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CALIFORNIA CONGRESSIONAL DELEGATION

Dear Members of Congress:

As the world's largest public research university system, the University of California (UC) is confronting many of the worst impacts of the virus all at once. We are a health care system saving lives; a research enterprise seeking cures and vaccine; an education system transitioning from classroom to remote instruction; and an employer working hard to protect our workforce in the face of economic downturn. In a time of crisis, UC is ready to help the nation overcome obstacles resulting from the inability of researchers to perform their work, as well as shortcomings in training the research workforce that can advance innovation.

During the 2008 recession, Congress enacted the American Recovery and Reinvestment Act to encourage an economic stimulus, which included significant investments in research and development. The global pandemic of severe acute respiratory syndrome coronavirus-2 and its associated disease (COVID-19) present a similar, but more urgent need to preserve employment, stimulate the economy and foster institutions of higher education as they perform critical functions in education and research that are known research-driven economic engines and hubs for medical innovation.

Accelerated federal support is vital to preserving and advancing research and innovation solutions for the immediate and long-term needs of California, the nation and the world. In a situation as unprecedented as the one now facing our society, our nation is dangerously close to ceding U.S. leadership of the world's technology enterprise.

The attached document includes research-related priorities UC would like to see addressed in future recovery and stimulus acts, which, if passed, will arm our nation's research enterprises with the resources necessary to aid in our country's recovery and allow us to rebuild once the crisis is over. As legislation and proposals are further developed, UC will provide additional comments and recommendations. For more information or questions regarding UC's priorities, please contact Director for Research

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Sincerely,

Theresa A. Maldonado, Ph.D., P.E.
Vice President for Research and Innovation
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UNIVERSITY OF CALIFORNIA

University of California's COVID-19 Research-Related Priorities

RECOVERY PRIORITIES

While researchers across the University of California (UC) system are currently engaged in more than 300 research initiatives designed to combat COVID-19, most other research has been suspended or slowed down due to closures of laboratories. With these setbacks, the University's research workforce is also impacted, especially post-doctoral fellows, graduate students and technical support staff. To ensure the research enterprise rebounds quickly, several congressional actions are needed.

UC supports:

- To help researchers make up for lost time and resources spent during COVID-19 suspensions and/or slowdowns, UC urges additional emergency supplemental funding for automatic extensions for grants and cooperative agreements to allow researchers to meet their commitments on existing projects. Lost resources include ramp down/up costs, and caretaker maintenance costs, including core facilities. Actions such as automatic extensions in time and full funding, rather than the requirement of administrative applications and reviews, would result in cost and time efficiencies and eliminate unnecessary workload burden for both agencies and research institutions.

- Agencies need to balance between addressing suspensions/slowdowns of existing awards and processing new proposals/solicitations with an emphasis on the former. However, new proposals for assistant professors should be given priority.

- The Office of Science and Technology Policy (OSTP) should coordinate agencies' responses in order to reduce administrative burden for both the researchers and the agency staff (e.g., no cost extensions should be automatic; researchers that choose to redirect work to pandemic-related research should not have to seek permission; immediately approve payment of staff that were unable to perform work related to the award owing to the stay at home orders).

    - Streamline the process to determine the appropriate size of supplements for existing awards based on factors such as research discipline, infrastructure and the number of students and staff. It will be impossible to respond to the urgent funding needs of the research community on a case-by-case basis without incurring insurmountable delays.

    - Encourage and facilitate inter-agency opportunities to leverage federal dollars for greater immediate impact on the research enterprise.

    - Streamline opportunities to execute rapid, efficient funding vehicles across agencies (e.g., National Science Foundation (NSF) Early-concept Grants for Exploratory Research (EAGER) and Rapid Response Research (RAPID);

Defense Advanced Research Projects Agency (DARPA) Other Transaction Authority (OTA)).

- Research Infrastructure—Universities are home to some of the brightest minds working to address COVID-19, but often the tools they are working with are aging or inadequate. To enable timely advances, UC urges funding for competitive research infrastructure and instrumentation programs across the major research agencies.

- Post-Doctoral Fellows—Academic hiring has been delayed and jobs in industry will be scarce. The U.S. cannot afford to lose the current cohort of postdoctoral fellows. They are critical to rebuilding and continuing research programs, especially those that were ramped down due to the pandemic. UC recommends extending the term for all federal postdocs by one year. UC also recommends supplementing postdoctoral fellowship programs to increase the number of postdocs in the next cohort.

- When crises emerge, the U.S. needs to move quickly. Unfortunately, many agencies, even with emergency supplemental appropriations, are too slow to execute their research priorities. “Rapid turnaround” for review alone can take up to 60 days. UC recommends raising the $200,000 cap on NSF’s RAPID and EAGER grants. Additionally, the ceiling for NSF research supplements should be increased from 20 percent to 40-50 percent. Additionally, the National Institutes of Health (NIH) should create a similar program. Finally, agencies should consider utilizing several expedited contracting vehicles, such as DARPA’s OTA model.

STIMULUS PRIORITIES

If the U.S. is to remain a world leader in innovation, significant investments will be needed to revitalize the research enterprise, supporting the array of investigations spanning fundamental science to applications with direct societal impact. These investments should not only include funding for research, but also for our future scientific workforce and aging research infrastructure and instrumentation.

CROSS-CUTTING PRIORITIES

While significant investments in research across all agencies is a priority for UC, the university also encourages Congress to consider a number of cross-cutting priorities that would ensure the nation remains responsive to critical national needs, and competitive in the global landscape of science and technology. Achieving this goal will require investing in a diverse workforce, as well as training the next generation of faculty to drive the research enterprise. At UC, all research is inextricably linked to the University’s education mission. The unique skills of the workforce trained by UC is a competitive advantage of California’s innovation economy.

UC supports:

- Joint Cross-Agency Initiatives
    - Science, technology, engineering, mathematics and medicine (STEMM) research has advanced in ways that make clear how cooperative transdisciplinary efforts produce transformative outcomes. However, bureaucracy and budgetary silos

keep the efforts separate, inhibiting communications and progress. Congress should encourage agencies to develop joint programs, including co-funding, that could break the silos, and ensure research progress. In particular, in response to COVID-19, there should be more responsive, durable interactions between the agencies in this time of precision medicine and knowledge networks that demand high performance computing and artificial intelligence (AI).

- Crisis Preparedness Research and Development
    - UC encourages research to inform pandemic preparedness, including lessons learned, and to develop forward-looking strategies for future major crisis preparedness, while addressing societal implications and responses both domestically and internationally, including cross-border issues.
    - UC encourages research to improve the nation's preparedness and societal resilience in relation to social, local, national and international vulnerabilities; cybersecurity; food, water and energy security; housing security; inter-dependent infrastructure (utilities, communications systems, transportation systems, data centers, etc.); economic/labor security; and societal resilience. We encourage expanding current national initiatives, such as domestic manufacturing initiatives, to prepare for future needs.
- Research Workforce Development
    - Diversity—UC encourages increased funding opportunities to diversify the workforce by incorporating more underrepresented minorities – i.e., the new majority in many regions of the U.S. and California – in the pipeline at several levels: increasing the number of women and minority faculty, and increasing the recruitment and retention of minority tenure-level faculty and senior level administrators. Diversifying the research workforce should be amplified through targeted funding across all agencies for minority-serving institutions.
    - Graduate Students—Graduate students are the backbone of research and innovation at institutions across the country. This means supporting young investigators with grants that promote innovative research and include mentoring and professional development components. Training the next generation of faculty also requires mentoring the mentors themselves. Therefore, UC recommends that the budgets for graduate research fellowship programs should be supplemented to increase the number of these future researchers.
    - Very Early Investigators—the U.S. will have a class of new researchers and faculty members who have had limited ability to connect with programs, conferences and program managers. Loss of months of research experience, career development and networking opportunities at conferences can have long-term detrimental effects. UC recommends federal agencies create a very early investigator award to help address this potential delayed career development, and encourage faculty to apply for career awards.

- Enhanced International Cooperation
    - With COVID-19's rapid international spread highlighting the connectedness of our planet, federal agencies should significantly enhance their collaboration and coordination with international counterparts to prevent future outbreaks. There is much to be improved in the realm of international collaborative research activities, and the significant interest from the research community for such collaboration is not currently matched by agencies capability or focus to enable jointly-funded activities.
- Innovation and Entrepreneurship
    - UC encourages additional investments for agencies' I-Corps programs, which provide entrepreneurship training for startups and support students, faculty and alumni in launching startups and generating economic development by creating jobs and growing businesses.
    - UC encourages additional funding for agencies' programs that infuse entrepreneurial skills across STEM, social science, medical, arts and humanities disciplines, that both train the next generation of a highly skilled workforce and prepare students to foster innovation in existing industries and lead the digital transformation to meet market demands.
    - UC encourages funding for proof-of-concept/seed grant programs, which support technology commercialization and startups at a critical stage of growth. Proof-of-concept is the riskiest stage for investors. Investment dollars have shifted to later-stage funding rounds, hence an increased need for funding to bridge the gap and help startups to survive the "Valley of Death." Funding should be included in NSF's Convergence Accelerator program, the Department of Energy's (DOE's) Advanced Research Projects Agency-Energy (ARPA-E) and the Department of Defense's (DoD's) Proof of Concept program.
    - UC encourages new grant programs that are needed to target startups in pre-product and pre-revenue stages, which, due to their verticals and development stage, are ineligible for existing federal funding. These startups are the building blocks of new industry development, and the impact of their failure is amplified because the loss of their research, technology and networks will take time to rebuild.

National Institutes of Health

UC, with more than 800 research centers, institutes, laboratories and programs spanning ten campuses, five medical centers, three national laboratories and numerous specialized research facilities, is the top recipient of funding from National Institutes of Health (NIH) and performs research representing more than half of the NIH funding distributed to California. If the nation is to continue grappling with emerging threats, such as COVID-19, as well as improve the health of Americans and the quality of their lives, the U.S. must continue to invest in biomedical research.

UC supports additional funding focused on:

- Basic and clinical research on pandemics and sustainable preparedness and response systems.
- Research for NIH's major initiatives that were funded via the 21st Century Cures Act, such as Precision Medicine, Cancer Moonshot, BRAIN Initiative and regenerative medicine.
- Research on mental health disorders to better understand origins, treatment and prevention. Depressive disorders were the leading cause of disability before the pandemic and in particularly stressful and uncertain times, an emphasis on mental health research is necessary to aid in recovery.
- NIH postdoctoral fellowship programs, which support advanced and specialized training in basic and clinical research through intensive, mentored research project experience that encourages the development of independence, innovation and creativity in a highly productive research setting.
- Research emphasizing the unique needs of at-risk populations, behavioral health, bioethical issues and the use and integration of new technologies in the delivery of health care.
- Robust funding (no less than $1 billion) for public and non-profit institutions to expand, remodel, renovate or alter and instrument existing research facilities or construct new research facilities, including major instrumentation grants for acquisition of biomedical measurements and HIPAA compliance secure research data and computing environments. Additionally, funding should be provided to upgrade labs to accommodate researching SARS-type viruses.
- Authorize NIH to create centralized, express seed funding distributed directly to universities to enable immediate action on pandemic research projects so that no time is wasted writing proposals and waiting for funding agency decisions in a rapidly spreading outbreak. Ideal models could be DARPA's OTA. Additionally, centers of excellence could be authorized.

U.S. Department of Agriculture

With UC serving as a vital partner, California continues to be the nation's top agricultural state. For more than a century, California's $50 billion agricultural industry has depended on UC for the stream of new technologies and research breakthroughs that are needed to stay competitive and be responsible stewards of the land. UC's critical food, agricultural and natural resources research and public outreach activities serve all Californians and, ultimately, the nation. UC works hand in hand with farmers and industry to enhance agricultural markets, and deploy scientifically tested production techniques.

UC supports additional funding focused on:

- Significant funding for the National Institute of Food and Agriculture program for carrying out cooperative extension and education programs in response to exigent circumstances

created by COVID-19 to ensure continued programming, including for such programs as 4-H.

- Significant funding for the capacity programs (Hatch, Smith-Lever and McIntire-Stennis). These programs provide critical "people power" and research talent to enable states to connect local issues with the power of research. From expediting water quantity and efficiency improvements to better informed wildfire prevention and recovery, increased funding for the capacity programs are crucial.

- Significant funding for the Agriculture Food Research Initiative, which enhance the competitiveness of American agriculture, ensure the safety of the nation's food supply, improve the nutrition and health of communities and sustain the environment and natural resources.

- Significant funding for the Specialty Crop Research Initiative, which support research and extension that address key challenges of national, regional and multi-state importance of sustaining all components of food and agriculture, including conventional and organic food production systems.

National Science Foundation

UC researchers are awarded more National Science Foundation (NSF) funding than any other institution in the country. With NSF funding, UC advances knowledge, builds technical expertise, drives innovation, helps to create new businesses and trains tomorrow's scientific workforce. Strong funding and prioritization of programs and initiatives for NSF across all agency directorates and research disciplines is critical for UC scientists and graduate students to tackle our nation's greatest challenges and expand knowledge of our world and the universe.

UC supports additional funding focused on:

- Infrastructure—UC recommends no less than $1 billion for the mid-scale infrastructure program. A 2018 request for information that called for mid-scale research infrastructure ideas produced $1 billion worth of high-impact projects as reported in a recent National Science Board report.

- Collaborative Research—UC recommends increased funding for anticipated collaborative center opportunities that may take place in the coming year, including Science and Technology Centers, Engineering Research Centers, Quantum Leap Challenge Institutes, Biology Integration Institutes and National Artificial Intelligence Research Institutes (NAIRI). Following the recent NAIRI model, when other agencies collaborate and co-fund these center initiatives, NSF can leverage its basic research investments and translate impact to the mission agencies.

- People—UC recommends increased funding for the CAREER and the Graduate Research Fellowship programs to support larger cohorts of these early career scholars. Additionally, with the expected slow economic recovery and impact on the job market, UC recommends supporting additional robust funding for the postdoctoral fellowship programs and innovative partnerships to support postdocs who will likely face a weak economic environment. For example, in 2009 there was the Computing Innovation

Fellows program, which was an NSF-Computer Research Association (CRA) partnership created to support postdocs in computer science for several years. This partnership may provide a programmatic model for engaging postdocs in potentially similar situations following the COVID-19 crisis.

National Aeronautics and Space Administration

Multi-decades of partnerships between National Aeronautics and Space Administration (NASA) and UC has led to scientific discoveries and technological innovations and high-quality education. NASA's support of UC research has facilitated interdisciplinary research and education, bringing together academia, government and the private industry. This allows the fulfillment of NASA's vision to discover and expand knowledge for the benefit of humanity.

UC supports additional funding focused on:

- The Science Mission Directorate and the centers of excellence in each program, including the Space Technology Research Institutes.

- People—UC recommends increased funding for NASA graduate fellowships and other early career programs. NASA Science and Education programs support technology development, research and observations. These programs also provide critical support for graduate students and postdoc scholars.

- Infrastructure—UC recommends funding to modernize and upgrade university infrastructure that supports development and operation of NASA science missions.

National Oceanic and Atmospheric Administration

Together, UC and the National Oceanic and Atmospheric Administration (NOAA) have made significant advances in ocean and weather observation systems improving scientific understanding of marine and atmospheric conditions and living marine resources. UC campuses lead one of NOAA's 16 cooperative institutes (CIs). CI partnerships provide NOAA with efficient access to key innovations at the nation's primary homes of science, social, learning and research, while maintaining the flexibility to adjust workforce capabilities with evolving needs at NOAA.

UC supports additional funding focused on:

- Research—Increase extramural research opportunities and sustained observing programs across NOAA to increase the effectiveness of observations, monitoring and modeling to help states manage their infrastructure, agricultural resources, fisheries, water resources and natural disaster planning and response. NOAA's competitive research programs, sustained observations and regional information serve as a suite of scientific needs from short-term weather forecasting to long-term oceanic and atmospheric analysis.

- Infrastructure—Increasing funding for the infrastructure and equipment needed to sustain ocean and atmospheric observing programs, including modernizing research vessels, observing platforms, unmanned surface and subsurface vehicles, artificial

intelligence and quantum computing deployment, and expanding observational suites to operationalize observations of e-DNA and 'omics for ecosystem/fisheries observing programs. Along with improving forecasts, increases in sustained ocean observing systems will improve competitiveness and create opportunities for increased U.S. exports.

- Workforce—Expand and increase funding for workforce development and training programs like the Sea Grant College Program, Quantitative Ecology and Socioeconomics Training Program, the Education Partnership Program and public science and formal and informal educational activities in museums, aquariums and zoos. These programs support training of the next generation of experts needed to support mission critical priorities such as unmanned systems development, blue technology, forecasting and aquaculture.

Department of Defense

The Department of Defense (DoD) is responsible for providing the military forces needed to deter war and protect the security of our country. Through research funded by DoD, UC is able to make advances in areas of national security. In addition, DoD also funds applied research and advanced technology development, which allows our nation to advance in other scientific areas as opposed to basic research funded by other agencies.

UC supports additional funding focused on:

- Basic Research—Many of the technologies the nation uses today derived from DoD basic research funding, including the Internet, GPS and machine learning. If the nation wants to succeed in future global competition, the U.S. cannot underinvest in the long-term basic research that will provide the military with new transformational capabilities. The National Academies and Defense Science Board recommend the basic research budget compromise at least 20 percent of the overall science and technology budget. Unfortunately, the current budget falls short by $1.5 billion. UC recommends a robust increase to realistically close this gap.

- Infrastructure—The Defense University Research Instrumentation Program helps ensure universities have the appropriate equipment needed to conduct cutting edge research of importance to DoD. Since the department has received approximately $300 million in unfunded proposals each of the past three years, UC recommends $300 million for this important program.

Department of Energy

The Department of Energy (DOE) ensures America's security and prosperity by addressing its energy, environmental and national security challenges through transformative science and technology solutions. It is the nation's leading funder of the physical sciences and supports researchers across all UC campuses. The University also plays a critical role in the stewardship of the three national laboratories that are critical to the nation's innovation and national security missions—Lawrence Berkeley, Lawrence Livermore and Los Alamos—advancing discovery science and driving innovative solutions across a broad swath of scientific, energy and environmental challenges. The partnership among the DOE, the national labs, UC and industry is critical

to the nation's innovation ecosystem and to the development of a national workforce capable of meeting today's and tomorrow's biggest challenges.

UC supports additional funding for the Office of Science, Energy Efficiency and Renewable Energy and ARPA-E focused on:

- Infrastructure—Investments in infrastructure, new scientific instrumentation and novel research facilities and tools at the department's seventeen national laboratories to ensure the delivery of internationally leading discovery science and technology creation, and to meet the nation's most difficult challenges. The national labs are the jewels in the nation's science and innovation ecosystem. Thousands of University of California scientists and students from every campus utilize the national scientific user facilities and other resources at the national labs to do their research—including research into the structure and function of viruses so critical to understanding the current pandemic. Unfortunately, many of the labs are decades old and have critical infrastructure needs. Without strategic investments now, these decades old infrastructure inadequacies will limit the labs' effectiveness and threaten U.S. innovation and national security. Therefore, UC recommends $27 billion for DOE national laboratory infrastructure improvements.

- Workforce—Ultimately, no amount of investment in scientific infrastructure will reap the needed returns on investment without an adequately trained and motivated research workforce. In direct international competition for the world's best and brightest, the U.S. must aggressively provide compelling opportunities to attract and retain internationally recognized talent. Therefore, UC urges Congress to triple funding for DOE Office of Science graduate and postdoc fellowships, and for early career researcher awards.

- Research on ensuring the health and economic security of the nation in the face of global pandemics and their associated disruptions, including reliable, efficient energy management in medical facilities, investigations into deep energy de-carbonization of electricity, particularly in energy and transportation sectors, will provide pathways and strategies to achieve needed energy security, along with economic, employment and health co-benefits.

- Basic research into carbon capture and sequestration methods in land use and in industrial sectors, in order to stabilize the atmospheric concentration of carbon dioxide, and to achieve negative emissions.

Department of Transportation

The Department of Transportation (DOT) ensures that our nation has the safest, most efficient and modern transportation system in the world, which improves the quality of life for all Americans. Funding from the DOT can provide UC with opportunities to advance U.S. transportation-related technologies and expertise, which will help with COVID-19 recovery efforts.

UC supports additional funding focused on:

- Increasing the ceiling for funding to the University Transportation Centers (UTC) Program, which is critical to ensuring that a broad range of transportation research can

continue to be conducted by universities, which are at the forefront of research that enables the advancement and deployment of transportation technologies. Providing additional funding for the UTC Program could help with COVID-19 economic recovery efforts by allowing for additional research to be funded to support the development of next generation smart transportation technologies and systems. Additionally, UC recommends authorizing additional centers of excellence, along with additional funding, to help tackle the number of critical transportation research topics.

- Increasing the extramural research opportunities. Many UC campuses (Berkeley, Davis, Irvine, Los Angeles and Riverside) have significant expertise and could provide valuable transportation innovation. However, much of the funding is intramural. At a minimum, the intramural research should be partnered with more extramural research opportunities.

- Authorize the creation of an Advanced Research and Development Agency-Transportation (ARPA-T). Using ARPA-E as a model, the department should have an agency that focuses on funding high potential, high impact transportation research that are too early for private sector investment. Several UC campuses already have transportation-related ARPA-E projects and can leverage the UC existing tech-to-market expertise.

U.S. Agency for International Development

The U.S. Agency for International Development (USAID) has been instrumental in reducing pandemic threats and promoting global health. Through its Emerging Pandemic Threats program, global capacity has been strengthened for the detection and discovery of zoonotic viruses with pandemic potential. Funding from USAID can provide UC the opportunity to advance understanding on the behaviors, practices, and ecological and biological factors driving disease emergence, transmission, and spread; and help prevent the next COVID-19 type outbreak.

UC supports additional funding focused on:

- Increasing USAID research funding, with a focus on identification, surveillance, detection, prevention and management of zoonotic diseases on a global scale.

- Enhanced coordination between USAID, NIH and other federal agencies to improve timely communication of findings.