

Recommendations of the Research Strategies Working Group to the UC Commission on the Future

March 8, 2010

Excellent research plays a central role in making the University of California the world's leading university system. UC researchers create new knowledge about nature, society, art, and technology, and pass this knowledge to future generations by integrating research and teaching. UC research touches the lives of everyone in the nation through discoveries that improve health, technology, welfare and the quality of life. It is a major factor in sustaining and renewing our economy, which relies increasingly on new knowledge.

UC's research mission faces a special challenge from diminished state support. How can we preserve the long term benefits of a superbly successful research enterprise while rethinking the way research is funded and carried out in response to new fiscal realities? UC will continue to rely primarily on support from the Federal government for much of its research. The working group spent considerable time discussing how to maintain and enhance Federal and State support, so that it can do more to serve the needs of the nation and the state. In addition, the group recommends changes that would help UC to do research more efficiently and make better use of available resources.

Some of the key elements of the University's success that need to be preserved are:

- Research excellence in all fields of scholarship;
- Support for emerging areas of research with seed funding;
- Support for research areas in which extramural funding is limited;
- Training of students in research to pass on to the next generation the ability to create new knowledge and innovation; and
- Translating new knowledge into new economic opportunities, thereby driving economic development.

The University can also improve the way it brings the benefits of research to society, by marshalling the enormous multicampus, national laboratory, and interdisciplinary resources within the University to address societal challenges. UC, with its ten campuses, three national labs and five medical centers, is the largest research system in the United States, containing the capacity to address the major challenges facing society in the 21st century.

To face these challenges, the Research Strategies Workgroup recognized that UC will need to change some aspects of its research practices to make optimal use of its most important resource, the creative time of its researchers, and to recover the full costs of research, especially those requiring state-of-the-art facilities for success:

- UC should lead nationwide efforts to ensure that the full costs of externally supported research are recovered from government, foundation, and industrial sponsors.
- UC should work with America's research universities and partners in industry and government to demonstrate the benefits of investing in research and advocate for maintaining and increasing investment in the research infrastructure of universities to keep the nation's capability strong.

- UC should organize itself to increase the time its researchers can use to produce scholarship and innovation, primarily by better management of administrative work.

This initial report of the Research Strategies Working Group offers five recommendations to maintain research excellence in the face of decreasing state support. The final report will offer additional recommendations in June.

Executive Summaries

Recommendation 1: The University of California must recover a greater share of the costs of research sponsored by outside agencies and make its management of those funds more transparent to ensure accountability to its sponsors and its researchers.

Executive Summary:

The University of California should recover a greater proportion of the indirect costs it incurs in the conduct of extramurally-sponsored research. To do so, it should negotiate indirect cost recovery (ICR) rates with the federal government that recover the full costs, and it should work with major foundations, requesting that they provide funding to cover those costs either directly or through indirect support. In addition, the University should ask that corporations provide full ICR for all industry-sponsored research. The goal should be to achieve an ICR rate comparable to the rates at peer research universities and closer to the actual costs of research than is presently the case.

The potential fiscal implications of these changes in indirect cost recovery are large. The current gap between the rates UC calculates and the final negotiated rate is between 5 and 18 percentage points, amounting to several hundred million dollars per year systemwide. Through improved management of waivers for foundations, corporations, and private donors, the University also can significantly improve the reimbursement of those research costs. Waivers of ICR for these and other external sponsors also add up to several hundred million dollars per year systemwide. And while the competition for funding will dictate the need for continued flexibility in how UC accepts research funding, improving the recovery of the costs of research by even a fraction of this amount would be an enormous boon to the University's budget and bring it closer to parity with its peer institutions, particularly the private universities.

UC should increase transparency in its management of indirect cost recovery (ICR) funds to emphasize that they represent reimbursement for costs associated with doing research. To attain this transparency, ICR funds should be directed initially to the campuses that generated them, and the academic and administrative leadership of each campus should be responsible for the allocation of funds within the campus. This arrangement will provide the incentives needed for campuses to weigh the costs and benefits of waiving indirect costs. Some of the ICR funds collected on campuses should be distributed by formula to the Office of the President for systemwide research initiatives.

Recommendation 2: The University of California must ensure continued excellence across a broad spectrum of cutting-edge research. To aid in this effort, the University should (1) prioritize internal funds to support world-class research in disciplines where extramural funding options are limited; (2) motivate the development of large-scale, interdisciplinary, collaborative research projects to capture new funding streams; and (3) augment and enhance opportunities for graduate student research and support wherever possible.

Executive Summary:

Support for research across broad disciplines and campuses has been an important element of UC's overall success as a research university system, enabling the campuses to hire and retain faculty, attract graduate students and postdoctoral scholars, secure extramural funding, provide research opportunities for undergraduates, and ultimately foster its mission of teaching enhanced by research. The University of California will need to use internal funding to support high-quality research in areas where extramural funding opportunities are limited or nonexistent, thus sustaining excellence in all areas of research.

UC internal research funds can also help researchers develop and compete for large-scale interdisciplinary awards. This goal can be accomplished through internal competitions for projects that break new interdisciplinary ground or require a period of initial development before they become strong candidates for extramural funding. Supporting such startup projects helps the university leverage its support by attracting extramural funding. These large-scale collaborative projects have the potential to make highly effective contributions to improving the lives of people in California, the nation, and the world.

Graduate students advance research because they bring in new ideas, facilitate collaborations, and are often the vehicle for the exploration of innovative approaches. Through attracting and sufficiently supporting the best graduate students, UC's outstanding research programs will continue to thrive and produce that vital element of the workforce for knowledge industries. Additionally, improved graduate student funding will offer greater opportunity to increase the diversity of people who can benefit from a UC education and research training.

Recommendation 3: Create multicampus, interdisciplinary "UC Grand Challenge Research Initiatives" to realize the enormous potential of UC's ten campuses and three national laboratories on behalf of the state and the nation.

Executive Summary:

Many grand challenges for society in the 21st century will be global, and many will require interdisciplinary solutions drawing upon large-scale, collaborative research efforts on multiple fronts: scientific, engineering, biomedical, agricultural, social, economic, cultural, ethical, and/or educational. UC is uniquely positioned to take a leadership role in addressing grand challenge research problems of the 21st century. No other research institution in the nation has UC's combination of scope and excellence across campuses, laboratories, and medical centers.

UC should create a framework (including a process, administrative and technological support) to support its campuses, national laboratories, and research units in multicampus, interdisciplinary "UC Grand Challenge Research Initiatives." Initiatives would be chosen for their research value, social value, and "fit" with UC strengths, and also to reinforce or balance each other.

Recommendation 4: Streamline risk management practices to increase the efficiency of the research enterprise, making optimal use of faculty researchers and administrative staff support.

Executive Summary:

Active researchers have been taking on an increasing amount of administrative work, diminishing the return to outside sponsors of their research investments. A recent national study on federally-sponsored research found that 42 percent of a faculty member's time was devoted to pre-award and post-award administrative activities and not to research itself; this percentage compares to 18 percent two decades ago. The significant increase is time that could be more effectively performed by administrative staff. In some cases, the University's own administrative and risk management practices create the burden.

The University should strive to be a leader in optimally managing the creative and administrative work among its faculty and staff. This management approach will ensure a better use of the research dollars provided by the State of California and extramural sponsors. The adoption of best practice models for the delivery of services, including use of trained specialists, may provide higher expertise at reduced costs. In addition, the time saved by not having faculty perform these tasks could be more cost-effectively used for increased research productivity and teaching. This should result in reduced costs and increased research revenues over time.

Recommendation 5: Proactively demonstrate the significant and long-lasting benefits that UC research provides to California and the nation, including the development of new knowledge, new industries, and new opportunities for economic expansion and employment. In addition, UC should speak in a strong and clear voice in advocating at the national level for increased and sustained investment in research and knowledge development.

Executive Summary:

Basic research creates new knowledge, and new knowledge fuels social mobility, global leadership, and economic health. UC is America's best public research university. The University of California and America's research universities are the envy of nations around the world.

Given that the federal government underwrites so much of the basic research conducted at U.S. research universities, laboratories, and research organizations through federal funding agencies, it is critical that this federal support be sustained or, hopefully, increased. But research funding in the United States stands on the precipice of potential disaster. Although the President's budget calls for a steady increase in the financing of research, the funds provided in the American Recovery and Reinvestment Act for research are about to expire. At the same time, fiscal pressures are placing the more established sources of support for research in jeopardy. While this challenge is certainly not a problem unique to California, it has serious potential consequences for California and the UC system. It is crucial that UC take leadership in working with America's research universities and partners in industry and government to demonstrate the benefit of research, and to advocate and ensure that federal funding of university research increases.

WORKING GROUP FIRST ROUND RECOMMENDATIONS

Research Strategies

Indirect Cost Recovery and Distribution

Recommendation 1: The University of California must recover a greater share of the costs of research sponsored by outside agencies and make its management of those funds more transparent to ensure accountability to its sponsors and its researchers.

This recommendation has two parts, one on increasing Indirect Cost Recovery (ICR) and one on increasing transparency in the management of ICR. The discussion below is therefore separated into two parts.

Recommendation 1a: Increase indirect cost recovery.

Rationale:

Many of the costs of research are direct costs, for example, to purchase specialized laboratory equipment needed for an experiment, to travel so as to carry out a scholarly investigation in a specialized archive, or to hire graduate students or postdoctoral researchers to assist in carrying out a research project.

Other costs of research are the indirect costs of research facilities and the administrative support for research, also known as overhead costs. They do not involve expenditures that are unique to the particular research project that the grantor is funding, but they are part of the total costs of carrying out research within the University. Indirect costs (IC) include a portion of the costs of technology infrastructure at a campus, utility bills, libraries, buildings, laboratories, research facilities, and staff members who support research activities. The University recovers some of the indirect costs of research by charging a percentage of direct costs as overhead on many external grants.

In recent years, the University has received over \$3.5 billion per year in extramurally-sponsored research grants, of which over \$780 million per year is designated for indirect costs such as facilities support and research administration. But the actual indirect costs of extramurally-funded research are estimated to be \$1.5 billion. It is therefore critical that the University increase its rate of indirect cost recovery, since it can no longer afford to substantially underwrite the infrastructure costs of conducting research.

The University needs to recover a greater portion of the costs it incurs in the conduct of extramurally sponsored research. With sufficient investment of effort and resources, the University can reasonably aim to increase its recovery of costs by well over \$100 million per year. To do so, the University should take the following steps:

- a. It should support the negotiation of indirect cost recovery (ICR) rates with the federal government by hiring experts in this field at each campus and coordinating their efforts centrally. The goal should be to achieve an ICR rate equal to or greater than the rates at similar research universities. UC, together with other leading research universities, should make the strongest case possible to the federal government to raise the cap on the administrative component of ICR.

- b. UC, together with other leading research universities, should work with major foundations, requesting that they provide funding that covers indirect costs or allow overhead costs to be represented as direct costs of conducting research.
- c. Research contracts and grants from corporations should include full ICR.
- d. Research contracts and grants from State agencies should include ICR at a standard rate negotiated between UC and the State. No State agency should be permitted to require blanket waivers of this negotiated rate.
- e. Each campus must develop clear mechanisms for assigning fiscal responsibility when waiving the requirement that full indirect costs be recovered from extramural sponsors, and each campus should develop policies identifying the circumstances in which the administering unit should be required to cover the indirect costs lost by a full or partial waiver of ICR.
- f. Each campus should have a clearly defined procedure for deciding whether a research award is a grant or a gift.

It is often appropriate for the University to share in the support of externally funded research: for example, through academic salaries, staff support, and mandatory or voluntary cost-sharing. But the University should not be underwriting the full costs of externally funded research. What is reasonable for external grantors to expect may be somewhat different in different cases, so we discuss types of external grantors separately in what follows.

Federal grants. Since World War II, the national effort in science and technology has been carried out through a combination of government-owned laboratories and federally supported research projects at universities. In the late 1950s, the federal government recognized that universities could support a larger research enterprise only if the government reimbursed universities for the indirect costs of the research. American research universities have thus developed over the last 50 years on the premise that federal research funding should cover the full costs of doing research.

In practice, however, indirect cost recovery (ICR) from federal grants does not cover the true overhead costs of research at any university in the nation. The federal government is the largest sponsor of research, providing a total of about \$2.5 billion per year for research at UC. Of this, about \$600 million per year is designated for indirect costs. Yet these ICR funds fall far short of UC's actual overhead costs on federal grants, which are estimated to be as high as \$900 million.

As California reduces funding to the University, it is vital to return to the basic principle that federal research funding should cover the true overhead costs of research. Given the constraints of federal policy, achieving full ICR is not an attainable goal at the present time, but UC should aspire to the greater levels of ICR that are being achieved at other universities.

The ICR rate is negotiated every few years at each campus. The key action is to make sure the University makes the best case possible as part of those negotiations. At present, the negotiated ICR rates at UC campuses run from 51.5% to 54.5% of modified total direct costs, which is relatively low compared to similar institutions. The universities that have successfully negotiated better rates often have deployed teams of experts dedicated to analyzing their institutions' true indirect costs. By building such teams on its campuses, and by supporting them centrally, the University of California can maximize its ability to recover the true overhead costs of the federally-funded research that it carries out.

State agencies provide direct funding to UC research to advance our missions. The agencies sponsoring such research include the Departments of Education, Health, Transportation, Water Resources, Food and Agriculture, and Energy Resources and Conservation Development. By conducting the State's research, UC is able to make excellent use of its research capability, but the agencies often specify that they will not pay indirect costs. This may be because they assume that the University receives such support from the State within its core budget. For the University to sustain its excellent research capabilities and provide this service, some reasonable fraction of the true indirect costs must come to the University from the state agencies, since there are no provisions for these costs in the University's core budget allocation from the State.

Foundations are another important source for the University's research funding, providing about \$400 million per year in research awards. Many of these foundations specify that they will pay little or nothing to cover the overhead costs of research, and in such cases, UC typically grants waivers to its ICR policies in order to accept these funds. In other words, the University pays the full overhead costs of conducting this research.

In the very diverse realm of foundation support, the University will need to use a variety of approaches. Waivers may be appropriate for some foundations supporting research in the humanities, arts, behavioral sciences, and social sciences (HABSS fields), research in science technology, engineering, or mathematics (STEM) fields that are not supported federally, or research carried out by new faculty. In other cases, the University and its campuses may need to create policies that would limit the granting of waivers. The University also must partner with other research universities on strategies for persuading major research foundations to increase ICR.

Corporations provide research funding that often makes it possible to "translate" basic research into products that are of broad social value. Examples include medical treatments and the technology needed for increasing energy efficiency and discovering new energy sources. These corporations usually have business reasons to support the research. It is entirely appropriate for the University to expect these grantors to provide the University with full ICR, and indeed that is the usual practice among most corporate sponsors with the exception of biotechnology and pharmaceutical firms. The University should aim to recover full ICR from all corporate research sponsors.

Private donors also fund research by making gifts to the University. The distinction between a gift and a grant is important, because indirect costs are not generally recovered from gifts for research, even though the infrastructure needs are comparable. As outlined in the UC Berkeley policy on research gifts, the following are the characteristics of a research gift:

- a. It does not carry restrictions;
- b. It is irrevocable; and
- c. Its donor requires no formal fiscal accountability beyond periodic progress reports and summary reports of expenditures.

The University should make sure that privately funded research awards that do not pass these tests are classified as grants or contracts, to ensure that the indirect costs associated with such research will be covered.

Impact on Access:

Currently, the University is underwriting the cost of conducting research. By increasing our recovery of the costs of doing research, some University funds could be redeployed more broadly to support broadened access to educational and research opportunities.

Impact on Quality:

Improved recovery of indirect costs will help to improve and renew research facilities at UC, including its libraries, laboratories, and research infrastructure, thereby enhancing the research excellence that serves the State's needs. As a result, the University will be in a better position to attract the top faculty researchers in the world, which is the most important factor in sustaining and improving research quality.

Fiscal Implications:

The potential fiscal implications of the changes in indirect cost recovery outlined in this recommendation are large. The gap between our costs of doing research and the federal dollars brought in through ICR is approximately one quarter of a billion dollars. Raising the federal rates of UC campuses by five percentage points could bring in an additional \$70 million per year to UC. Through improved management of waivers for foundations, corporations, and private donors, the University also can significantly improve the reimbursement of indirect costs; here, a realistic goal would be increased reimbursements of \$80 million per year. By combining the raising of the federal rates and improving the management of waivers, the University can aim to increase its recovery of costs by well over \$100 million per year.

Challenges:

Some faculty members are concerned that increases in overhead rates and changes in cost recovery policies will reduce their chances of receiving funding that is adequate to cover the direct costs of their intended research projects. For example, in issuing requests for proposals, some grantors set a cap on the total amount of funding that will be provided for proposals that are accepted. Thus the amount of funding that researchers can request for direct costs may be reduced if the amount they must request for indirect costs is increased. Nevertheless, it is important that the actual costs of conducting research be explicitly stated and recovered; the University can use cost-sharing to assist with the direct costs of those research projects with limitations on the total funding level.

The experience of other leading universities suggests that UC can maintain its excellence in research while increasing ICR. In addition, if UC and other leading universities were able to succeed in persuading the federal funding agencies to increase the cap on administrative ICR, that change would assist all universities and would not affect the competitive balance among them. It will be critical to provide faculty with information and opportunities to participate in crafting campus policies concerning ICR.

Making these changes in ICR recovery for all of the nation's research universities would require increasing total federal funding for university-based research by only one to two percent. Universities need to make the case that their continued research partnership with the federal government will require reimbursement for appropriate costs of research, including the costs of meeting federal requirements.

Next Steps for Implementation:

It will be important to carry out the research and analysis necessary to refine and validate reasonable goals for increased cost recovery. Such an analysis can be undertaken by the UC Office of Research and Graduate Studies, with policies developed by a joint Academic Senate and Administrative Task Force. In addition, the University needs to make certain that the upcoming negotiations of ICR rates by campuses receive appropriate support.

Recommendation 1b: Increase transparency in the management of recovered funds.

Rationale:

To strengthen its case for recovery of indirect costs, the University must increase transparency in its management of indirect cost recovery (ICR) funds and must ensure that they are expended to meet clearly defined costs associated with doing research. To attain this transparency, ICR funds should go to the campus or campuses that generated them, and the academic and administrative leadership of the campus should direct the allocation of funds within the campus. Some of the ICR funds collected on campuses should be distributed by formula to the Office of Research and Graduate Studies within the Office of the President. These funds would be used to sustain the research support activities carried out there for the University. This arrangement will provide the incentives needed for campuses to balance the costs and benefits of waiving indirect costs.

The University's processes for allocating indirect cost recovery (ICR) funds on campus are relatively opaque. ICR funds generated by research conducted at the ten campuses now go directly to the UC Office of the President (UCOP). There, a small portion of these ICR funds is retained, and the remainder is mingled with other types of funding and then distributed to the campuses. On the campuses, these blended funds are expended in accordance with needs identified by the campus administration.

As a basic principle of operation, the University should be expected to have a clear and well-justified system for managing these funds. Such a system would help the University explain to grantors that a higher indirect cost return rate is justified by documenting and demonstrating the true costs of doing research. It also would help the faculty receiving extramural research awards understand more clearly how the funds are being used to sustain the research activity of the campus. Finally, the administration and the faculty can work together to determine how the funds can best be used at the campus and systemwide to support University research endeavors.

Transparency also will enable better decisions about possible waivers of indirect cost recovery. In certain cases, the campus will decide for strategic reasons to waive or reduce indirect cost recovery, understanding that other campus funds will be needed for the indirect expenses associated with the research project. When the use of ICR funds is not clear, as is the case now, it is easy to see the benefit of a waiver and ignore the cost.

Impact on Access:

Fiscal transparency will help to increase ICR, and some of the increased ICR will relieve State funds and other University funds that could be redeployed more broadly to support access to broader educational and research initiatives.

Impact on Quality:

Transparency will help to build the case made to sponsors for increased indirect cost recovery rates and will provide incentives to campuses to collect the appropriate level of ICR. For the reasons stated above, increased ICR will lead to improved quality of research.

Fiscal Implications:

Campuses will have a strong incentive to increase indirect cost recovery if they retain a predictable proportion of the ICR funds they generate. This change would make clear the cost of ICR waivers and would help reduce the amount of ICR waived. More transparent fiscal processes will help campuses make the case for increased ICR to grantors.

Challenges:

Some important aspects of research administration and policy are done centrally at UCOP. Some of the ICR funds collected on campuses should be distributed to UCOP to sustain these efforts. Determining the appropriate formula for this distribution will require a careful analysis of how the research support effort is divided between UCOP and the campuses.

Next Steps for Implementation:

Full transparency in the distribution of ICR funds will require significant changes in accounting practices across the University and in the processes by which these funds are allocated and spent at each campus. Once fully transparent accounting procedures are implemented, the administration and the faculty should work together to determine how the funds can best be used at the campus and systemwide to support University research endeavors.

WORKING GROUP FIRST ROUND RECOMMENDATIONS

Research Strategies

Research Excellence in All Fields

Recommendation 2: The University of California must ensure continued excellence across a broad spectrum of cutting-edge research. To aid in this effort, the University should (1) prioritize internal funds to support world-class research in disciplines where extramural funding options are limited; (2) motivate the development of large-scale, interdisciplinary, collaborative research projects to capture new funding streams; and (3) augment and enhance opportunities for graduate student research and support wherever possible.

Rationale (1):

The University of California system is an ensemble, not a hierarchy. All ten campuses, and all of its faculty's research areas, contribute to the University's ability to create new knowledge for the State and nation, and to serve the needs of our highly diverse student body. Therefore support for research across disciplines and campuses is essential to the health of the UC system as a whole, enabling the campuses to hire and retain faculty, attract graduate students and postdoctoral scholars, secure extramural funding, provide research opportunities for undergraduates, and ultimately foster our mission of teaching that is informed by research.

Outstanding research can be carried out in many different ways, ranging from discoveries that emerge through insight within a single brilliant mind to the collective efforts of teams of collaborators. Techniques for discovery include close analysis of texts and images, creative accomplishment in the arts, archival research, theoretical analysis, laboratory experimentation, clinical investigation, and field work. Debate, peer review, and critical discourse further ensure excellence across all domains.

Different areas of research require different sources and levels of funding to sustain excellence. Much research in science, technology, engineering, and mathematics (STEM fields) is supported by extramural funds, including contracts and grants from government agencies, corporations, foundations, and gifts from donors. Direct costs and indirect (facilities and administrative) costs for such research are high. Research costs in the humanities and arts, as well as the behavioral and social sciences (HABSS fields), are usually relatively modest. Extramural funding for research in these areas, however, has been dropping precipitously for many years.

The sources and levels of funding vary with the missions, thematic focus, and changing priorities of funding agencies. Research projects tend to be more competitive when projects contribute to the mission of the funding agencies, and when reviewers favor the paradigms of the day. But excellence in research is not bounded by the missions of funding agencies, and breakthroughs by definition go beyond the current paradigms in ways that are rarely anticipated or even recognized at first.

The University of California should use internal funding to support high-quality research in areas where extramural funding opportunities are limited or nonexistent. This is increasingly the case in the HABSS disciplines, but also occurs in areas of STEM fields that fall outside the typical purview of funding agencies. In addition, innovative research often requires internal funding to obtain preliminary data in order to compete for external funds. Internal funding also should

target projects in which modest investments of time and money will result in the completion and dissemination of a piece of research, scholarship, or creative work. Internal fellowship programs providing a quarter or semester of research time for project completion should be expanded, with particular attention to untenured faculty members and graduate students in their final year of Ph.D. work (see *Rationale (3)*).

While extramural funding opportunities may be very limited in some disciplines, they do exist. UC should aggressively compete for such funds by supporting the researchers, scholars, and artists who are in the best position to pursue these opportunities. In these instances, UC should provide targeted administrative support for grant proposal identification, for budget development, and for managing large grants. Internal funds directed for this purpose will not only benefit the projects themselves, but also will be highly leveraged because faculty time and resources can be more appropriately directed towards developing and conducting the research rather than on administrative tasks (see Risk Management and Administrative Staff Support Recommendation).

Rationale (2):

Recent shifts in the national research landscape have resulted in new funding opportunities for large-scale, interdisciplinary, collaborative research. Its diversity and strength makes the UC research enterprise particularly well-positioned to address the growing interest in relations among systems across scales and modalities, i.e., physical, biological, social, economic, historical, cultural and technological. Addressing these relations requires collaborations across disciplinary boundaries, enabling synergies and producing knowledge that would not otherwise come from disciplinary research.

UC is unique in the world in its size and scope as a public institution. It is imperative that UC support researchers who want to pursue today's large-scale collaborative problems and challenges through world-class research.

While external funding for collaborative research in some fields is provided routinely, it is less common in other fields, especially in the HABSS areas. In addition, some exciting collaborations may stretch far more broadly than external funders currently envision—it is easy to imagine, for example, research that extends from the genetics laboratory to the philosopher's study to the archaeologist's dig for understanding human migration responses to local and global climate changes in the past.

UC internal research funds can help researchers compete for large-scale interdisciplinary awards, such as internal "grand challenge" seed funding competitions. Seed funding is particularly important for projects that break new interdisciplinary ground and require a period of initial research and development before they can become strong candidates for extramural funding or before the priorities of funding agencies catch up with them. Supporting such projects with seed funding in the startup phase helps the university leverage its support by attracting extramural funding.

UC must identify and remove barriers and disincentives to interdisciplinary and intercampus research. For instance, departmental and other academic units sometimes make it difficult to apportion researcher time and resources across units, or to properly divide and assign credit for cross-unit collaborations. Multicampus collaborations will be eased by the removal of barriers such as unnecessary requirements for subcontracting between campuses.

Rationale (3):

Graduate students are future researchers, scholars, artists, and teachers. They advance research because they bring in new ideas, facilitate collaborations, and are often the vehicle for the exploration of innovative approaches. Their training must reflect the symbiotic relationship between teaching and research. Many master's degree students and all doctoral degree students at the University of California engage in research as an integral component of their graduate education. Our graduate students must therefore be supported sufficiently to engage in their research and to complete their theses and dissertations. Stability in graduate student support for the duration of these studies is crucial. Only through attracting and supporting the best graduate students will our outstanding research programs continue to thrive.

UC-specific sources of dissertation research funding such as the Pacific Rim Research Program, Graduate Residencies offered by UCHRI, the UC Dissertation Year Fellowship Program, and others with a focus on supporting graduate research, give UC graduate students a competitive edge and shorten time to degree. Programs such as these should be expanded and supported by systemwide resources.

Postdoctoral researchers play key roles in many laboratories, departments and research units within the University of California community, generating innovative ideas and leading-edge research. In addition, postdoctoral experience is for many disciplines, a necessary "next step" in training after completion of a doctoral degree. The University of California President's Postdoctoral Fellowship Program (PPFP) was established in 1984 to encourage outstanding women and minority Ph.D. recipients to pursue academic careers at the University of California. PPFP offers postdoctoral research fellowships, faculty mentoring, and eligibility for a hiring incentive to qualified scholars in all fields whose research, teaching, and service will contribute to diversity and equal opportunity at the University of California. Expansion of this or similar programs would increase access and improve diversity among our postdoctoral scholars.

Undergraduate students also benefit from opportunities to participate in research in association with (and under the mentorship of) faculty, postdoctoral scholars and graduate students. UC undergraduates have showcased excellent research conducted in parallel or in addition to their courses. A relatively small commitment of support to inaugurate the creation of innovative programs, workshops, showcase events, or other activities that encourage undergraduates to participate in research and allow them to gain access to UC's world-class researchers would enhance the ability of UC to attract and train the best students.

Impact on Access:

Seed funding for high quality research topics before they are recognized by extramural funding agencies broadens the scope of education at UC to include emergent areas of interest among a more diverse student population.

Stimulating collaborative research programs across disciplinary boundaries increases the breadth of academic programs at UC and the proportion of students able to participate in research at both the undergraduate and graduate levels.

Improved funding for graduate students and postdoctoral fellows will offer much greater opportunity to increase the diversity of scholars who can participate in, and benefit from, a UC education and research training.

These measures will help UC to serve the educational needs of a highly diverse undergraduate, graduate, and postdoctoral population, providing them with research opportunities and experiential learning across broad areas of human knowledge.

Impact on Quality:

This proposal will help the University sustain excellence across the full range of disciplines, the full scale of research efforts, and across all campuses.

Increased incentives and support will enhance both the quality and the quantity of research in the humanities, arts, behavioral sciences and social sciences throughout the UC system.

Large-scale collaborative projects have the potential to make highly effective contributions to improving the lives of people in California, the nation, and the world.

Augmented funding for graduate students and postdoctoral scholars will greatly enlarge and enhance the potential pool of applicants to UC programs as improved funding will make our institutions more competitive for the top students and fellows. Providing appropriate funding to support students throughout their graduate studies and postdoctoral careers will serve to keep us competitive in attracting and graduating the most talented and sought after students. This will significantly enhance and sustain the quality of graduate education and postdoctoral training provided by the University of California for tomorrow's leaders.

Fiscal Implications:

Targeted seed funding to incubate new and innovative research efforts will bring a corresponding increase in extramural funding. This is particularly true in the humanities, arts, behavioral sciences and social sciences.

Internal nucleation of interdisciplinary collaborative research projects will position UC researchers to be more successful in competing for new sources of funding linked to broader interdisciplinary collaboration at the national and international levels.

Funding of Multicampus Research Programs and Initiatives (MRPI) and campus Committee on Research (COR) efforts on a competitive basis provides a familiar mechanism for disbursement of internal funds that can be augmented as needed.

Augmentation of graduate student support requires a serious investment of financial resources that may require further study of the University's policies on non-resident tuition and fees.

Challenges:

As state support for the University declines, the question arises whether sufficient internal funds can be found to implement the many facets of this recommendation. By many accounts and for many years, the University has used state funds to subsidize externally funded research, particularly in many STEM disciplines, but also in some HABSS fields. This subsidy has been necessary because indirect cost rates (around 52% across UC campuses) are lower than the true costs of supporting research facilities and infrastructure (estimated to be closer to 70% of modified total direct costs). To phrase it another way, the University collects over \$780 million in indirect costs on grants and contracts per year, yet it spends an estimated \$1.5 billion on facilities and administrative support for these grants and contracts (see Indirect Cost Recovery and Distribution Recommendation). To make up this shortfall, internal UC funds have been disproportionately used to support research that is aligned with the missions of funding agencies. If the University is successful in negotiating higher indirect cost recovery rates (see corresponding recommendation), then more of the internal funds will be available to implement

this recommendation and support high-quality research that does not yet appear in the dossiers of extramural sources.

Next Steps for Implementation:

A joint Academic Senate - Administrative task force should be charged with identifying new UC systemwide incentives and other mechanisms to support this recommendation.

The University should examine current policies and procedures, streamlining or enforcing them as needed to implement this recommendation.

The Academic Senate should ensure that criteria for faculty merit and promotion cases include appropriate recognition for collaborative or interdisciplinary work. This is particularly true in the HABSS fields, which traditionally emphasize single investigator research and scholarly activities.

Administrative support for the development of interdisciplinary research proposals should be forged in anticipation of faculty collaboration on large interdisciplinary projects.

WORKING GROUP FIRST ROUND RECOMMENDATIONS

Research Strategies

Multicampus and Interdisciplinary Research

Recommendation 3: Create multicampus, interdisciplinary “UC Grand Challenge Research Initiatives” to realize the enormous potential of UC’s ten campuses and three national laboratories on behalf of the state and the nation.

Rationale:

Many grand challenges for society in the 21st century will be global and many will require interdisciplinary solutions drawing upon large-scale, collaborative research efforts on multiple fronts: scientific, engineering, biomedical, agricultural, social, economic, cultural, ethical, and/or educational.

UC should create a framework (including a process, administrative and technological support) to support its campuses, national laboratories, and research units in multicampus, interdisciplinary “UC Grand Challenge Research Initiatives.” Such initiatives would be designed in consultation with the faculty, the public, and funding entities.

Initiatives would be chosen for their research value, social value, and “fit” with UC strengths, and also to reinforce or balance each other.

UC is uniquely positioned to take a leadership role in addressing grand challenge research problems of the 21st century. The University’s multiple campuses are unique for the scale, breadth, and excellence of research they produce across the full range of disciplines (as indicated, for instance, by the fact that UC is unrivalled in the number of academic programs that are ranked first in the National Research Council’s assessment of U.S. Research Doctorate Programs). No other higher-education research institution has UC’s combination of scope and excellence. None can rise to the same level as a match for today’s global challenges. Channeling the full spectrum of UC research around these grand challenges would allow the university to address issues with great state, national, and world impact.

Creating “Grand Challenge Research Initiatives” would have the following specific benefits for UC:

- a. New Funding Streams: To the extent that UC Grand Challenge Research Initiatives align with, or complement, nationally-identified challenges, the University’s considerable system-wide strengths would give it a competitive advantage for funding from major federal sponsors such as the NSF, NIH, and DOE. In addition, a consolidated UC front on grand challenges would act as a magnet for funding from private foundations and the National Endowments for the Humanities and the Arts (NEH and NEA).
- b. Meeting California’s needs: UC Grand Challenge Initiatives would allow UC to serve California by helping to catalyze next-generation synergies in information technology, green technology, biomedical research, nanotechnology, media and entertainment, social and cultural innovation, etc.

- c. New Research Paradigms: Grand Challenge Initiatives would drive innovations and efficiencies in inter-campus, interdisciplinary, and collaborative research arrangements and practices at UC.
- d. Supporting Basic Research: UC Grand Challenge Initiatives would help support basic research and training in the STEM disciplines, and it would augment support for the equivalent basic research in the arts, humanities, behavioral sciences, and social sciences.
- e. Public Engagement and Advocacy: UC Grand Challenge Initiatives would engage the public in a renewed spirit of consultation, responsiveness, and advocacy for research.

Impact on Access:

Grand Challenge Research Initiatives will improve the access of graduate and undergraduate students to research faculty, facilities, programs, and activities. This enhanced access will provide more students the opportunity to participate in innovative research and teaching programs across campuses including:

- The addition of more course credits for students in research-centered or laboratory courses.
- The combination of innovative teaching/research programs with public engagement to attract students to UC and the research professions.

Impact on Quality:

- a. Quality from intellectual synergy: The quality of UC research will be enhanced through interdisciplinary synergy.
- b. Quality from efficiencies: Greater efficiencies deriving from the Grand Challenge Research Initiatives will strengthen UC's research mission--e.g., through cost sharing of the next-generation information-technology and remote-conferencing resources needed for systemwide collaboration.
- c. Educational quality: New collaborative research organizations, practices, and methods fueled by UC Grand Challenge Initiatives will create opportunities for new kinds of integrated research-and-teaching. Undergraduate students, graduate students, and postdoctoral scholars will be exposed to a variety of laboratory, field, clinical, technological, archival, social, cultural, artistic, and other research.
- d. Maintain UC's world-class research quality: The Grand Challenges Research Initiatives will strengthen the already world-class research at UC. Even as UC seeks new ways to apply research to the emerging needs of California and the world, it should maintain its support for basic research. Basic research is the foundation for identifying and reacting to emergent, applied needs. Basic research is one of the core missions of the University. Today, when the private sector is increasingly challenged to provide for basic research, UC's importance in this role will only increase.

Fiscal Implications:

- a. Increased external funding. UC Grand Research Initiatives would allow UC researchers to compete more successfully for extramural funding.
- b. Channeled internal funding. A portion of UC's internal research funding would be channeled to support the creation of grand-challenge research initiatives.

- c. Cost savings. Certain cost savings may be realized through the sharing and pooling of research facilities, technologies, activities, student funding, etc. (see above).

Challenges:

- a. "Picking winners" from the top down. The role of UCOP and UC campus administrations should *not* be to pick or shape grand challenges. Instead, their role should be to create the conditions of consultation, collaboration, and support that foster the bottom-up emergence of grand challenge research initiatives from UC's deep talent pool of faculty and students. UC needs to tap its strength--individual researchers and research units -- to incubate innovative grand challenge initiatives suited to the resources of the UC system.
- b. Supporting research unevenly. UC Grand Challenge Initiatives should not have the effect of concentrating resources or leadership in just a few types of disciplines. It is also crucial that UC Grand Challenges support both applied and basic research.
- c. Constraining academic freedom. Safeguards must be created to protect academic freedom, prevent conflicts of interest, and establish a clear distinction between policy-relevant research and policy advocacy. Also, a process will be needed to guide the ways in which UC handles conflicting interests and power imbalances among different groups of the "public."
- d. Launching a program without funding. The Grand Challenge Research Initiatives will require either new internal seed funding or a collaborative effort to obtain extramural seed funds. It should not be started unless such funding and the large-scale extramural funding it ultimately seeks to attract is identified. After the budget cuts of the last few years, there is no capacity to fund this program without trimming other research programs.

Next Steps for Implementation:

Create a framework for developing UC Grand Challenge Research Initiatives

- a. Draw together a diverse group of stakeholders (e.g., faculty, students, and the public) to develop the framework to set up these initiatives.
- b. Design a time line and administrative and technological support.
- c. Design a process for wide consultation with the UC research community.
- d. Design a process for consultation with the public, government, and funding agencies.
- e. Design a process for evaluating, selecting, staging, and assessing the impact of these initiatives.

Other Options Considered:

Another option considered was only to recommend a renewed public advocacy campaign emphasizing UC's considerable research accomplishments and their impact on California and the nation. Thus, in addition to the Grand Challenge Research Initiatives, the Research Strategies Workgroup is continuing to consider a call for a broader campaign of public engagement and education to communicate the premier, basic research at UC and the transformative impact this research has on the lives of Californians. The public engagement would emphasize that continued support of basic research at UC is vitally important for the

University, the State, the nation and the world today. The basic research environment attracts top talent to the University. It makes essential contributions to the education of today's and tomorrow's teachers, researchers, leaders and innovators. Successful research students leave the University with the ability to contribute much more to society than they could beforehand. Basic research inspires new generations and creates knowledge of great intrinsic value. Of equal importance, history has shown that very often, basic research whose instrumental value cannot be determined during the time it is carried out has later been applied to solve problems of great societal value, as well as to discover next-generation challenges. Continued and enhanced support of basic research at UC is a wise investment that will create the knowledge that will help solve pressing problems with great local and global societal impact.

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WORKING GROUP FIRST ROUND RECOMMENDATIONS

Research Strategies

Risk Management and Administrative Efficiencies

Recommendation 4: Streamline risk management practices to increase the efficiency of the research enterprise, making optimal use of faculty researchers and administrative staff support.

Rationale:

Faculty researchers at the University of California are experiencing an ever-increasing administrative burden associated with their work. Some of this burden results from requirements imposed by external sponsors, while other burdens are related to regulatory requirements that apply to research activities. As a result, many faculty researchers believe that the University's administrative and risk management practices are making highly creative and innovative research more difficult. The University has adopted many research policies that, while based on statutory and regulatory requirements that are meritorious in their own right, provide an additional layer of control on research activities. This problem is compounded when campus administrators add their own interpretations of these requirements and policies to require a level of control that exceeds that actually required under the applicable regulations and University policies. Systemwide research policies should be reviewed to determine whether they should be updated and revised. Training should be provided to administrators to prevent additional restrictions not based on policy or regulation.

Faculty also have reported that minimum insurance requirements and risk management practices make it more difficult than necessary to enter into research collaborations with other partners, particularly international research partners. The Working Group urges a thorough review of claims or losses related to research activities to determine the frequency and size of insurance claims and settlements. This review should, to the extent feasible, review the University of California's experience along with the experience of other leading institutions. It is possible that such a review would disclose that the largest claims (e.g., laboratory disasters or losses related to a University-sponsored research boating accident) involve activities performed on-campus and/or by University employees and students, while the most common difficulties faced by researchers seeking risk management approval involve non-University research collaborators or subcontractors.

The Working Group recognizes that, even if the University is successful in paring back restrictions placed on research to those based only on applicable regulations, policies, and relevant claims history, a significant administrative burden will remain.

A January 2007 report of the Federal Demonstration Partnership's Faculty Standing Committee described the results of a survey of its membership. It found that, of the time a faculty member committed to federally-sponsored research, 42 percent of the time was devoted to pre-award and post-award administrative activities and not to research. Commentators have noted that this compares to only 18 percent two decades ago. This is a significant increase and represents time spent performing administrative tasks that could be more efficiently and perhaps more effectively, performed by administrative staff.

To maintain the level of research excellence for which the University is known, it should strive to be a leader in providing administrative support to its faculty. Providing increased administrative staff support would increase the return on investment in research. By providing additional administrative staff support to researchers, they can concentrate a greater percentage of their time on conceiving of and performing research. This will ensure a better use of the research dollars provided by the State of California and extramural sponsors. It is possible that a solution lies in the consolidation of research support services (including the possibility of clustering at intermediate levels) and the adoption of best practice models for the delivery of said services as recommended by the Funding Strategies Working Group. Such programs may provide greater expertise at a reduced cost to the research community. The Commission should review the efforts in this area that have already begun at UC Santa Barbara and UC Berkeley to determine the applicability of such programs systemwide, keeping in mind that centralization may not always be the most efficient solution.

Using trained specialists may provide higher expertise at reduced costs. Academic units often duplicate services in procurement, finance, human resources, and contract and grant administration at the departmental or decanal level. Such functions are often performed by management services officers who function as generalists and may have strengths in only one or two of the areas they are expected to serve. These functions could perhaps better be performed by specialists who, by training and experience, would be able to perform more efficiently and with greater expertise the administrative duties that are being performed by departmental staff and research faculty.

Impact on Access:

Streamlined administrative practices and decreased administrative burdens on faculty will result in increased research opportunities for students. Faculty will have more time available to conduct research with students at all levels.

Decreased administrative burdens on faculty will increase interaction between faculty and students. Providing additional support to faculty researchers reduces the time they spend on administrative duties and frees up their time for additional research, mentoring, and other educational interactions with student researchers.

Impact on Quality:

As a result of improved administrative efficiencies and decreased administrative burden, the University of California will be able to compete more effectively in research endeavors. By implementing a careful review of University risk tolerance and removing barriers to research activities that are not based on regulation or policy, University researchers will be able to compete more effectively with researchers at other institutions. In addition, efficiencies for the University research enterprise are expected to result from a consolidation of services. Skilled researchers would spend less of their time performing administrative tasks; the required administrative functions would be performed by individuals specifically trained in the particular area.

Fiscal Implications:

Certain kinds of activities, such as the performance of classified research on-campus, are limited by University policy. However, other research activities may be further restricted by campus or systemwide practices that are not based on regulations or policy. Such restrictions

can result in lost research opportunities and can inhibit the growth of the University's research portfolio. While initial outlays for increasing administrative support staff and streamlining research regulations may increase research expenditures, the University should see reduced costs and increased revenues relatively quickly.

Consolidating services in smaller units of staff with higher levels of expertise could allow campuses to provide the same, or perhaps higher, levels of service at reduced cost. In addition, the time saved by not having faculty perform these tasks could be more cost-effectively used for increased research productivity and teaching. This should result in reduced costs and increased research revenues over time.

Challenges:

There are likely to be challenges associated with identifying research obstacles related to regulatory or policy requirements. It will be important to analyze carefully the reported cases of unnecessary regulation. In many cases, the restrictions on research result from statutes and regulations that are outside of the University's control. Moreover, campus restrictions may be based on University policy that is well-founded. Care will need to be taken to separate restrictions that are based on a campus practice without a foundation in regulatory or policy requirements from those that implement applicable requirements.

There also may be challenges associated with obtaining data on research-related claims; however, the University has begun significant efforts to collect information on non-campus, research-related insurance claims in the past several years. While the system has decades of data related to on-campus claims, it is still collecting information on claims related to research collaborators and off-campus research. A sound risk management program will be data-driven and will evaluate claims that are truly related to research activities. Fortunately, the risk management offices at the campus and systemwide level already have an incentive to put together comprehensive and accurate data on research-related claims. Such data can be used to lower the University's premiums on the coverage provided by outside insurers.

Redirecting administrative support funding from the departmental level may prove challenging; however, resources will need to be directed to the consolidated units to enable those units to retain the necessary expertise to perform the work formerly performed at the departmental level. Departments can be expected to resist such redirection of funding without convincing evidence that an existing or superior level of service can be provided at the same cost.

A final challenge regards implementing appropriate structures and mechanisms for accountability for performance by research support services. It is possible that support services are best provided at the division level for certain areas of research such as the humanities, arts, behavioral sciences, and/or social sciences. In other cases such as specialties within schools of medicine, services may be more effectively delivered at the departmental level. The Working Group notes that the organizational support structure could vary by discipline. In addition, consideration must be given to the size of the resulting consolidated unit. A balance must be struck between an unnecessary duplication of services at the departmental level and having the services too far removed from the investigators. All structures must be accountable for quality and timeliness of performance of services to faculty members.

Other Options Considered:

One option considered was a recommendation for increased administrative services based on the existing model of providing such services through departmental management services officers. While such increased support would secure many of the benefits described above, this also would require the identification of a new source of funding. One such source would be the redirection of recovered indirect costs related to campus research. Increased recovery of indirect costs related to research would facilitate the redirection of a portion of these funds without decreasing the funds available for other areas of University operations.

Other options for providing increased administrative support would require changes at the federal level. For example, the Office of Management and Budget (OMB) could decide to lift the 26% cap on administrative indirect costs that may be charged to federal grants. In addition, OMB could revise Circular A-21 to provide greater ability to directly charge administrative costs related to performing the research.

Next Steps for Implementation:

Data must be collected on restrictive practices, such as extra-legal requirements that are inhibiting research. In addition, data should be collected on research-related claims and losses to analyze areas in which the University may be overly risk averse.

Campus implementation models must be reviewed. Certain campuses, notably UC Santa Barbara and UC Berkeley, have begun to use consolidated research support services and have developed some working experience illustrating the benefits and difficulties associated with such models. The Working Group recommends that this experience be reviewed to determine the feasibility of implementing such models at other campuses.

Works Cited:

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WORKING GROUP FIRST ROUND RECOMMENDATIONS

Research Strategies

Advocating for UC Research at a National Level

Recommendation 5: Proactively demonstrate the significant and long-lasting benefits that UC research provides to California and the nation, including the development of new knowledge, new industries, and new opportunities for economic expansion and employment. In addition, UC should speak in a strong and clear voice in advocating at the national level for increased and sustained investment in research and knowledge development.

Rationale:

Basic research creates new knowledge, and new knowledge fuels social mobility, global leadership, and economic health. UC is America's best public research university. The University of California and America's research universities are the envy of nations around the world.

Given that the federal government underwrites so much of the basic research conducted at U.S. research universities, laboratories, and research organizations through federal funding agencies, it is critical that this federal support be sustained or, hopefully, increased.

But research funding in the United States stands on the precipice of potential disaster. Although the President's budget calls for a steady increase in the financing of research, the funds provided in the American Recovery and Reinvestment Act for research are about to expire. At the same time, fiscal pressures are placing the more established sources of support for research in jeopardy.

While this challenge is certainly not a problem unique to California, it has serious potential consequences for California and the UC system. It is crucial that UC take leadership in working with America's research universities and partners in industry and government to demonstrate the benefit of research, and to advocate and ensure that federal funding of university research increases.

Impact on Access:

With increased research funding and a healthy economy, more funds will be available to ensure broad access to education at the University of California.

Impact on Quality:

Increased Federal funding for basic research will create more opportunities for faculty members to compete for research grants and will stimulate innovation and research excellence at UC.

Fiscal Implications:

Sustained Federal investments in basic research are essential for the financial stability of the University. They will ensure that the research enterprise at UC remains properly funded.

Challenges:

The U.S. Congress is under considerable pressure to reduce Federal budgets. As a result, it may look for short-term monetary gains and neglect basic research and its long-term impact on economic health.

Next Steps for Implementation:

The University of California should advocate for increased Federal investments in basic research in collaboration with key partners and structure their advocacy to communicate that basic research is critical for social mobility, global leadership, and sustained economic health.