Multilocation Research Collaboration at the University of California

The Challenge: Opportunities and Barriers, and When Best to Collaborate across Locations

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UC-CORO Systemwide Leadership Collaborative
2015 Northern California Cohort
Multilocation Research Collaboration at the University of California

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I.   EXECUTIVE SUMMARY

The UC-CORO Systemwide Leadership Collaborative is a leadership training program for current and future UC administrative and faculty leaders. This leadership program focuses on the benefits of inter-campus and cross-functional involvement. As a part of the program, the Northern California participants (referred to as the "cohort") pursued a leadership project proposed by Sandra Brown, Vice Chancellor for Research, UC San Diego, aimed at investigating and addressing the challenges, barriers, and opportunities associated with research collaboration across the UC system.

Over the course of our investigation into the barriers and incentives for cross-location collaboration at UC, we gathered information and opinions from over 75 UC stakeholders across campuses, disciplines and types, and years of experience, through interviews with university and campus senior leaders, responses to surveys, and follow-up interviews with selected survey respondents. The information collected and resulting observations are largely representative of research administrators within the UC system. Further work would be necessary to also fully include principal investigators and on-the-ground researchers, who did not respond to our outreach in significant numbers.

In an era where cutting edge research is becoming increasingly multidisciplinary and Federal research funding is progressively emphasizing larger and interdisciplinary approaches, our data showed that UC has a unique opportunity to respond by leveraging the resources and vast capabilities within its system. Our survey results provided us with historic and current realities of the challenges associated with systemwide collaborative efforts within UC. But we also heard ideas for successful mitigation of these barriers and challenges that could enable UC to respond to systemwide collaborative opportunities to create sustained funding for addressing some of the most vexing problems of our time. Some key observations stemming from the cohort's outreach to stakeholders are summarized in the following.

First, collaboration, in and of itself, is not always optimal. A majority of stakeholders felt that cross-UC research collaboration is warranted under specific criteria and circumstances such as specific funding opportunities calling for interdisciplinary collaboration or funding opportunities from the state of California. A significant proportion of stakeholders did not feel that collaborating with another UC campus always resulted in a competitive advantage versus collaborating with another academic entity.

UC's culture also emerged as a repeated theme from the stakeholders. The culture of UC – entrepreneurial, creative, and independent – was cited as both a barrier and enabler to collaboration, as where investigators approach the same funding source separately, when a combined approach could be significantly more powerful.

Stakeholders also identified several critical success factors for powerful collaboration, including:

- Relationships – trust and a shared goal must be in place between the relevant investigators
- Larger vision and leadership support for major and multi-faceted research collaborations to succeed – there needs to be a vision that is sufficiently compelling to warrant researchers taking the time and effort to work across campuses.
- Leadership – an influential leader who has had success in collaboration and is externally focused on how to influence sources of state and federal funding.
- Funding – the availability of funds was throughout cited as a key foundational factor (as well as a barrier, in the case of a lack of funding).

Interviewees consistently indicated that UCOP could be an important enabler in research collaboration. In addition to vision and leadership, UCOP can play a role in addressing funding issues, whether by facilitating the funding application process, reducing associated internal bureaucracy, or influencing the state and federal funding agenda.

Finally, stakeholders cited many examples of existing successful UC collaborations. Drilling down into the specific factors underlying the success of each using objective criteria was beyond the scope of this project but that may be a fruitful future line of inquiry.

Taken together, we believe the stakeholders' responses point to the utility of a coordinated effort to address the barriers and identify unique opportunities for future collaboration. We recommend the establishment of a Transformational Research Collaborative made up of a group of key administrators, academics, and researchers, which will be a multilocation/ multidiscipline facilitated consortium tasked with identifying existing structures and new solutions to support broad UC research collaboration on the next large challenges, and which can take up the work of further inquiry into the topics identified in this report.

II.   INTRODUCTION

The Context for this Report – The UC-CORO Systemwide Leadership Collaborative

The UC-CORO Systemwide Leadership Collaborative is a leadership training program for current and future UC administrative and faculty leaders. This leadership program focuses on the benefits of inter-campus and cross functional involvement, with overarching outcomes including (1) enhanced leadership abilities through exposure to and practice with a broad array of leadership tools and concepts that emphasize self and group awareness, interpersonal communication, and insightful analysis of resources and systems; (2) deepened connection to peers and colleagues and an on-going network of leaders that transcends boundaries across UC; (3) increased confidence to initiate positive change and innovation across all levels of UC and improved relationships between UC leaders; and (4) the beginning of a cultural shift across the UC system that will yield more collaborative partnerships.

As a part of the leadership program, the Northern California participants (referred to as the "cohort") pursued a leadership project proposed by Sandra Brown, Vice Chancellor for Research, UC San Diego, aimed at investigating and addressing the challenges, barriers, and opportunities associated with research collaboration across the UC system, including all campuses, the UC-managed national labs, and the Division of Agriculture and Natural Resources.

Through outreach to numerous stakeholders, the cohort recognizes the widely shared opinion within UC that the university has great potential to create and manage the large, multi-location, multi-disciplinary research efforts needed to compete for new and untapped funding, which promise advances in fields as wide-ranging as those in social equity/social justice studies and digital humanities, to those in biomedical engineering and precision agriculture. Our goal with this project was to identify barriers to broad, successful collaborations across the UC system and provide actionable recommendations to address these barriers.

Structure of the Report and Limitations

This report presents information and insights derived from our investigation of this problem statement. Section III ("The Group Project – Selection, Methodology") describes how we determined the scope of the project, which ultimately focused on gathering information and opinions from UC stakeholders. Section IV ("Results of Stakeholder Surveys, Interviews, and Leadership Interviews") summarizes the results of that information/opinion gathering. The quotes that are interwoven into the body of the report were culled from the surveys and interviews and selected to punctuate our findings.

The report's recommendations section is prefaced with the following caveat: while we believe our work on the project has accumulated a wealth of information and insight into research collaboration within UC, this effort was not sufficient to provide conclusive recommendations to the posed problem. Rather, our work illuminates UC stakeholders' thinking about collaborative research within UC, which is a solid jumping off point for further and deeper inquiry on this topic.

Accordingly, Section V ("Recommendations/The Next Big Challenge – A Possible Approach") provides the cohort's recommendations for next steps to continue the important work of positioning the university to leverage its resources, both human and physical/infrastructure, toward bold and complex collaborative research.

Finally, the Appendices primarily serve to provide additional detail on the information we gathered during the course of the project.

III. THE GROUP PROJECT: SELECTION AND METHODOLOGY

A. UC-CORO Process: Project Selection

In our fourth monthly UC-CORO session of ten sessions in total, we had the opportunity to evaluate two possible group projects. Utilizing consensus decision-making tools introduced by the CORO curriculum, we selected "Research Collaboration Across UC including the Lab and ANR," sponsored by Sandra Brown, Vice Chancellor of Research, UC San Diego, that identified the need for greater coordination in pursuing more effective and strategic pathways to multi-location research projects (Appendix A).

"Problem/Opportunity Statement: *What are the barriers to research collaborations across the University of California?*

Cutting edge university research is becoming increasingly more collaborative and multidisciplinary for a multitude of reasons. These reasons include the increased complexity of many of the most important questions, and the changing patterns of Federal funding that emphasize larger, interdisciplinary approaches rather than single investigator grants. UC has a unique opportunity to address complex research problems because of the breadth of our systemwide research capabilities, and by doing so provide the best education for our students, create new knowledge to address some of the most vexing problems of our time, and create public benefit for California and beyond.

As the largest research university in the nation (if not the world) comprised of 10 quasi-autonomous campuses, UC faces an even greater challenge than a single campus institution in creating and managing the large multicampus, multi-disciplinary research programs needed to compete for these new Federal funding programs. However, it has been said that is easier to collaborate with other institutions than it is to collaborate within UC. Identifying the barriers to, solutions for, or incentives to stimulate broad collaboration across UC could help unleash unrealized potential of our university and ensure that we remain a preeminent research institution that provides the greatest value to our faculty, our students, and to our State and Nation."

B. Project Process and Methodology

Having selected a project, and with only six remaining face-to-face UC-CORO sessions, we rapidly began work to reach completion by November 2015. The first task was to define and narrow the vast scope of the project. Our first proposed project scope was a Funding Application Framework/Portal Concept. This concept was derived from early indications that there was no way to formally or clearly facilitate systemwide research collaboration funding applications on a large scale. A subset of the cohort conceptualized the development of a web-portal for the UC research enterprise that would address the project sponsor's description of the problem and directive to "orchestrate a mechanism to better facilitate research" with a central information source when applying for a funding proposal (Appendix B). We have since discovered that a systemwide IT collaborative produced just such a tool, https://www.ucnext.org/, which could be leveraged to meet these objectives.

When we presented this proposed project scope and portal concept to a group of key stakeholders at the UC Davis campus, this scope was challenged as too large and unwieldy–an attempt to "boil the ocean." Upon further reflection, the cohort concluded that we could not narrow or define the scope of the project without more extensive outreach and discussion with stakeholders.

Our next step, therefore, was to reach out widely to stakeholders to gather opinions and information (Appendix C). We did this primarily in three ways:

- We created a 10-question survey, to which 64 stakeholders responded via Survey Monkey.
- We conducted 15 follow-up interviews with survey respondents and others.
- During our UC-CORO sessions, we interviewed 20 campus leaders regarding our project.

Through this exercise, we determined that an achievable and useful scope for the project would be to assemble and present the information gathered during the survey and interviews, and identify important themes, issues, and implications as well as recommended potential next steps.

IV.   RESULTS OF STAKEHOLDER SURVEYS, INTERVIEWS, AND LEADERSHIP INTERVIEWS

This Section describes stakeholders' opinions regarding research collaboration within UC (Appendix D). It is divided into subsections on (A) barriers to collaboration, (B) when we should collaborate, and (C) existing successful collaboration.

A. KNOWN OR PERCEIVED BARRIERS

We also gained insight into known and perceived barriers to successful collaboration. A number of major themes that emerged around the responses to the questions regarding "Barriers" are discussed in detail below. A list of quotes collected from stakeholders on the topic of known and perceived barriers is included in Appendix E .

What emerged from our survey, interviews, and conversations with campus leaders was the fact that multidiscipline/multicampus collaboration within UC was complex. We received comments spanning a wide range of topics addressing:

- vision, strategy, and leadership;
- culture and political climate;
- existing administrative infrastructure;
- geographical separation and communication; and
- systemwide rewards and incentives.

We expand on each of these more fully below.

Vision, Strategy, and Leadership

We heard that people across the various parts of the UC system don't have a clear consensus view of "increased research collaboration across the UC system." This would present a complex challenge and a barrier to any systemwide collaborative initiative that cannot communicate a clear set of compelling goals and a comprehensive vision.

> **"Specific advantages of collaboration versus independent research not well defined. There is a presumption that collaboration is beneficial within the UC system; however, there is little empirical evidence that this is true."**

The framework for systemwide collaboration is viewed by some as having "too much unilateral decision making centrally and not enough peer reviewed assessment of opportunities." The value/benefit from "taxation of campuses for resources to promote trans-UC research collaboration and the expensive top-down bureaucracy to promote and administer the programs" is not universally understood.

We heard that a lack of committed scientific leadership and champion can ultimately result in failed collaboration. A critical element of that strategy is the need to include subject matter experts who can provide the technical leadership ("bottom up") to credibly champion an opportunity. Respondents noted that "grassroots efforts starting at the lowest level could help generate the ideas to help promote more collaborations within and between the campuses, labs, and Agriculture and Natural Resources (ANR)."

In addition, the full support of each location's senior leadership ("top down") was also seen as a key to what would lead to ultimate collaborative success.

It was further suggested that within the collaboration strategies and framework, there often is a "lack of clear metrics for evaluating success; ability to adapt based on what is working well and what is not working are often lacking." Without a clear leadership vision on the definition of success, it is difficult to sustain a long-term robust collaborative effort.

Culture and Political Climate

The culture within the UC campuses has been fundamentally focused on individual excellence whether it is recognition of an individual researcher for his/her groundbreaking contribution to a field of research or a campus achieving national and international ranking status. This culture presents some challenges to systemwide collaborations:

- "Fundamentally the culture within the UC system is that Principal Investigators (PIs) are focused on their own recognition and campuses follow suit. Successful research collaboration is not the driving factor in individual merit and promotion for staff and faculty, it lacks an imperative from UC campus leadership."
- "Campuses are focused on becoming number one and achieving status/funding of projects and programs to set themselves apart. Campus centric mentality."

- "There is rivalry between institutions that tends to cause each to be very selective in interactions. There is also a lot of hoops through which to jump in order to collaborate."
- "Competition among the campuses to be the 'best,' to bring in the most grant dollars, etc."

According to stakeholders, expanding research collaborations is not a key evaluation criterion in individual merit and promotion system for UC staff and faculty. The emphasis on PI-driven projects was noted as the big barrier to collaboration in the system. The tenure process puts pressure on early career faculties to be "stars" in their fields. There is disincentive for researchers to commit professional risks by forsaking the more traditional career trajectory.

Campuses take great pride in their specialties. Many viewed collaborations within a campus, with a small group of select campuses within the same geographic area, or well-established relationships to be the most productive means of collaborating. Campus and administrative self-interest driven by the incentive to "succeed" locally tends to cause each campus to be very selective in its interactions with other institutions in fear of diluting their own reputation. Each of the campuses is in competition for an increasingly scarce pool of R&D funding and, as such, they often approach potential collaborations as a zero sum game – in order for my research to gain someone else must lose.

Existing Administrative Infrastructure

Many administrative hurdles were identified as needing to be addressed to foster systemwide collaboration:

- Lack of an organized process to enable people to come together, especially a funding mechanism or facilitated process to come together.
- Cost sharing and other administrative hurdles that get in the way of the research ideas.
- Need to overcome bureaucracy.

Respondents pointed to a lack of consistent and uniform process to facilitate systemwide research collaboration, a lack of information about different, creative options for setting up multicampus projects, and uncertainty around the governance between the campuses and UCOP.

There are few systems/processes in place to facilitate systemwide collaborations. There are no good mechanisms for "identifying potential synergistic relationships." The lack of a comprehensive list of academic research areas and the specific researchers that can be pulled

in to collaborate results in efforts that are limited in scope given they are organically grown and dependent on individual professional networks of peers. A lack of a quick and easy mechanism for funneling communications through the system to identify collaboration opportunities was also cited. The challenge of matching collaborators becomes much more challenging when a collaborative initiative requires a diverse set of expertise.

There are also procedural barriers, including all of the unique offices that researchers have to deal with at their sites and specific institutional policies. For example, the Institutional Review Boards (IRBs) have agreed to rely on each other, but the other ancillary committees, i.e., Conflict of Interest, Radiation Safety, Biosafety, Medicare Coverage Analysis, etc., do not. In addition, while Lawrence Berkeley National Laboratory (LBNL) requires no additional hurdles since it performs only unclassified research, collaborating with Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL) often adds security clearance requirements.

> **"There is pain when Standard Operating Procedures and processes differ between the institutions."**

Private funding adds additional complexity. If a location gets funding from foundations, for example, credit may have to be shared with the development office. With the combination of distribution of funds, sources of funds, and the policies on the use of said funds, it is sometimes difficult to match the various obligations to avoid legal disputes.

"Backward, outdated web and other digital communications capabilities across UC" present a fundamental challenge to bring the various parts of the UC system together. Cost sharing and other administrative hurdles can get in the way of the research ideas. There is often not a clear understanding of how indirect costs are distributed campus by campus, which location manages the funding, which location gets the credit, which is the lead location? There is a lack of consistent process for the distribution of funds, confusion about the sources of funds, and the policies for the use of said funds. Reaching agreement and finding an appropriate and consistent funding model is often challenging.

Geographical Separation and Communication

The physical separation of the campuses, labs, and ANR was brought up as a barrier to collaboration.

> **"Because personal relationships are so central to successful collaborations, UC system's size and geographical separation presents**

> **complex challenges when it comes to facilitating collaborations. Deliberate strategies and resources required to overcome the lack of familiarity between the different locations aren't readily available. When research opportunities arise, it is difficult to get the right parts of the right institutions together. More fundamental to that, there are no easy ways to find out if a particular expertise or potential collaborator exists inside UC."**

Another comment addressed emphasis placed on campus centric versus collaboration centric focus among campus, labs, and ANR.

> **"Collaborations can occur across campuses and between many campus units/labs/ANR if communication is strengthened and Chancellors view/shift recognition from PI centric/campus centric to collaboration focus."**

Systemwide Rewards and Incentives

Perspectives of rewards and incentives to collaborations are summarized by the following quotes:

- "There is no formal, standard mechanism within the merit and promotion process to reward collaboration."
- "Lack of visible and consistent sources to allow scientific leaders to tackle collaborative initiative and opportunities."
- "The different sponsored projects offices each have different expectations of their faculty."
- "Large internal issues need to be addressed in order to have successful multi-disciplinary, multicampus/system collaborations."
- "Lack of a reward system to rewarding 'successful collaborative efforts.'"

"The culture shift to more collaboration can only begin with an imperative from UC campus and UC systemwide leadership." However, in the process of promoting greater system-level collaboration, much care must be exercised to not damage the fragile ecosystem that has made UC a premier research institution in the world.

When UC fully leverages its systemwide capabilities, it could become a dominant player, not only by being a solution provider for defined problem-sets, but also a key player in shaping the

strategic state and federal research agendas and policies to create public benefit for California and beyond.

> **"For systemwide strategic collaboration to function well, there needs to be leadership and commitment from the highest level. Systemwide collaboration can't be done successfully from a centralized office that is disconnected from technology and "what is going on." Technical experts and scientific thought leaders create the ideas and have the drawing power to bring people together and to energize them around an opportunity. A centralized office is useful for managing the process, but isn't successful in advancing successful large-scale collaboration alone given it tends to be process oriented instead of innovation/scientifically focused. Successful large-scale collaboration must have scientific leader(s) who champion the effort.**"

B. WHEN WE SHOULD COLLABORATE

A common theme that emerged from stakeholders was that, because of the costs and risks associated with cross-location collaboration, there must be a compelling reason to collaborate on a research project or initiative. For example, full participation in a broad UC initiative may require setting aside personal research, which entails professional risk. Physical distance and lack of familiarity with collaborators increase the risk that the project will fail or not meet its full potential. Participants must be motivated and committed to overcome these obstacles. Further, a large project requires a large, sustained investment. Such an investment should only be made strategically and in a manner calculated to support significant advances and success.

> **"The work is hard: physical distance, lack of familiarity, working within the campus is the norm. The [project] director's job is 'out in the world' and judged on ability to extend the collaboration. This requires setting aside personal research, which is a risk."**

We further queried stakeholders about "when we should collaborate." The most commonly cited reasons follow:

- **A compelling vision or imperative guides the research**

  We should collaborate when the vision of success is compelling and an imperative to achieve and addresses major societal or knowledge opportunities. There must be a well-articulated compelling vision or imperative, in the form of a challenge, that is too large or

complex for a single entity to manage or solve on its own and that is hugely important to achieve. Examples include vast social imperatives (health, environment, and food insecurity), as well as large physical infrastructure projects that advance knowledge creation in ways that will not be immediately realized (telescopes, colliders, and data transfer networks).

- **Results gained from collaboration are greater than the sum of the parts**

  The largest benefit to UC research collaborations is the combination of scale and visibility. Only the University of California has ten campuses, three national labs, and an agriculture and natural resources network that contains such an unequaled talent pool. Working across the system of campuses, labs, and ANR enables very ambitious, strategic research proposals that one location could not manage with only their own internal resources. Collaboration allows for leveraging scale and assembling complementary skill sets, and resource sharing on large infrastructure.

- **The project is huge and requires a broad range of expertise**

  UC collectively has the ability to take on projects that no individual location could take on by itself. Locations can bring together the relative strengths of researchers and technical staff (including physical and organizational infrastructure) across disciplines and approaches, in order to address complex, multi-faceted elements of a project. The best conditions for collaboration exist when you can put together the brightest and best, who have expressed an interest in working collaboratively. These characteristics may be exhibited in ways other than personal research, such as demonstrated excellence in teaching and commitment to service.

  While it would be enormously beneficial if business process and infrastructure issues could be resolved – fixing difficulties with interlocation transfers, shared payroll, shared equipment and purchasing – investing in building the human infrastructure for collaborations (relationships, communication and trust) is the imperative.

- **Stable funding is available or can be obtained**

  Large, complex projects have long timelines and require a funding model that provides appropriate continuity. Lack of stable funding is a disincentive for researchers to commit to the professional risk and is a drag on progress. One interviewee suggested following the National Science Foundation (NSF) model of rolling 3-5 year budgets to create the necessary stability, mitigate the personal risk, and focus the talent on the work. Other stakeholders emphasized the importance of the university anticipating and, perhaps more importantly, *influencing* the Federal agenda for research funding.

> **"Broad funding bases (UCOP, campuses, external matching) enhance collaboration."**

- **When trusting interpersonal relationships can be established**

Successful collaborations also transcend the boundaries of the academy to engage other segments of industry, government and society. Given this diversity, success clearly depends on strong interpersonal relationships. Trusted partners invest in the necessary communication to foster continuity and stability so that potential barriers such as leadership roles and funding can be more effectively overcome:

> **"Successful collaborations require strong leaders who can facilitate collaboration and mediate conflict."**

C. EXAMPLES OF EXISTING SUCCESSFUL COLLABORATIONS

As noted, our research suggests that the primary shared characteristic of collaborations that are perceived as successful is the existence of a well-defined problem of common interest that is too large or complex for a single entity to manage or solve on its own. Moreover, as collaborative work is structurally complex, successful collaborations work in alignment to social imperatives such as health, environment, food and energy or large infrastructure essential to advancing knowledge in a field such as colliders, telescopes, data transfer networks, and curation and archival services with common taxonomies.

Successful collaborations were also seen to transcend the boundaries of the academy to engage other segments of industry, government, and society. Given the large numbers of players, success clearly depends on strong interpersonal relationships. Trusted partners invest in the necessary communication to foster continuity and stability so that potential barriers such as leadership roles and funding can be more effectively overcome.

Over the course of our investigation, we have been exposed to myriad examples of outstanding collaborations. The selected exemplars listed in the following have been aggregated from the feedback received.

Example	Link	Description
Governor Gray Davis Institutes for Science and Innovation	**http://www.ucop.edu/california-institutes/**	These institutes are regarded as catalysts for the California economy with overwhelming support by California business leaders and industries. The initiative brings together the best and brightest UC scientists in an unmatched research enterprise and serves as a successful partnership among the State, UC, and California Industry.
Calit2	http://www.calit2.net/	**Calit2** is taking ideas beyond theory into practice, accelerating innovation, and shortening the time to product development and job creation. Where the university traditionally has focused on education and research, Calit2 extends that focus to include development and deployment of prototype infrastructure for testing new solutions in a real-world context.
QB3	http://qb3.org/	QB3's mission is to stimulate innovative life science to keep us healthy, sustain our environment, and grow the economy. QB3 promotes cross-campus, interdisciplinary research using quantitative approaches to tackle the most difficult challenges.
California NanoSystems Institute (CNSI)	http://www1.cnsi.ucla.edu/index	CNSI is an integrated research facility with locations at UCLA and UC Santa Barbara. Its mission is to encourage university collaboration with industry and to enable the rapid commercialization of discoveries in nanoscience and nanotechnology in four targeted areas of nanosystems-related research including Energy, Environment, Health-Medicine, and Information Technology.
Center for Information Technology Research in the Interest of Society (CITRIS)	http://citris-uc.org/	CITRIS creates information technology solutions for society's most pressing challenges. The institute was created to "shorten the pipeline" between world-class laboratory research and the development of applications, platforms, companies, and even new industries.

UC Biomedical Research Acceleration & Integration Development (UC BRAID)	http://www.ucbraid.org/	The vision of UC BRAID is to integrate resources and talent across the University of California to accelerate research that improves health. UC BRAID's mission is to create an environment that reduces barriers, leverages and combines resources, enables teams, and serves as a model for collaborative consortia.
UC Humanities Research Institute	http://uchri.org/	Based on the UC Irvine campus, UCHRI serves all ten campuses in the UC system, interacting with UC campus humanities centers, other campus research centers, and with individual faculty to promote collaborative, interdisciplinary humanities research and pedagogy throughout the University of California system and within the larger communities they inhabit.
UC Observatories	http://www.ucolick.org/	The University of California Observatories (UCO) is a multicampus research unit. UCO operates the Lick Observatory, the technical labs at UC Santa Cruz and UCLA, and is a managing partner of the Keck Observatory in Hawaii. UCO is the center for UC participation in the Thirty-Meter Telescope (TMT) project.
UC WATER Security and Sustainability Research Initiativehttp://ucwater.org/	http://ucwater.org/	The UC WATER Security and Sustainability Research Initiative is a new project focused on strategic research to build the knowledge base for better water-resources management.

Repeatedly referenced as to why these projects have been so successful were things such as "solid relationships," "broad funding bases," and "partnership, transparency, and the creation of a whole that is greater than the sum of its parts." In addition, the "entrepreneurial spirit" and "innovative nature" of UC research were seen as what makes UC fertile ground for such larger collaborations. One interesting note is that a "trusting and transparent governance" model was seen as essential by several respondents as a way to keep all collaborators and the relevant leadership at the collaborating locations involved and engaged. While these are certainly examples of success, we would caveat they are far from perfect, each speaking to a large and compelling vision which is often still on the way to being realized.

Examples of Existing Structure/Processes that Support Research Collaboration

In addition to successful scientific collaborations, UC has pockets of excellence of centralized practices and infrastructure that support collaborative research

One example of such a practice is the Systemwide Institutional Review Board (IRB): to meet the Office of Human Research Protections' goal of providing appropriate protections of the rights and welfare of human subjects and to reduce administrative burdens and time required to perform research activities, UC developed a Memorandum of Understanding (MOU) for IRB review of multicampus human subject research. The resulting UC IRB Reliance Registry (The Registry) is aimed at protecting human subjects, reducing administrative burden, and facilitating multicampus research.

V.   RECOMMENDATION/THE NEXT BIG CHALLENGE – A POSSIBLE APPROACH

As we combed through our survey responses and interview notes, as a group we realized that (1) we had collected a wealth of information, and (2) this information points to specific topic areas and methods for further inquiry.

To continue the important work of positioning the university to leverage its resources, both human and physical/infrastructure, toward collaborative research, we recommend a framework as follows:

(1) Establish a Transformational Research Collaborative designed to be a think tank on UC's next big challenge and on facilitating research collaboration on big challenges, and

(2) Charge this Collaborative with finding *substantive* areas for further inquiry to be undertaken to address barriers and incentives to research collaboration and to work on identifying the next big challenge for UC to lead.

Establishing a Transformational Research Collaborative
Based on the results of our stakeholder outreach and on our experiences using CORO tools to complete our group project, we recommend that the Transformational Research Collaborative embody the following characteristics/processes:

- Broad-based identification and participation of key academic and influential researchers/administrators from all UC campuses, laboratories, and ANR, and at all levels.

- Inclusion of key influential Associate Vice Presidents (AVPs), Vice Chancellors of Research (VCRs), Provosts, Council of Vice Chancellors (COVCs), Executive Vice Chancellors (EVCs), PIs, and Deans who are externally focused, conversant in Washington, leaders in their areas of expertise, and have records of successful collaboration.

- Facilitated sessions designed to seek a wide range of discussion and exploration of potential collaborative research topics.

- Articulation of the Collaborative's goal of Identifying areas for collaborative research that, by their nature, are so big, complex, and advanced that they require the strength and intellectual assets of the entire UC system, engaged in a collective multi-disciplinary/multilocation effort. For example, research project(s) that address(es) the implications for health, the environment, energy, and food and the agricultural system, where one problem cannot be solved without solving the other problems.

- Seed funding for the Transformational Research Collaborative that sets a path to sustained external funding.

- Consideration of constituting a Transformational Research Collaborative by modifying or expanding *existing* structures and processes focused on research and innovation (e.g., Presidential Initiatives and UC Research Initiatives; Appendix F).

Recommended Focus Areas and Lines of Further Inquiry for the Collaborative or its Subgroups:

Addressing Key Barriers

The Collaborative might consider establishing focus groups that would be tasked with determining how to address each of the barriers to collaboration identified below and addressed in more detail in Section IVA of this report:

- vision, strategy, and leadership;
- culture and political climate;
- existing administrative infrastructure;
- geographical separation and communication; and
- systemwide rewards and incentives.

When Best to Collaborate

The Collaborative could be tasked with an in-depth study of new approaches to how the Office of the President could enable UC's unique opportunity to set up large scale, multicampus centers of excellence, and determine the role of UCOP in leading and supporting long term investment in the big challenge collaboration.

Catalyzing the collective power and competitive edge of UC will require shared governance to insure both top down and bottom up engagement. The collaborative should consider the following key factors when addressing the grand challenge vision:

- A compelling vision or imperative guides the research;
- Results gained from collaboration are greater than the sum of the parts;
- The project is huge and requires a broad range of expertise;
- Future stable funding is available or can be obtained; and,
- Trusting interpersonal relationships can be established.

Using the recommendations of the Collaborative, UCOP should make a strategic decision and commit to a long-term investment to go after the big topics (e.g., water, climate, microbiology, precision medicine). Consistent feedback from key stakeholders suggests a need to collaborate on this direction setting.

Elements of Successful Large Scale Collaborative Efforts
The Collaborative could include in its topics an in-depth study of elements that have led to successful large-scale collaborative efforts such as the ones listed in our report. A suggested follow-up to this project is to delve deeper into specific examples of collaborative attempts to uncover potential solutions. Two that come to mind are: Precision Medicine and/or TriInstitutional Partnership (TrIP). We suggest doing a deeper dive into the critical success factors, existing gaps and barriers, as well as a detailed SWOT analysis of what could make such a collaboration have a resounding impact on the future of health care research. The Collaborative might conduct an in-depth study of those elements that were key to the success of large scale collaborative efforts identified in Section IVC of this report.

Consideration of Existing Infrastructure and Initiatives
The Collaborative could include in its topics an in-depth study of existing UC initiatives and structures including Presidential Initiatives, UC Research Initiatives, etc.

Ways to Increase Collaboration between Campus, National Labs, and ANR
The Collaborative could include in its topics an in depth study of ways to increase collaboration between the campuses, ANR, and the national labs.

Consider Revisions of Academic Personnel Policy to Incentivize Collaborative Research
The Collaborative should consider reviewing the Academic Personnel Manual (APM) and its references/highlights of the individual researcher. The collaborative researcher is less well

recognized and rewarded in policy. Having the APM call out the value of collaborative research can spur investment in centralized practices that support it.

A More Holistic Approach to How Collaborative Research Infrastructure Is Developed
This will help free principal investigators from the political ties that guide funding. Infrastructure development is primarily tied to funding source. This limits the ability to develop shared approaches and the ability to deliver services effectively. UCOP could participate in establishing "level set" access to certain functionalities that might otherwise not be feasible for less well-funded projects or campuses to develop.

The California Institutes for Science and Innovation (CAL ISI) are emerging as places/spaces that facilitate collaboration, and they could serve as a centralized resource for developing collaborations.

Office of the President (UCOP) Role in Creating Infrastructure that Supports UC Research Collaborations
More unified, systemwide processes – such as Systemwide IRB – can facilitate research collaboration. Coordinated databases and central units that can support proposal and project development can help. Infrastructure issues that currently plague collaborations, such as difficulty with payroll, interlocation transfers, equipment and purchasing, may be better resolved centrally. One additional example of the type of tool that would be possible is UC Next (https://www.ucnext.org/).

VI. CONCLUSION

In conclusion, collaboration across the UC system is possible – as evidenced by a number of powerful, impactful cross-system projects as captured in Section IVC. Many or all of these projects demonstrate many of the key criteria for a successful collaboration. It is worth noting that high profile projects like UC BRAID and Cal ISIs, although good examples of UC collaboration, continue to evolve and adjust to trends in the environment, funding, and organization. As such, this list would be worth revisiting in a few months to a year to ascertain progress or change.

Collaboration is perceived by our faculty and leadership to be most valuable under particular circumstances and criteria. Successful examples of collaboration across UC locations often involve a major funding source and/or a situation wherein the combination of multiple disciplines or expertise across locations makes for a significantly stronger impact than could be achieved if any one location were to do this alone. Perhaps the major criterion for successful and impactful multi-location collaboration is the presence of a larger vision, which is championed and supported by

leadership – a vision that is large and ambitious enough to unite disparate areas and sufficiently motivate tactical actions and investment. A work-in-progress example of this is precision medicine. This is a concept which, if achieved in its entirety, could truly transform healthcare as we know it – with ramifications for the fields of agriculture, the environment, and the economy. The promise of this vision, however, cannot be realized without the power of multiple UC locations working together. A vision like this one requires leadership and vision, as well as a clearly defined agenda, goals, and tactics, coupled with major investment of resources, people, and time, resulting in systemic and major change.

Our work identified a number of historical barriers to collaborations – including funding or lack thereof, perceived bureaucracy or processes that are perceived as archaic and do not aid innovation or collaboration, and, notably, the academic culture, which can sometimes disincentivize collaboration. Nonetheless, the UC system, despite the barriers and issues cited, is unique in that it has the talents and diversity to enable transformative ideas, even in a time of decreasing state and federal funding. If any one entity is able to realize the promise of solving the major societal issues of our time, it will be the University of California.

Appendix A: Original Project Description

Research Collaboration across UC Including the Labs and ANR
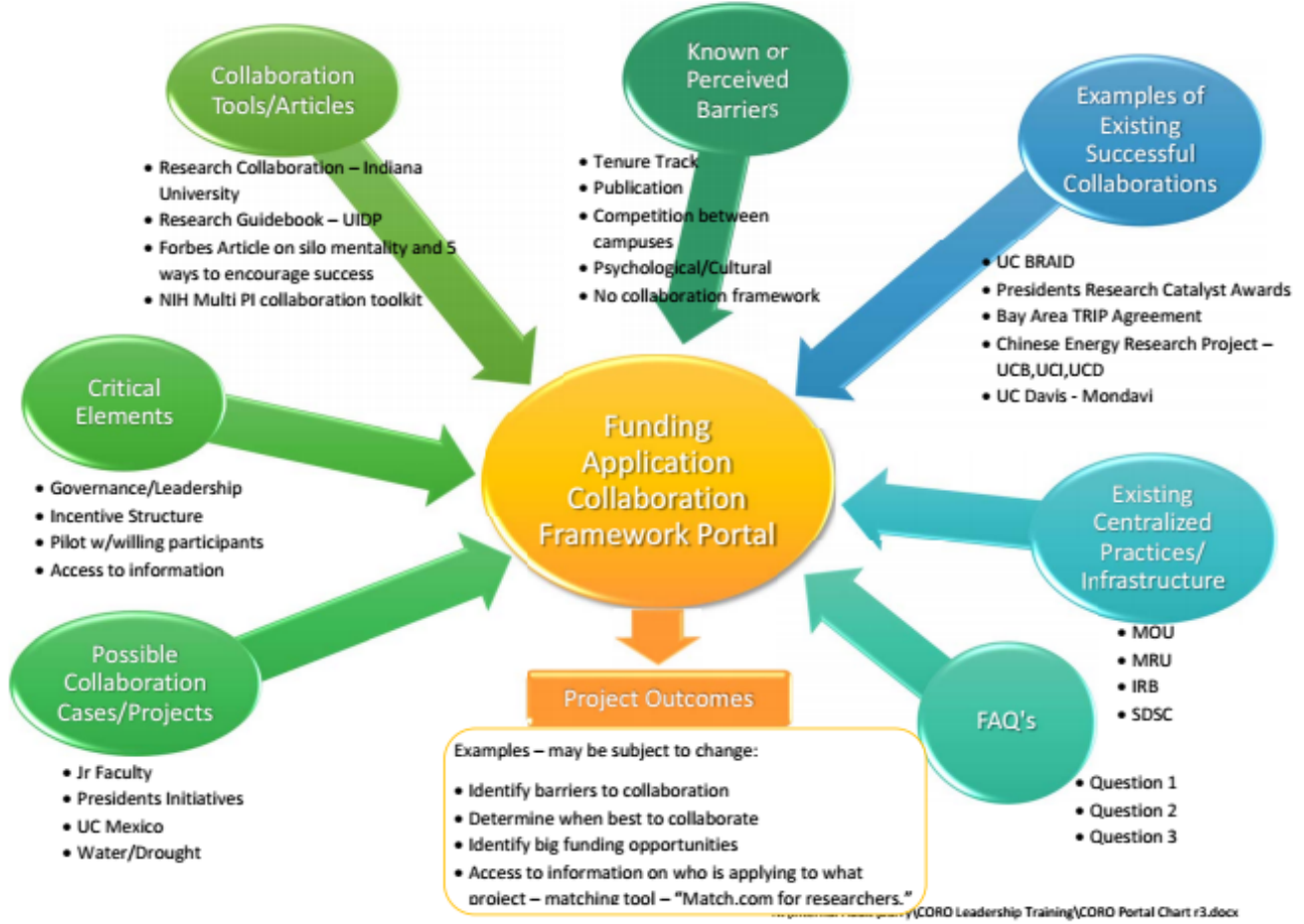
Problem/Opportunity Statement: What are the barriers to research collaborations across the University of California?

Cutting edge university research is becoming increasingly more collaborative and multidisciplinary for a multitude of reasons. These reasons include the increased complexity of many of the most important questions, and the changing patterns of Federal funding that emphasize larger, interdisciplinary approaches rather than single investigator grants. UC has a unique opportunity to address complex research problems because of the breadth of our systemwide research capabilities, and by doing so provide the best education for our students, create new knowledge to address some of the most vexing problems of our time, and create public benefit for California and beyond.

As the largest research university in the nation (if not the world) comprised of 10 quasi autonomous campuses, UC faces an even greater challenge than a single-campus institution in creating and managing the large multicampus, multi-disciplinary research programs needed to compete for these new Federal funding programs. However, it has been said that is easier to collaborate with other institutions than it is to collaborate within UC. Identifying the barriers to, solutions for, or incentives to stimulate broad collaboration across UC could help unleash unrealized potential of our university and ensure that we remain a pre-eminent research institution that provides the greatest value to our faculty, our students and to our State and Nation.

Appendix B: Initial Concept - Funding Application Portal

Successful UC Multi-System and Multi-Discipline Collaboration 6/23/15

Collaboration Tools/Articles
- Research Collaboration – Indiana University
- Research Guidebook – UIDP
- Forbes Article on silo mentality and 5 ways to encourage success
- NIH Multi PI collaboration toolkit

Known or Perceived Barriers
- Tenure Track
- Publication
- Competition between campuses
- Psychological/Cultural
- No collaboration framework

Examples of Existing Successful Collaborations
- UC BRAID
- Presidents Research Catalyst Awards
- Bay Area TRIP Agreement
- Chinese Energy Research Project – UCB,UCI,UCD
- UC Davis - Mondavi

Critical Elements
- Governance/Leadership
- Incentive Structure
- Pilot w/willing participants
- Access to information

Possible Collaboration Cases/Projects
- Jr Faculty
- Presidents Initiatives
- UC Mexico
- Water/Drought

Funding Application Collaboration Framework Portal

Existing Centralized Practices/Infrastructure
- MOU
- MRU
- IRB
- SDSC

FAQ's
- Question 1
- Question 2
- Question 3

Project Outcomes

Examples – may be subject to change:
- Identify barriers to collaboration
- Determine when best to collaborate
- Identify big funding opportunities
- Access to information on who is applying to what project – matching tool – "Match.com for researchers."

In pmaherabc.com.r/paorry\CORO Leadership Training\CORO Portal Chart r3.docx

Scope Workgroup Discussion: The Scope Workgroup acknowledged and discussed the tension between a process-oriented deliverable and a substance-oriented deliverable. As we considered the options and the sponsor's description of the problem and her directive to "orchestrate a mechanism to better facilitate research" across the UC system, inclusive of campuses, medical centers, ANR, and labs, and recognizing the multidisciplinary nature of 21st century research, we agreed on the development of a web-portal for the UC research enterprise. At present, there is no way to formally or clearly facilitate system wide research collaboration funding applications on a large scale.

Funding Application Framework/Portal Concept: The portal will support successful cross-system applications for major research funding. The portal will achieve this by providing a framework to identify and address barriers to collaboration, by providing an opportunity to develop, test, and implement solutions. This proposal accounts for the recommendations from the Northern California cohort's original work groups, as well as feedback from the Sponsor. Success includes a model to determine the appropriate conditions for encouraging cross-system collaborative applications

Goal: Successful multi-discipline, cross-system collaboration.

Appendix C: Acknowledgement of Those Who Contributed to and Supported Our Journey

List of Survey Respondents

We would like to thank each and every one of the following UC members who took part in our group project survey.

Name	Title	UC Location
Bill Frost	Associate Vice President	Division of Agriculture and Natural Resources
Gabriel Youtsey	Chief Information Officer	Division of Agriculture and Natural Resources
Jeff Dahlberg	Director	Division of Agriculture and Natural Resources
Jim Farrar	Director, Western IPM Center	Division of Agriculture and Natural Resources
Katherine Webb-Martinez	Program/Policy Analyst 4	Division of Agriculture and Natural Resources
Kathleen P. Nolan	Director, Office of Contracts & Grants	Division of Agriculture and Natural Resources
Kristin Balder-Froid	Head of Strategic Development, Laboratory Directorate	Lawrence Berkeley National Laboratory
Patricia Falcone	Deputy Director for Science and Technology	Lawrence Livermore National Laboratory
Rich Rankin	Director, Industrial Partnerships Office and Interim Director, Economic Development Office	Lawrence Livermore National Laboratory
Elsie Quaite-Randall	Chief Technology Transfer Officer	Lawrence Berkeley National Laboratory
John Knezovich	Director, University Relations & Science Education	Lawrence Livermore National Laboratory
Bill Priedhorsky	Science Resource Office Director	Los Alamos National Laboratory
David Doll	Farm Advisor	Merced County
Kimberly Budil	Vice President for National Laboratories	Office of the President
Jeremy James	Director SFREC	SFREC
Carla Hesse	Dean of Social Sciences and Executive Dean of Letters and Science	UC Berkeley
Maggi Kelly	CE Specialist	UC Berkeley
Rebecca Armstrong	Director, Research Subject Protection	UC Berkeley
Cindy Gates	Director, IRB Administration	UC Davis
Darrene Hackler	Executive Director Humanities & Arts Research Development, Strategic Research Initiatives Office of Research	UC Davis
Jeffery C. Gibeling	Vice Provost - Graduate Education and Dean - Graduate Studies	UC Davis
Lars Berglund	Senior Associate Dean, Professor	UC Davis
Paul Dodd	Associate Vice Chancellor for Interdisciplinary Research and Strategic Initiatives	UC Davis

List of Survey Respondents *(continued pg. 2 of 3)*

Name	Title	UC Location
David Theo Goldberg	Director/Professor	UC Irvine
Howard Gillman	Chancellor	UC Irvine
James Economou	VC Research	UC Los Angeles
Kip Kantelo	Director, Office of the Human Research Protection Program	UC Los Angeles
Juan Meza	Dean	UC Merced
Roger Bales	Professor	UC Merced
Samuel Justin Traina	Vice Chancellor for Research and Economic Development	UC Merced
Susan Carter	Director, Research Development	UC Merced
Tom Peterson	EVC/Provost	UC Merced
Kim Wilcox	Chancellor	UC Riverside
Eric Mah	Executive Director, Clinical Research Ops	UC San Diego
Daniel Lowenstein	Executive Vice Chancellor and Provost	UC San Francisco
Lisa Denney	HRPP Assistant Director	UC San Francisco
Rachael Sak	Director UC BRAID	UC San Francisco
Sam Hawgood	Chancellor	UC San Francisco
Alison Galloway	Campus Provost/Executive Vice Chancellor	UC Santa Cruz
Brad Smith	Director Research & Faculty Partnerships, ITS	UC Santa Cruz
George Blumenthal	Chancellor	UC Santa Cruz
J. Xavier Prochaska	Professor	UC Santa Cruz
Jim Phillips	Director ITS	UC Santa Cruz
Jim Warner	Network Engineer	UC Santa Cruz
John O. Jordan	Research Professor of Literature, Director of the Dickens Project	UC Santa Cruz
Joseph Konopelski	Dean, Baskin School of Engineering/Professor of Chemistry	UC Santa Cruz
Linda Rosewood	Program Director/ Cancer Genomics Hub	UC Santa Cruz
Lisa Coscarelli	Special Agreements Officer	UC Santa Cruz
Liv Hassett	Associate Campus Counsel	UC Santa Cruz
Murray Baumgarten	Emeritus Distinguished Professor of English & Comparative Literature	UC Santa Cruz
Paul Koch	Dean	UC Santa Cruz
Quentin Williams	Associate VCR/Dep't Chair/Distinguished Prof.	UC Santa Cruz
Robin Hunicke	Associate Professor – Art Department	UC Santa Cruz
Scotty Brookie	Arts IT Director/ITS	UC Santa Cruz

List of Survey Respondents *(continued pg. 3 of 3)*

Name	Title	UC Location
Sheldon Kamieniecki	Dean, Social Sciences	UC Santa Cruz
Stephen Hauskins	Computing Director for Physical and Biological Sciences	UC Santa Cruz
Tyrus Miller	Vice Provost and Dean, Graduate Studies	UC Santa Cruz
Elizabeth Boyd	Executive Director, Research Compliance	UCOP
Janna Tom	Associate Director, Research Policy	UCOP
Jeff Hall	Director, Research Policy Development	UCOP
Mary Croughan	Executive Director, Research Grants Program Office	UCOP
Rachel Nosowsky	Deputy Campus Counsel	UCOP
William Tucker	Interim Vice President, Research and Graduate Studies	UCOP
Kathleen Erwin	Director, UC Research Initiatives	UCOP - Office of Research & Graduate Studies
Ellen Auriti	Senior Counsel	UCOP/OGC

List of Senior Leaders Interviewed Individually for Our Group Project

We would like to thank the following UC location leaders for making time to be interviewed and to discuss with us at length the responses to our survey questions.

Name	Title	UC Location
Scott Brandt	Vice Chancellor for Research	UC Santa Cruz
Larry Smarr	Director of Cal IT	UC San Diego
Cindy Kiel	Executive AVC Office of Research	UC Davis
Fred Meyers	HS Vice Dean	UC Davis
Dave Clark	Director, LANL Institutes Office	Los Alamos National Laboratory
Bill Frost	Associate Vice President	Division of Agriculture and Natural Resources
Kathleen P. Nolan	Director, Office of Contracts & Grants	Division of Agriculture and Natural Resources
Patricia Falcone	Deputy Director for Science and Technology	Lawrence Livermore National Laboratory
Bill Priedhorsky	Science Resource Office Director	Los Alamos National Laboratory
Jeffery C. Gibeling	Vice Provost - Graduate Education and Dean - Graduate Studies	UC Davis
Lars Berglund	Senior Associate Dean, Professor	UC Davis
Alison Galloway	Campus Provost/Executive Vice Chancellor	UC Santa Cruz
George Blumenthal	Chancellor	UC Santa Cruz
Mary Croughan	Executive Director, Research Grants Program Office	UCOP
William Tucker	Interim Vice President, Research and Graduate Studies	UCOP

Senior Leadership Interactions at the Monthly CORO Sessions

We would like to thank the following UC leaders who generously shared with us their leadership journeys and provided inputs/thoughts for our group project. Their words of wisdom have been tremendously helpful as we worked together to tackle an issue of importance for the UC.

Name	Title	UC Location
Introduction and Welcome to Northern California CORO Cohort		
Janet Napolitano	President	University of California
Dwaine Duckett	Vice President, Human Resources	UCOP
Interviewed by CORO Cohort During Monthly Sessions		
Nathan Brostrom	Executive Vice President and Chief Financial Officer	UCOP
Ralph Hexter	Provost and Executive Vice Chancellor	UC Davis
Dave Lawlor	Vice Chancellor of Finance and Resource Management and Chief Financial Officer	UC Davis
Julie Freischlag	Vice Chancellor for Human Health Services and Dean of the School of Medicine	UC Davis
Dan Lowenstein	Executive Vice Chancellor and Provost	UC San Francisco
Sam Hawgood	Chancellor	UC San Francisco
Carol Christ	Director, Center for Studies in Higher Education	UC Berkeley
Keith Yamamoto	Vice Chancellor of Research	UC San Francisco
Gretchen Kiser	Director, Research Development Office	UC San Francisco

Senior Leadership Interactions at the Monthly CORO Sessions *(continued pg. 2 of 2)*

Name	Title	UC Location
Group Interview		
Jeff Gibeling	Vice Provost of Graduate Education and Dean	UC Davis - Chancellors Cabinet
Rahim Reed	Associate Executive Vice Chancellor, Campus Community Relations	UC Davis - Chancellors Cabinet
Dave Lawlor	Vice Chancellor of Finance and Chief Financial Officer	UC Davis - Chancellors Cabinet
Susan Gilbert	Associate Vice Chancellor, Human Resources	UC Davis - Chancellors Cabinet
Ralph Hexter	Provost and Executive Vice Chancellor	UC Davis - Chancellors Cabinet
Harris Lewin	Vice Chancellor of Research	UC Davis - Chancellors Cabinet
Karl Mohr	Interim Senior Associate Vice Chancellor, Campus Planning, Facilities and Safety	UC Davis - Chancellors Cabinet
Kelly Ratliff	Senior Associate Vice Chancellor	UC Davis - Chancellors Cabinet
Teresa Gould	Interim Director, Intercollegiate Athletics	UC Davis - Chancellors Cabinet
Viji Murali	CIO and Vice Provost of Information and Educational Technology	UC Davis - Chancellors Cabinet
Jeremiah Maher	Director, Internal Audit Services	UC Davis - Chancellors Cabinet

List of Program Supporters

We would like to thank our program supporters, our CORO instructors and our UCOP Human Resource organization leaders in supporting this journey. Thanks also to our project sponsor who provided us counsel along the way, and to the ARN logic study guides for supporting the kickoff of this program.

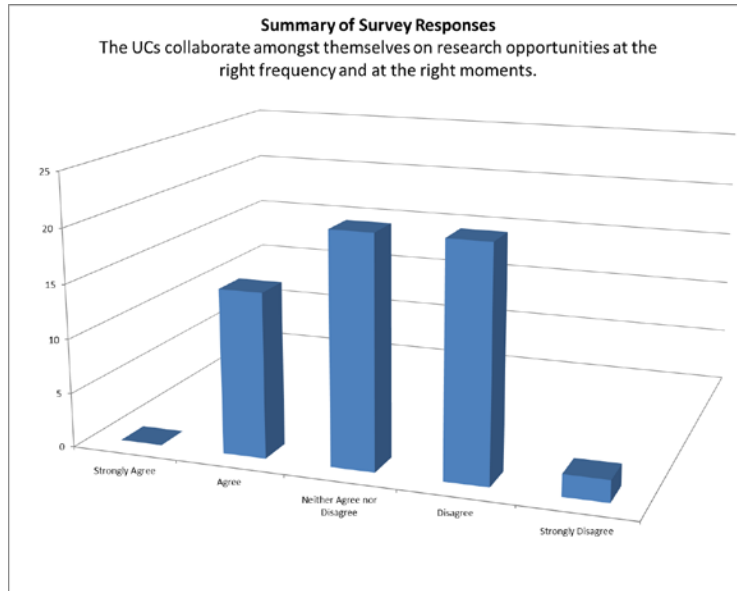| Name	Title	UC Location
Linda Klink	Learning and Development Manager	UCOP
Donna Salvo	Executive Director of Systemwide Talent Management and Staff Development Human Resources	UCOP
Mira Ringler	Faculty	CORO
Nancy Shemick	Program Manager and Lead Faculty	CORO
Laney Whitcanack	Faculty	CORO
Juliette Villanueva	Systemwide Talent Management & Staff Development Administrative Officer	UCOP
Our Project Sponsor		
Sandy Brown	Vice Chancellor for Research	UC San Diego
Session 1 - Logic Study Guide		
Jan Corlett	Chief of Staff to the Vice President ANR	UC ANR
Darren Haver	Water Resources/Water Quality Advisor and Director of South Coast REC and UCCE Orange	UC ANR

List of Executive Sponsors – We Thank You

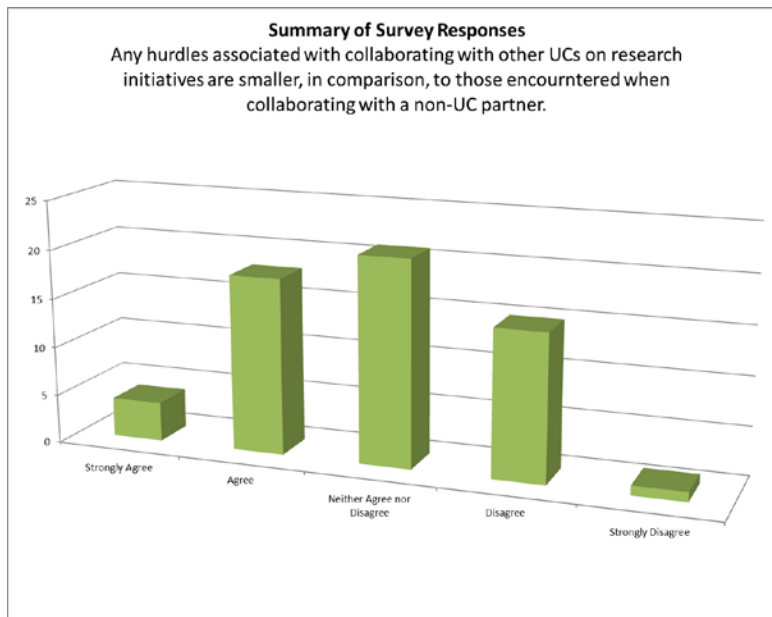Finally, a special thanks to those who nominated us and supported our participation in this program.

Name	Title	UC Location
Aimee Dorr	Provost and Executive Vice President	UCOP
Alison Galloway	Provost and Executive Vice Chancellor	UC Santa Cruz
Barbara Allen-Diaz	Former Vice President	UC ANR
Bill Frost	Associate Vice President	UC ANR
Horst Simon	Deputy Laboratory Director	Lawrence Berkeley National Laboratory
Jeff Bluestone	Former Executive Vice Chancellor and Provost	UC San Francisco
Jeffery Gibeling	Vice Provost, Graduate Division	UC Davis
Jeraemiah Maher	Director, Internal Audit Services	UC Davis
John Plotts	Former Senior Vice Chancellor, Finance and Administration	UC San Francisco
Julie Freishchlag	Vice Chancellor for Human Health Services and Dean of the School of Medicine	UC Davis
Kimberly Budil	Vice President, Office of the National Laboratories	UCOP
Mary Doyle	Vice Chancellor, Information Technology Services	UC Santa Cruz
Michael Troncoso	Chief Campus Counsel	UC Santa Cruz
Sarah Latham	Vice Chancellor, Business and Administrative Services	UC Santa Cruz
Tu Tran	Associate Vice President, Business Operations	UC ANR

## Appendix D: Summary of Survey Responses

D-1 – UC Collaboration. Survey results suggest that there is no consistent position on the right frequency and timing of collaboration within UC.


Summary of Survey Responses
The UCs collaborate amongst themselves on research opportunities at the right frequency and at the right moments.

D-2 – Hurdles Collaborating with UC vs. Non-UC Partners. Survey responses suggest there is a little more agreement than not that collaboration within UC has fewer hurdles than collaborating with a non-UC partner, but the level of those identifying more hurdles collaborating within UC deserves careful consideration.


Summary of Survey Responses
Any hurdles associated with collaborating with other UCs on research initiatives are smaller, in comparison, to those encountered when collaborating with a non-UC partner.

D-3 – UC Role in Creating the Collaborative Infrastructure. Most survey respondents believe that UCOP should play a primary role in creating infrastructure that supports research collaboration among the UC's.
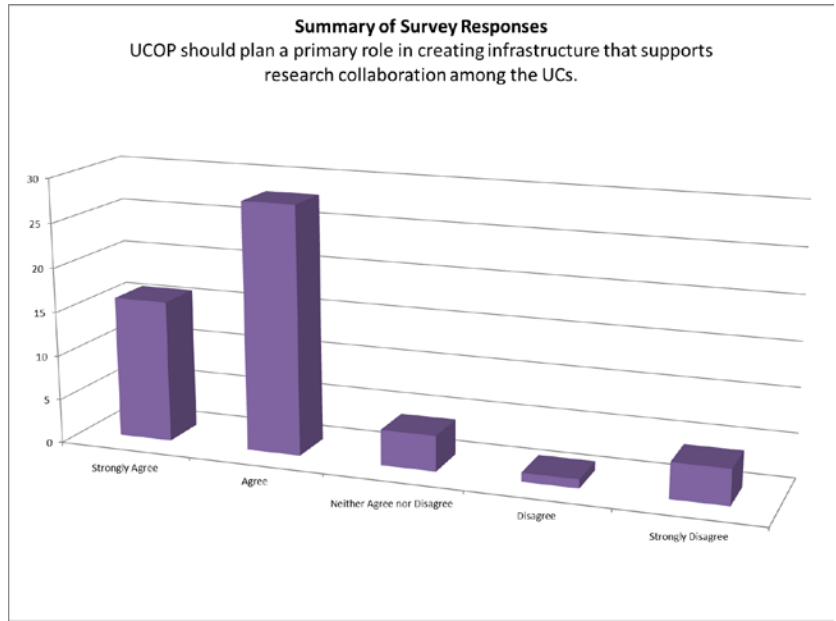

D-4 – Benefits to Research Collaboration. Survey responses pointed to leveraging and sums greater than parts as the largest benefits to engaging in UC research collaboration.
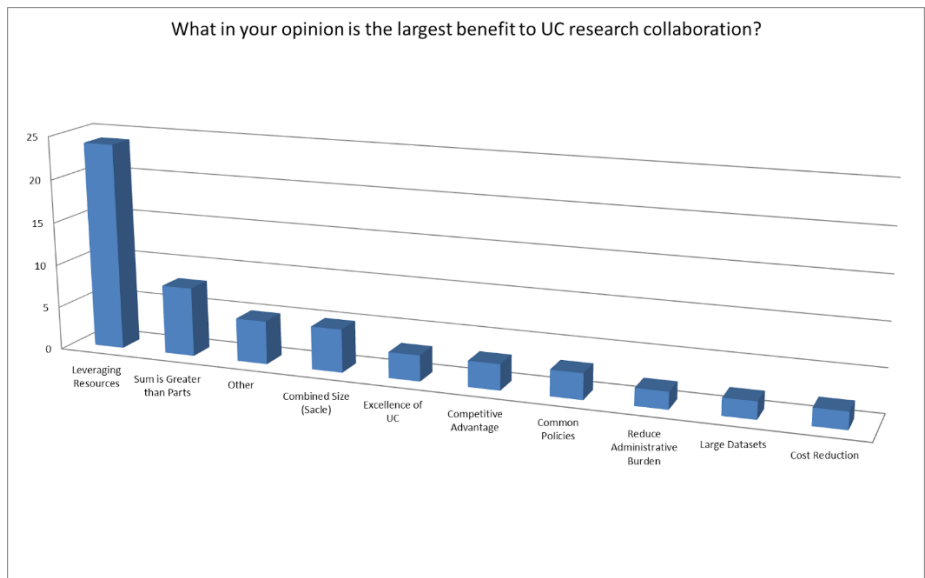
D-5 – Pain Points Associated with Research Collaboration. Funding concerns and the need to navigate policies and procedures from multiple UC locations are seen as primary barriers to collaboration.
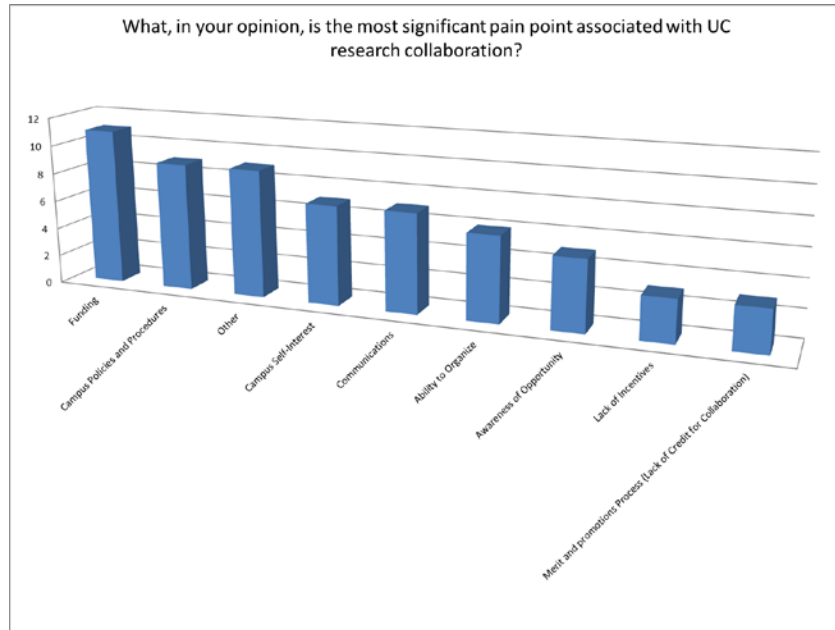
D-6 – Immediate Changes that Could Enhance Collaboration. Based on survey responses, funding was the most significant factor that could immediately enhance research collaboration.
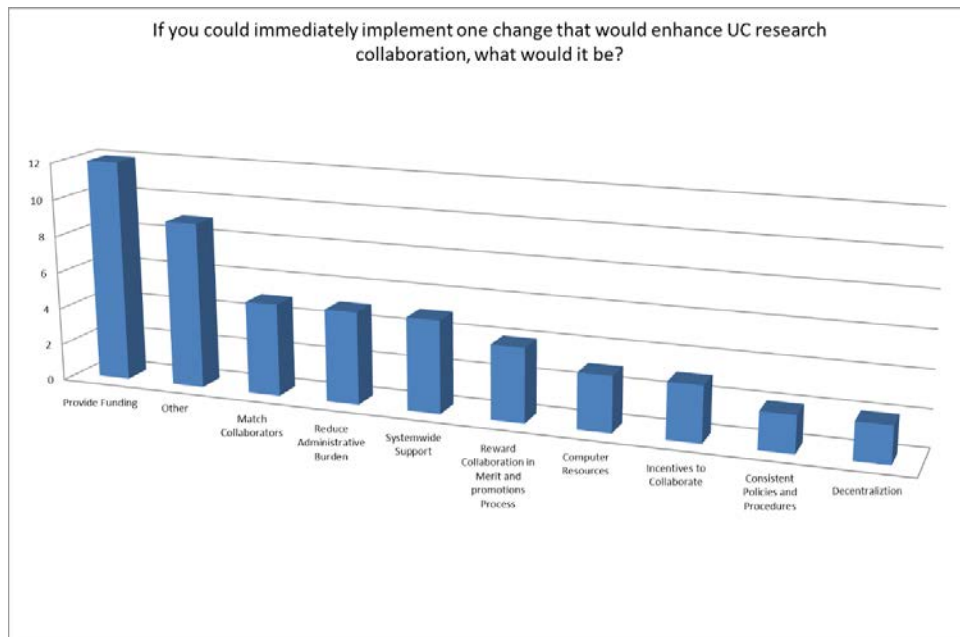
D-7 – Examples of Best Practices. UC has a number of research collaborations that can be used to learn about best practices as future collaborations move forward.

What project comes to mind as a best-practice example of research collaboration among the UCs?
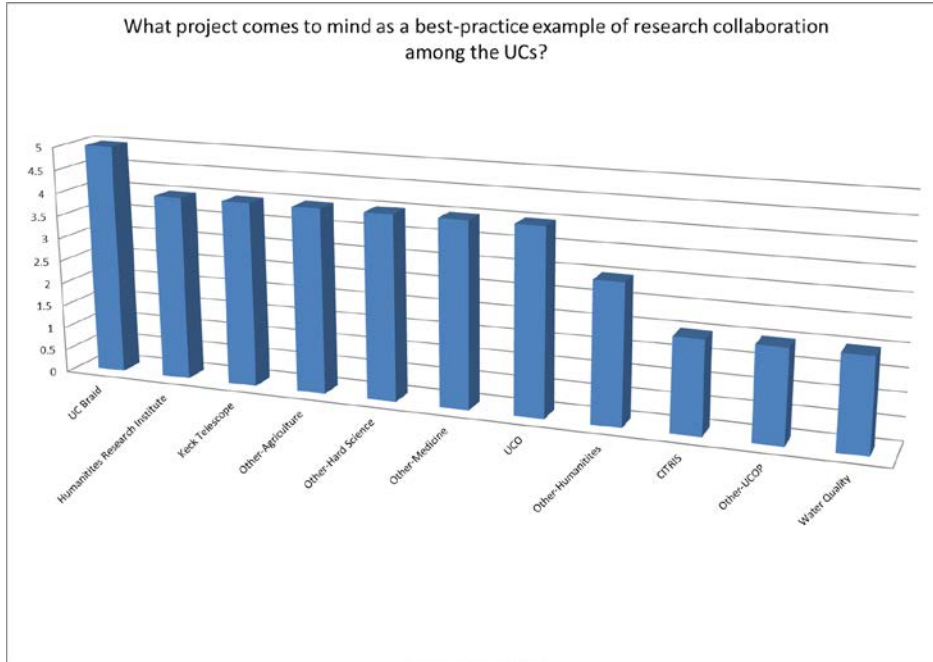
Appendix E: Other Survey and Interview Comments about Collaboration

The following represents points of interest not addressed earlier, reflecting some of the different ideas and viewpoints from those we surveyed and interviewed.

On the Topic of Working Together:

- "Desire at UCOP for campuses to engage as a system rather than as individuals."
- "It is sometimes difficult within a single campus to have a critical mass, and we aren't always able to launch larger projects within a single campus, so multicampus allows us to bring world-class expertise together."
- "Need to work as a system to compete for larger National Institutes of Health (NIH), NSF opportunities and consider advantages of an integrated approach."
- "It also means that we don't need to have overlap (individual campuses don't always understand that). UC should be considering itself one institution with the power of ten, seeing those collaborations as ways to bring together a better research project and education."
- "More likely to have high impact research, be leaders, if UCs work together. Holds true for everything. "I'm a newcomer here. But for all the strengths within the system, I find the UC campuses insular and isolationist. Among the 'crown jewels' of the nation's multi-institutional "Centers" programs (e.g., the ERCs and STCs at NSF, the Centers of Excellence at Department of Energy [DoE], the NIH Centers, etc.) are there any examples within the UC institutions of such programs where the participants are all primarily UC campuses?"

On Leveraging Resources:

- "There is a sense that by leverage resources, we could take advantage of greater opportunities and compete for large scale projects."
- "By leveraging resources UC Medical Centers would have far more influence impact than alone. Happening on larger multi-disciplinary projects."
- On External Expectations:
    "California Gov. Brown is seeking one grant proposal versus one from multiple campuses."

On Why to Collaborate?

- "Collaboration has the ability to bring together people with expertise and resources across UC that can truly complement each other. The whole is larger than the sum of the parts."
- "The potential is huge and if we are able to focus on interdisciplinary teams, communicate across the system no one could have the impact that UC can (has) on the state or country."

- "Collaboration is essential especially on big initiatives. One campus cannot handle the entire project. We have to honor the spirit of the project if there is an element of collaboration required."

On When Best to Collaborate:

- "Collaboration may be best when going after altruistic goals, going after bigger things."

On the Willingness to Collaborate:

- "There is willingness to collaborate but that varies across campuses."
- "........indicated this is the most collaborative university system she has ever worked in."
- "Suspicion is that it is also coming through in other things. One example is Precision Health launched recently. In a very short time, various UC teams came together in response. Working on various infrastructure processes at various UCs. Sharing best practices. There is a great willingness. System has not yet realized great potential it has. "

On Barriers to Collaboration:

- "Collaboration can always be improved, but UC isn't missing out on opportunities; if we are, it's rare."
- "UC is quite good at responding, pulling together, and having success in research collaboration. The VCRs are very interested, faculty are interested, but sometimes it's easier to collaborate with other institutions and not within UC."
- "Faculty want to but it can be difficult, and so some are likely to look past UC to other institutional collaborators. "

UCOP's Role in Collaboration:

- "UCOP needs to aggressively enable our unique opportunity to setup large scale, multicampus centers of excellence. Only UC has 10 campuses and an unequaled talent pool. UCOP must make a strategic decision and commit to a long term investment to go after the big topics (water, climate, microbiology, precision medicine.)"
- "UCOP apply greater focus w/higher levels of commitment. (Invest more in less.)"
- On How to Identify Collaboration Opportunities:
- "The idea of a regional hub or center(s) for collaboration that ensures focused individuals are tasked with identifying potential opportunities, participants and possible partners would be a good step in the right direction."
- On Impacts of Existing Infrastructure:
- "We may have lost the Lost Genome Cancer 2 project to another university, because we did not have a mechanism to collaborate."

Challenging the Benefits of Collaboration:

- "Defining the specific advantages of collaboration versus independent research. There is a presumption that collaboration is beneficial within the UC system; however, there is little empirical evidence that this is true. "
- On Factors to Successful Collaboration:
- "Most collaborations don't work. About teamwork. Don't know people working with. Need skilled leaders who can facilitate collaboration and mediate conflict."
- "........thinks facilitation skills are critical to success of collaborations. "
- "Collaboration needs to be incentivized and promoted at the highest level."

On Entrepreneurial Spirit:

- "There is a very entrepreneurial spirit at UC - more than at other major universities, and on some campuses this is their life."
- "MRPI's has worked well within Humanities."

Appendix F: UC Presidential and Research Initiatives

Presidential Initiatives: http://www.ucop.edu/initiatives/http://www.ucop.edu/initiatives/

- **President's Postdoctoral Fellowship Program (PPFP):** Over the next three years, this initiative will provide additional support for new faculty hires and develop systemwide diversity leadership programming. Learn more about PPFP hiring incentives initiative.
- **Equity:** This initiative will increase student access and success by enhancing systemwide and campus-specific resources for undocumented UC students. See the undocumented student resources site.
- The University of California **Global Food Initiative** seeks to address one of the critical issues of our time: How to sustainably and nutritiously feed a world population expected to reach eight billion by 2025.
- **President's Research Catalyst Awards:** This initiative will channel up to $10 million over three years to fund research in areas of strategic importance to California and the world, such as sustainability and climate, food and nutrition, equity and social justice, education innovation, and health care.
- **Mexico:** UC will work with Mexico to address issues facing our shared populations, environment and economies.
- **Innovation, entrepreneurship and technology commercialization:** Increased financial support and flexibility for campus-led activities will help streamline existing technology commercialization processes and systems, while enhanced communication will create greater awareness of UC as a critical source of innovation driving California's economy.
- **Carbon neutrality:** UC is a national leader in sustainability research and practice has pledged to become carbon neutral by 2025.
- **Transfer student** initiative will streamline the flow of California Community College students to UC campuses by improving transfer students' awareness of UC as an attainable option, ensuring the transfer roadmap is as clear and simple as possible.

Research Initiatives

President's Research Catalyst Awards

The President's Research Catalyst Awards will channel up to $10 million to fund multi-campus research in areas of strategic importance to UC that could benefit California and the world. Research proposals must involve a minimum of three UC campuses and address topics that have the potential to improve human lives, society, the environment, or the economy, enhance culture and community, or provide other public benefit. Awards are open to all fields and are made on a competitive basis.

Multicampus Research Programs and Initiatives (MRPI)

The MRPI program supports innovative multicampus research collaborations that strengthen UC's position as a leading public research university. This program and subsequent awards aim to facilitate and support outstanding research and cutting edge discoveries that can: Advance research in areas important to UC, California, its people, environment and economy Increase UC's competitiveness in attracting faculty, graduate students, awards and honors, and extramural funding Support innovative graduate student research at UC.

UC Laboratory Fees Research Program

The UC Lab Fees Research Program enhances partnerships between UC researchers and laboratory scientists at Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL). These grants promote the development of projects and collaborations, which can help advance the missions of these national laboratories at UC. Goals and funding priorities:

- Support collaborative research between UC faculty and Laboratory scientists.
- Support UC graduate students in programs that promote interaction between Laboratory scientists and UC graduate programs.
- Support research that takes advantage of unique Laboratory facilities, especially involving students.
- Support research in the physical, life, or social sciences, or in the humanities, on topics aligned with the mission of the laboratories.

UC Innovation Opportunities

- **Proof of Concept Program:** Commercialization Gap Grants - The Proof of Concept Commercialization Gap Grants (PoC Program) initiative was launched in 2011 to advance both the research and public service missions of UC. The program funds innovations and discoveries at the cusp of commercialization that require a final demonstration of their commercial viability.
- **UC Discovery Grant:** The UC Discovery Grant promotes collaborations between University of California researchers and industry partners in the interest of supporting cutting-edge research, strengthening the state's economy, and serving the public good.

Front Row: Wendy Smith, Lisa Fischer, Rachel Nosowsky, Rosemary Martin-Ocampo, Nick Eversole, June Yu, Peggy Delaney, Janhavi Bonville, and Linda Klink

Center Row: Donna Salvo, Liv Hassett, Marie Logan, Jen Stringer, Leslyn Kraus, Yvette Gullatt, Andrea Hesse, and Nancy Shemick

Back Row: Mira Ringler, Barry Long, Michael Riley, Miriam Rike, and Bill Johansen