2010-11	2011-12	2012-13 Preliminary
CAES I&R and AES	0.57	4.58	-11.49	-7.80	7.00
CBS I&R and AES	1.50	-1.50	-2.51	-3.50	-3.00
COE	3.50	-0.10	-10.30	-0.50	-1.00
HArCS	16.00	-2.70	-8.50	-5.70	1.00
MPS	3.00	3.00	-6.00	0.67	-3.50
DSS	5.25	-3.50	-9.50	-1.00	2.00

Figure 8. Net annual faculty FTE change by college 2008-2012

Since 2011, this trend has reversed, with faculty hiring and separations projected to be approximately equal on a campus-wide basis in 2012-13 (Figure 9).



	2008-09	2009-10	2010-11	2011-12	2012-13 Preliminary
Colleges	29.82	-0.22	-48.30	-17.83	2.50
Professional Schools	-4.25	8.00	-6.00	6.50	3.67
Total	25.57	7.78	-54.30	-11.33	6.17

Figure 9. Net annual faculty FTE change for campus 2008-2012

This approximately zero net increase in faculty headcount in the first year of 2020-driven student enrollment increases may be the result of the final stages of previous budget-related reduction in faculty headcount overlapping with the initial phases of 2020-related hiring, as well as the natural lag inherent in the faculty hiring process. As noted in the Joint Report, transient imbalances in student-faculty ratio and enrollment increases that precede hiring can be remediated in the short term by the hiring of lecturers. However, it is important that college hiring plans be accelerated in future years, beginning immediately, if the campus is to adhere to the original thesis of the 2020 plan that student faculty ratios will be maintained.

There are no absolutes when it comes to a "right" student-faculty ratio, and each unit will have to assess the degree to which it needs to grow teaching capacity to support new growth. During the recent period of budget cuts, the campus managed to absorb modest enrollment growth, with strains in some areas to be sure, while nonetheless continuing to deliver a high-quality education. We will work closely with units to understand their plans for hiring over the coming years, and the metrics they will be using to support their decisions.

Current plans for faculty hiring in 2013-14. The process by which a determination is made each year regarding the number of hires to pursue in each college begins in the offices of the college deans, who must integrate the college academic planning process, research initiatives, college course enrollment demand from students both in and outside of the majors housed in the college, faculty separations the previous year, budget resources (in partnership with the Provost) and available space for faculty offices and research programs. In collaboration with college faculty and departmental chairs, the deans develop a specific proposal presented to the Provost in the Spring Quarter along with a plan detailing anticipated costs for each hire and proposing specific cost shares. On the basis of these proposals, additional

analysis by the Office of Budget and Institutional Analysis, and the alignment of campus vision with college proposals, the Provost authorizes the initiation of a specific number of new and continuing searches in each college and commits additional funds to support these searches as appropriate. Hiring proposals for 2013-14 have been recently submitted to the Provost, and faculty recruitment authorization letters sent to the college deans.

The net gain in faculty head count each year represents the balance between new hires and separations. Although it is not possible to ascertain beforehand the outcomes of searches and the number of separations in any specific year, it is nonetheless useful to consider the following in contemplating future actions to address faculty hiring under the 2020 plan:

- Among the six colleges and divisions that provide the vast majority of faculty who teach undergraduate courses, 44 new searches and 26 continuing searches have been authorized for 2013-14.
- For the past three years, completed hires in the six colleges and divisions have averaged around half the number of authorized recruitments, though during this time there has been a ramp up of hiring so it is not clear if this relationship will hold steady or perhaps change.
- Faculty separations are difficult to predict but can be projected based on recent history to be approximately 30-35 per year in the six colleges and divisions
- There are currently just over 1100 faculty in the six colleges and divisions
- It is proposed to increase the number of undergraduate students by about 20%, with an approximately proportional increase in faculty.

Based on the above, it is evident that a concerted effort must be implemented immediately to accelerate the successful recruitment of new faculty, either through increasing the number of searches for new faculty, or improving the rate of success in completing searches, or both, if the goal of sustaining the approximate ratio of students and faculty is to be achieved under the 2020 growth process.

Faculty hiring in 2014-15 and beyond. Initial 2020 models predicted that maintenance of historical student-faculty ratios would require a net increase of somewhat over 200 ladder faculty in total by 2020, based on a calculations taking into account variations in instructional activity in the various colleges and the traditional use of non-ladder faculty for some instructional purposes. Achieving the net growth in faculty numbers implicit in the 2020 plan will require increasing the differential between hires and separations in future years (the level of separations may be influenced both by faculty demographics and by faculty choices). Uncertainties regarding the distribution of faculty hires among colleges remain, which could have a slight impact on the total numbers modeled due to college-specific differences in student faculty ratio; however, it is difficult to envision a scenario with many less than 200 net new faculty. Since there was no net increase in faculty numbers in 2012-13, an average net annual headcount increase (hires minus separations) of approximately 25 ladder faculty will be required to meet the targets set for 2020-21. This is just slightly higher than the average net increase in ladder

faculty hiring per year over the twelve years from 2000-2012 (average 76 hires per year; average 53 separations per year; average net growth of 23.5 ladder faculty per year; data from http://academicpersonnel.ucdavis.edu/statistics.cfm).

General considerations with respect to the process governing faculty hiring. Optimally synchronizing faculty hiring with 2020-related growth will require an increased level of communication between the provost, the deans, the faculty, the Office of Admissions and the enrollment and budget staff of the Office of Budget and Institutional Analysis. Consideration of the ladder faculty headcount in each college in relation to growth under the 2020 process in the number of majors and student credit hours offered should be an obligatory part of each college's presentation to the Provost in the annual budget meeting, and an evaluation should be made of the degree to which faculty hiring is satisfactorily aligned with growth. If alignment is not satisfactory, an explanation should be presented of how the unmet needs are being met (e.g., additional lecturers) and a plan presented for bringing ladder faculty numbers back into alignment.

As noted above, various factors other than enrollment growth are important factors in faculty hiring plans. These include:

- College and university academic planning process. Each college has an academic plan reflecting the strategic priorities of that unit, and the university may likewise seek to encourage hiring in specific areas of importance to the campus vision, through the allocation of resources to be used in strengthening specific disciplines. If hiring driven by these research priorities does not align optimally with campus teaching needs, then the increased use of lecturers in certain disciplines may be needed to ensure student access to courses.

- Teaching load. The demand for courses by students is determined by a complex array of factors, including the disciplinary mix of students admitted to the university (both undergraduate and graduate) and the curricula required by the faculty. Course demand is only partially dependent on the number of majors admitted to or enrolled in each college, since students take only a fraction of their student credit hours from the college in which their major resides (ranging from a low of 24% in CAES/Agricultural Sciences to a high of 56% in Social Sciences). It is thus the case that increases in the enrollment in one college can have a dramatic impact on teaching loads in another. It is imperative that clear channels of communication regarding enrollments and curricular requirements be maintained between the colleges so that faculty growth in one college is balanced not only with the needs of its own majors but also with the needs of majors in other colleges. The Office of the Provost, and especially the Vice Provost-Undergraduate Education, working in close cooperation with the Council of Associate Deans, will be a key clearing house for this information; indeed, these are currently precisely the individuals who collaborate with Admissions in right-sizing the incoming classes of both freshmen and transfer students.

- Faculty separations. Although it is not possible to precisely model retirements, resignations and deaths, it is nonetheless feasible to make estimates based on faculty demographics and historical patterns of behavior. Such estimates should become a standard feature of each college's long range plan for hiring, in the context of other factors, and should be presented at the annual meeting with the provost regarding faculty hiring.

- Budget resources. Substantial differences exist in the resources required to hire faculty in different colleges and divisions. Although not necessarily the major driver of hiring targets in each college, in some cases the costs (particularly startup packages and the cost of constructing/remodeling lab space) are so substantial that specific accommodations must be made with the provost before hiring plans are approved. At present, these differential costs are partially reflected in the differing provost allocations in the new budget model. Going forward, the increased revenues associated with supplemental tuition from national and international undergraduate students will be a critical source of funding for supporting new hires, and it is also possible that development efforts can increase philanthropic support for such funds (e.g., endowed chairs that come with start-up funds). As one of the largest factors in determining the cost of adding new faculty, disciplinary balance must be carefully calibrated with tuition revenues to ensure that one of the major foundational premises of the 2020 Initiative (increased financial stability for the university) is sustained. This topic is discussed at greater length in the section below on Physical Infrastructure and Campus Planning.

- Space for faculty offices and research programs. Although academic planning remains the major driver for faculty hiring, availability of adequate research and office space is a critical limiting factor. In some disciplines, faculty require only an office to engage in research; in other disciplines, substantial laboratory or studio space is required. Each college/division is in a unique position in this respect; some have sufficient space available currently for adding significant numbers of new faculty, while others are close to filling all available space and thus severely constrained in their ability to grow until construction of new space is complete. Since faculty hiring based on academic priorities and student enrollments is not aligned in all cases with the research and office space available, there should be an immediate determination of the maximum faculty hiring possible with extant space resources, and immediate initiation of efforts to identify, remodel and construct new space to house faculty and their research programs (detailed discussion follows below in section on capital construction). An immediate goal should also be to determine the potential availability of additional space on campus already available for use by new faculty through a comprehensive audit of current space use. It is possible that in some cases, faculty hiring may need to be delayed pending the completion of capital construction projects.

Considerations regarding disciplinary balance in faculty hiring. A key variable in planning for growth in the number of faculty at UC Davis is the disciplinary balance among new hires. Determining which if any areas of scholarly endeavor to grow differentially will be a serious, dynamic process. Growing the size of

the faculty presents a rare opportunity to focus the strategic priorities of the campus through differential investments in new and extant areas of scholarly research; to address new societal needs; and to strengthen areas of excellence for decades to come. Accomplishing these important goals, however, must be done in the context of supporting the teaching mission of the university and of sustaining the financial stability of the university. For the next 3-5 years, it is also the case that growth in specific disciplinary areas may be constrained by severe limitations on space available for faculty offices and research programs, particularly in the natural and social sciences.

- **Research priorities.** The *Vision of Excellence* (http://vision.ucdavis.edu/local_resources/docs/vision_of_excellence.pdf) sets out as aspirational goals the following: Fostering a Vibrant Community of Learning and Scholarship; Driving Innovation at the Frontiers of Knowledge; Embracing Global Issues; Nurturing a Sustainable Future and Propelling Economic Vitality; Championing Health, Education, Access and Opportunity; and Cultivating a Culture of Organizational Excellence, Effectiveness and Stewardship. These goals encompass disciplines across the breadth of the university. Nonetheless, as the campus endeavors to meet societal challenges, to build on areas of strength and to sustain the broad base that is essential to remaining a premier comprehensive university, it is likely that there will be occasions when certain disciplinary areas will be targeted for growth. After lengthy discussions, the 2020 task forces concluded that in all probability, changes in the relative distribution of faculty across the various academic disciplines (sometimes referred to as "turning the disciplinary dial") would likely involve subtle modulations rather than sharp twists. Absent a current strategy that would guide us immediately, we will balance growth proposed by the colleges with provost-sponsored hiring initiatives that will be the mechanism whereby specific areas of emphasis, including cross-disciplinary approaches and new fields of study, can be brought forward and funded.

- **Student demand.** As the university seeks to significantly increase the enrollment of national and (predominantly) international students, it is unknown whether patterns of student interest will be similar to past cohorts of California students (discussed in depth above). Unless compensatory steps are taken, this may result in disproportionate growth of specific majors (e.g., the economics major). Such growth has some ramifications for faculty hiring, in that providing sufficient sections of certain courses may require additional faculty. However, because students take many of their courses outside of the college in which they major, the impact is less substantial than might be assumed and can be predicted based on the average set of courses historically taken by students in that major. Another potential source of disproportionate growth might be the creation of new majors with high student demand; most notably, if a new business major is created, there may be a need to hire a new group of ladder faculty to teach in its core curriculum, although these students, too, will take many courses, both for their major requirements and for their general education requirements, from existing departments and programs across a range of colleges and divisions. Disproportionate growth in certain majors may also create demand for TAs that is not aligned with graduate enrollments, if

areas of student interest do not align with areas of faculty research interests. If this is the case, alternative measures will be needed to ensure that necessary teaching support is provided.

- **Space**. A critical variable that will have substantial impacts on the ability of the colleges to hire into some disciplines is the availability of adequate space to accommodate faculty offices and research programs (considered in detail below). This problem is particularly acute in certain disciplinary areas, where available space for new hires is far less than the capacity that might be required to accommodate anticipated needs. In the laboratory sciences, including the biological sciences, physical sciences, and some areas of engineering and agriculture, the cost of new laboratory construction can exceed $1000 per square foot, and there are severe disadvantages to buildings below a threshold size due to the fixed costs of building infrastructure, thus requiring very large investments of capital to address needs. Where possible, these costs can be somewhat reduced by renovation of unused space in older buildings. To the degree that growth occurs in these disciplines, the campus will need to make significant capital investments in new construction and renovations if hiring is to proceed to anticipated levels. Furthermore, there is a long lag time between the decision to proceed with construction or renovation and final occupancy of research buildings, so in cases where this is relevant to 2020 growth, decisions need to be made in the very near future. In disciplines where the primary need is office space, smaller capital investments will be required and timelines for construction and renovation will be somewhat shorter. However, it will still be critical to anticipate needs before the arrival of new faculty, as certain disciplines are operating very close to capacity and can accommodate only limited growth without new construction or renovation.

- **Budget.** The substantial investments required to hire faculty in certain disciplinary areas (up to $2 million per hire including startup funding and costs for construction of new space in many of the natural sciences and engineering) establish some limits to the flexibility of the campus to accommodate disproportionate growth in these areas in the absence of alternative revenue sources. One of the general principles of the 2020 Initiative was that growth in enrollment should proceed only if a model could be implemented that resulted in increased financial stability of the university. The models presented in the Joint Report included assumptions that growth would be roughly proportionate to current distributions of faculty among the various disciplines represented on campus, although, to reiterate, making this assumption was largely a necessity for planning. If actual growth deviates too far from this assumption in the direction of the higher-cost disciplines, the underlying cost model predicts that the net revenues generated will decline accordingly, leading eventually to no net revenue or in extreme cases to costs that exceed the tuition revenues generated. Although costs are not the only drivers of academic planning at the university, balance must be maintained if the basic principles set forth in the campus discussion of the 2020 process are to be upheld.

Alternative strategies. In instances where the hiring of new ladder faculty to address the teaching needs associated with increased enrollments is problematic (e.g., insufficient research space available,

budgetary limitations, lag time in hiring process), alternative strategies are possible and may be seen by some units as preferable in certain contexts. These include:

- Hiring of Unit 18 lecturers. This was anticipated in the Joint Report as a transient solution to shortfalls in ladder faculty availability due to the lag time inherent in the recruitment and hiring process. In some courses (particularly in HArCS), instruction is customarily provided by non-ladder instructors; thus, growth in enrollments will require increases in hiring in this job title.
- Hiring of Lecturers PSOE and SOE. In some disciplines where research space is limited or startup costs very high, and where there is interest in advancing pedagogical innovations, there may be incentives for hiring a limited number of Lecturers SOE (or PSOE). These individuals have somewhat higher teaching loads than other Senate faculty, do not require space beyond an office, and may engage in scholarship related to pedagogy rather than the specific discipline although they often have postdoctoral experience in disciplinary research.
- Engagement of professional school faculty in undergraduate teaching. Although faculty in the professional schools at UC Davis are significantly engaged in teaching at the graduate level, they participate at only minimal levels in undergraduate teaching. In some cases, it may be possible to make mutually beneficial arrangements between colleges and schools to permit professional school faculty to contribute to meeting the teaching needs associated with increased enrollments, without requiring substantial investments in startup packages or new research space. Under the new budget model, student credit hours in such arrangements accrue to both parties; depending on course size, this may be sufficient to cover associated salary and benefits costs.

Summary. The hiring of new faculty under the 2020 Initiative must reflect an integrated response to all of the factors described above. There is no single algorithm that can capture this complexity, and no way to accurately predict *a priori* how new hires will distribute across the disciplines. The process for determining each year's faculty hiring targets must be dynamic; well informed by data that captures progress in achieving campus and college goals in research, teaching and service; aligned with growth in student enrollment; reflective of budgetary circumstances; and cognizant of the constraints related to office and laboratory space.

Although it is not possible to make precise estimates of the number of faculty who will be hired in each college, school or division to accommodate 2020-related growth, it is nonetheless critical, given the increases in enrollment that have already begun, to accelerate faculty hiring as soon as possible to levels commensurate with the maintenance of an appropriate student faculty ratio to sustain the quality of the student experience at UC Davis. Some of this growth will occur through the usual annual academic hiring process as described above. Additionally, the provost will solicit, at two- or three-year intervals (with the first call to occur in 2013-14 for searches to commence in 2014-15), proposals for additional focused hiring around some combination of the following: specific areas of current excellence we may wish to advance differentially, newly emerging areas of study, and interdisciplinary research areas that also will draw student interest and enrollments, including opportunities to recruit faculty who can

engage students from under-served populations. An appropriate, consultative vetting process of such proposals will be developed and implemented in 2013-14.

Staff hiring and programmatic growth

Staff serve a critical role in supporting the academic success, extra-curricular engagement, health and well-being of the students; the research and teaching activities of the faculty; and the core operations required for the functioning of the university. The relationship of staff workload to student enrollment varies across a wide spectrum. For some who interact directly with individual students (e.g., resident advisors in student housing), it can be projected that additional personnel will need to hired in approximately direct proportion to growth in student numbers. For others whose jobs are only very indirectly related to student enrollment (e.g., higher levels of administrative staff), no increase in employee headcount should be required as a result of 2020-related growth. Finally, there are some job titles for which growth may need to be greater than proportional. An example of this category would be student advisers, for whom the increased time commitment *per capita* involved in advising an increasingly international cohort may require a higher adviser:student ratio than presently exists. Such a move will benefit all students, and, indeed, it is widely acknowledged that the adviser:student ratio is currently suboptimal, in some colleges/divisions more so than in others.

It is important to note that every aspect of the university's operation has been put under tremendous pressure due to the budget cuts of the past few years, with workloads increasing across the campus. Although some measures have been taken to increase productivity and/or reduce services, it is nonetheless a reality that there are fewer staff serving a growing university. Strategic investments in staff will need to be made to prepare for and support the growth of the campus. In other words, this is fresh investment, focused not on restoration of past levels of service or previous levels of staffing in every operational unit on campus but rather on supporting key areas needed to improve the academic experience of our students and the research programs of our faculty. We must look not at yesterday or today but at tomorrow.

Initial investments have already been made in certain key areas critical for the recruitment and success of a growing population of international students, who will comprise a majority of the 2020 enrollment growth as discussed above. These include substantial investments supporting the recruitment activities of the Office of Admissions, the Services for International Students and Scholars office (one new advisor), the College advising offices (five new student affairs officers to serve as international academic advisors), and the campus ESL program including the writing program and new ESL-enhanced GE courses. These investments are only the first steps in establishing the staff infrastructure that will be required to support the success of the growing university. Further investments have also been made to improve advising in general by funding a new position that will coordinate advising services across campus in both the colleges and in Student Affairs.

Alignment of growth with staff hiring will be the responsibility of unit directors across campus in consultation with the appropriate administrative leadership teams. There are distinct differences between units in how staffing levels with be aligned with revenue sources. In some units, funding is directly related to student fees, which will increase in direct proportion to growth in student enrollment. In other units such as colleges and departments, staff may be supported by revenues derived from the new budget formula in proportion to student credit hours, majors and degrees awarded. These revenue sources should also increase in proportion to enrollment growth, as faculty teach greater numbers of students and the enrollment in majors increases. Finally, there is a large number of staff who are supported by base budgets negotiated on an annual basis and for whom funding is not directly related to enrollment-sensitive drivers. In these cases, the appropriate administrative head will be requested to make a case for additional funding on the basis of demonstrated growth-related needs from reserves held centrally by the Provost. It will be the responsibility of leadership in each of these units to determine the level of additional staffing required to support the campus growth associated with the 2020 Initiative over the coming years, and to communicate their findings to the Provost, along with proposed funding levels and revenue sources (or requests). The campus already tracks changes in staffing levels in all units; these will be reviewed regularly and reported out so that such growth can be monitored.

Physical infrastructure/capital planning

The growth of the campus envisioned in the 2020 plan will require significant investments in the physical infrastructure of the campus. Although there is extant capacity in some areas that can accommodate the planned growth, there are urgent needs in others where current infrastructure is nearing the limits of capacity. As growth in undergraduate enrollment has already commenced, it is essential that specific planning and implementation accelerate for projects that are critical to supporting student success.

The following are campus functions for which additional space and/or physical infrastructure will likely (or in some cases possibly) be required:

- Classrooms and associated teaching infrastructure to support higher student enrollment, including offices for an increased number of teaching assistants
- Offices and labs/research/studio space for the increased number of faculty
- Space/infrastructure associated with student academic support (orientation, advising, international student support, study spaces, library, computer labs, meeting rooms, bookstore)
- Space/infrastructure providing support services for an increased campus population (housing, food services, recreation and athletics, health care, fire, police, safety, parking)
- Utilities (water, power, transportation, waste disposal)
- General campus support (facilities shops, telecommunication, IT)
- Research support infrastructure (animal facilities, EH&S)
- Other campus general support services as appropriate

In addressing this important part of the 2020 plan, there are some basic principles to be considered. First, it is the intent of the plan that growth will not negatively impact either the educational or research missions of the university; indeed, it is our aspiration that it would enhance them by creating opportunities for renewal, upgrades and fresh investment. Thus, it is anticipated in the plan that investments in infrastructure will be made where necessary to support the continued excellence of university and expand its ability to achieve its research and teaching missions. The budget model for 2020 sets aside sufficient funds to cover the estimated debt payments required to support these investments, based on models extrapolating recent construction costs and space assignments on campus. However, it is also critical, given the significant costs associated with physical infrastructure, that these investments be made as effectively and judiciously as possible, and that every effort be made to maximize the utilization of the current physical assets of the campus. To this end, work groups will be convened to study each of the general categories of infrastructural need set out above, with a charge of determining the need for and best approaches to addressing each of these priorities.

Classrooms. In some cases, there are already significant data regarding needs based on recent campus experience. Perhaps the most urgent of these is with respect to general assignment classroom space, for which the Office of the Registrar already has abundant data from recent use patterns indicating certain areas of need. Committees have already been meeting to explore this issue (including the Instructional Facilities Master Plan Project Advisory Committee and the Instructional Space Advisory Group of the Academic Senate Committee on Planning and Budget) and have made a first recommendation for the construction of an additional large lecture hall. This building will be located immediately to the east of Hutchison Hall on California Avenue and would seat 450-600 students. To address concerns that the pedagogies of the future might rely less on traditional large lectures, efforts will be made to ensure that this facility is designed to accommodate active learning approaches and to be as responsive as possible to future needs.

There is also a need for additional classrooms in multiple size ranges from 25 to 350 seats, and discussions are currently proceeding about the optimal strategies to develop additional classroom resources to meet these needs. There are several alternative approaches to achieving this goal, and it will be important to determine which provides the best solutions for the campus with respect to cost and time to occupancy. One approach will be to reclaim and renovate existing unused campus buildings to create classroom space. A major candidate for this approach is Haring Hall, which is mostly vacant with the recent relocation of School of Veterinary Medicine facilities, and which has the capacity with remodeling to provide over 1000 new classroom seats. Other extant buildings provide similar possibilities on smaller scales and should be considered as possibilities. Either remodeling or new classroom construction enables the development of new spaces optimally designed for methods of teaching consistent with current trends in pedagogy, including active learning environments and enhanced use of technology.

If one makes the assumption that the campus currently has an optimal ratio of classroom seats to students (a debatable assumption in both directions depending on which category of classrooms one is

discussing), then simple extrapolation to new 2020-related enrollment numbers suggests a need for the addition of something over 2000 new seats by 2020. However, this does not reflect the possibility that changes in pedagogy (e.g., flipped classes), in technology (greater use of online resources), or in average class sizes could impact these calculations. As a result, although there is an urgent need to begin increasing classroom availability to address pre-existing needs and the initial period of 2020 growth that has already begun, there should be further discussion of whether the factors mentioned above will have a substantive impact on limiting or dampening projected growth in classroom needs before the end of the decade, so that the campus can optimize construction to meet actual needs.

One instruction-related infrastructural need in addition to classrooms that has been proposed by several constituencies (CCFIT, to name one) is a "testing center," i.e., a space dedicated to providing proctored examinations for many different courses. This idea is being driven primarily by the need to support a rapidly expanding population of students with disabilities who require special accommodations during midterms and final exams that cannot be easily accommodated by course instructors. However, it has also been noted that such a center will be needed if the campus is to take advantage of increased utilization of classrooms that might be made possible through online delivery of curriculum or other strategies such as "flipped" classrooms. Such approaches might allow, for example, for a four-unit course to meet in a large classroom only two hours per week, with remaining course time online or in smaller discussion sessions. While this would allow a higher density of courses to utilize a single classroom, potentially reducing the need for new classroom construction, it could also lead to problems scheduling exams that a testing center might alleviate.

With 2020 growth already beginning, it is critical that planning decisions and initiation of classroom renovation/construction begin soon, before there are critical shortfalls that result in scheduling problems. In the short run, alternative strategies involving non-traditional teaching spaces (e.g., Freeborn Hall) can address campus needs, but this is neither an optimal nor sustainable solution. Additionally, many campus classrooms are in urgent need of renovation and upgrading to new technology, but this requires taking them transiently off-line, which is only possible if there is some spare capacity in the system. We anticipate imminent appointment of program committees for the first classroom construction projects, and the initiation of concerted planning efforts including appropriate stakeholders in the fall for additional projects.

Research space. Perhaps the most challenging issue facing the 2020 Initiative is the construction of new space to house the research activities and offices of ladder faculty to be hired in conjunction with growth. The construction of such facilities, particularly in the STEM disciplines, is very expensive, and economies of scale in both construction and operating costs create significant financial incentives for keeping such construction projects as few in number and large in size as possible. It is challenging to predict precisely which disciplinary areas will grow by exactly how much between now and 2020, as noted above in the section on faculty hiring. However, it is fairly certain that there will be significant growth in each college, including faculty doing research in the natural sciences, engineering, social sciences and humanities (all broadly construed).

For these reasons, one judicious approach might be to plan for the construction of at least two large new research buildings; one with flexible laboratory space that can accommodate research programs in a broad cross-section of STEM fields, and another that is predominantly office space to house faculty in the social sciences and humanities. (Clearly, some social scientists require labs, and many of the faculty in the arts have need of studios; these details will not be ignored in the planning processes.) The appropriate size for these buildings will depend on several factors, including the predicted numbers of faculty in different disciplinary areas to be hired, the currently existing capacity on campus (assuming some remodeling of existing space where feasible), and perhaps construction of some transient excess capacity to permit long overdue renovations of extant and aging buildings that cannot be vacated until new homes are available for the occupants.

The following steps should be started this year:

- A comprehensive space audit should be initiated immediately to determine the occupancy and productive use of all research space on campus. The goal of this audit would be to determine the availability of unused and underutilized space on campus that might be made available for faculty hiring associated with 2020 growth. Given the very high cost of constructing new space, the campus should ensure that it has optimized the use of existing resources before deciding on the scale of new construction. The audit will also identify and quantify space vacated by movement into new buildings in recent years that may be appropriate for remodeling and repurposing for teaching or research.

- As needs become clarified from the development of faculty hiring plans and a comprehensive campus space audit, formal planning should commence immediately for creation of the physical infrastructure (offices, labs, staff and research space) necessary to house additional faculty, staff and their programs. This space will be made available from a combination of unused existing capacity, renovation of existing buildings, and new construction, in accordance with principles described in the "Physical Design Framework" (http://dcm.ucdavis.edu/PhysicalDesignFramework/index.htm) and the campus Long Range Development Plan. The square footage and related programmatic needs required to support these programs depend significantly on the disciplinary blend of the faculty hired, as do the costs. The assumption used in the initial 2020 model, in which disciplinary growth mirrored the present distribution of campus programs, predicted that approximately 60,000 gsf of office space and 300,000 gsf of laboratory space would be required to support the new faculty (tenure track and non-tenure track), students and staff; actual needs will depend on the final disciplinary mix.

Academic support space. A basic premise of the 2020 Initiative is that although the number of students will increase, the quality of their campus experience will not be diminished, and it is our goal to use the planning process to develop creative and efficient approaches to improve as many aspects of the student experience as possible. Indeed, the work groups of this past year's Blue Ribbon Committee for Enhancing the Undergraduate Student Experience identified many of the same issues noted by the 2020

task forces as important concerns that should be addressed, and some of the investments made through the 2020 process in staff and infrastructure over the coming years will address key concerns.

With respect to physical infrastructure for student academic support, among the areas of potential investment that should be explored include the adequacy and capacity of facilities for student orientation, student advising, international student support, student study spaces, the library, walk-in computer labs, meeting areas for student organizations, and the bookstore. In each and every case, and as a general principle as we consider capital investments, we want to ensure that we are advancing as aggressively as possible accessibility on our campus and its many buildings. It remains to be determined which of these represent areas of particular concern due to issues of capacity after enrollment increases, and which areas are less sensitive to increased student population or have spare capacity at the present time. Once critical areas are identified, plans to address the situation should move forward in a timely fashion.

Campus services. Non-academic areas of the campus and community will also be impacted directly by increased campus populations, including housing, food services, student health care, recreational and athletic facilities. With respect to student support services, staff in the units responsible for these services are already developing plans to accommodate increased needs under 2020 for freshman and sophomore housing, for dining facilities (both for the dorms as well as the general campus population), and for some recreational facilities (e.g., the possibility of a satellite ARC-like facility is under consideration). Funding for these improvements will involve a combination of student fees that are dedicated to this purpose along with campus support as appropriate.

Utilities. Studies are ongoing to determine the capacity of campus water, sewer, sanitation, power, transportation and waste disposal facilities to support an increased campus population; investments will be made as necessary. The University of California Policy on Sustainable Practices commits each campus to reduce greenhouse gas (GHG) emission to what they were in 2000 by 2014, to what they were in 1990 by 2020, and to be climate neutral as soon as possible. Climate neutral means that the University will have a net zero impact on the earth's climate. These goals are generally consistent with the American College and University President Climate Commitment to which the University of California is a signatory and with the California Global Warming Solutions Act of 2006 (AB32). The UC climate protection goal is measured as the absolute total of GHG emissions. It is not calibrated on a per unit basis such as emissions per student or per employee or per square foot of building space. Thus, the policy means offsetting increased GHG emission due to growth (including 2020-related growth) as well as reducing the emissions of existing operations. This represents a challenging (albeit worthy) goal that will require the full creativity and ingenuity that the campus can bring to bear.

LRDP. The campus is proceeding with preparation of the next Long Range Development Plan (LRDP) and associated Environmental Impact Report for 2015-2030. In conjunction with this process, campus leadership will continue to brief and engage in planning with city and county stakeholders regarding accommodation of growth.

Research support. The capacity of campus animal housing facilities and EH&S facilities to handle increases in research programs will be determined, and plans for appropriate responses in these areas developed and implemented.

General campus infrastructure support. General campus support services, including facilities shops, telecommunication resources, IT infrastructure, fire, police, safety, and parking will all be evaluated with respect to their capacity to support growth associated with 2020, and appropriate accommodations developed and implemented.

Other. It is likely that limitations in many other aspects of campus operations supporting students, staff and faculty will become apparent as 2020 proceeds, and each will be accommodated as appropriate according to priority.