

February 2, 2015

Status of the University of Arizona Research¹ Program

Executive Summary

The Committee of Eleven (C11) has undertaken this study because of growing faculty concerns about maintaining the quality of the UA's research programs in the face of tight current budgets. This concern is not unique to the UA but is felt especially strongly here in light of the recent steep cuts in UA state funding. C11's goal is to document the situation at UA and to suggest potential actions, within the framework of the *Never Settle* program, to ensure a brighter future for UA's research programs².

A successful university must create new knowledge and understanding and impart that new knowledge to others, thereby generating an upward trajectory of human achievement and quality of life. A successful university will, therefore, provide constant inspiration not only to its own students but also to its local community, the nation and indeed the world. The economic benefits of successful university research in generating new businesses, industries and hence jobs and in maintaining a competitive edge in the global economy are well documented³, especially in such fields as the sciences, engineering and medicine. For example, the ~\$500M in annual UA sponsored research funding (most of it from out of state) adds approximately \$1.2B to Arizona's economy (using standard multipliers⁴). The positive impact of research on the local cultural environment is equally important. But perhaps most important of all is the inspiration that active involvement in successful university research provides to students, the next generation of research leaders, that can drive the upward spiral into the future. Without the stimulus from research, stagnation is inevitable and the world will pass us by, intellectually as a university and economically as a state.

While many contribute to a successful research program, the key players in a university context are faculty members, who provide the leadership, generate the resources and attract the students and team members to carry the enterprise forward. The principal problem at the UA stems from inadequate resources to recruit new faculty members to replace those retiring or recruited by other institutions. A second major problem is the lack of adequate seed funding to explore promising new ideas that could enable UA to lead the development of entirely new fields. The C11 recognizes that finding the needed resources will not be easy given today's financial realities but suggests that UA leaders and faculty re-examine internal priorities with a view to maintaining and increasing the upward momentum in its research programs. Unless the necessary resources are found, the UA research effort will first stagnate and then decline – with all the negative consequences to students and the community that are the

¹ For brevity we will refer to creative programs led by faculty as “research”, recognizing that these programs span all scholarly endeavors.

² The C11 completed a white paper on “Restructuring Undergraduate Education” in March 2007 as a result of concerns about the quality/appropriateness of the UA Undergraduate program. This was submitted to the Faculty Senate and led to the formation of a Senate Task Force on “Retention and Advancement of Undergraduate Students”. The Task Force Report, based on the C11 White Paper was adopted by the Senate in January, 2009.

³ See report entitled “Restoring the Foundation: The Vital Role of Research in Preserving the American Dream” published by the American Academy of Arts and Sciences (September 2014). See <https://www.amacad.org/restoringthefoundation>

⁴ APSS Research Opportunities to Advance Arizona's economic Growth. 2007 Report prepared by the Arizona Arts, Sciences and Technology Academy.

mirror image of the benefits of an upward trajectory noted above. The purpose of this white paper is both to document the problems and to examine potential internal/organizational changes that would contribute to finding solutions.

To address the situation, we recommend the following:

1. UA leadership and faculty unite in raising the priority of research and its impact on students to the highest possible level and in making changes in expenditure necessary to implement that priority.
2. Resources be found immediately for faculty hires at a level that will ensure that the UA will remain a leading international research institution. These resources will need continual enhancement. Similarly funds are needed urgently for seeding promising projects that should ultimately become path-changing research efforts and generate their own funding streams.
3. The UA Foundation give higher priority to supporting UA research/academic activities – such as providing resources for endowed chairs, fellowships and scholarships and to seed-fund new projects.
4. We should review the way in which research is organized within the UA to focus more effectively on areas of existing strength or great promise. In those cases where interdisciplinary work is needed (a steadily increasing number), encourage the development of “schools” or “institutes” that then lead the research efforts⁵. This will involve changing the current relationship among departments, colleges and interdisciplinary programs, for example, in making faculty appointments that are associated with the research program in question.
5. The University should streamline administrative processes associated with the research effort with a view to simplifying and speeding up procedures and reducing the number of groups/individuals whose approval is required. Consider the “value-added” to the research/teaching program by an activity versus its cost to determine whether it should be expanded or reduced. The point would be to avoid burdening faculty with bureaucratic tasks that distract them from their research/teaching mission.
6. The University’s administrative systems should be based on trust and accountability rather than on multiple levels of control and/or policing. It should avoid punishing the many for the sins of the few.
7. Encourage entrepreneurial activities and create the reward and administrative structures necessary for such activities to succeed. The CatCorp (Catapult Corporation) initiative is an example of a program developed by the UA Foundation and Tech Launch Arizona whereby donors can help both the University and the community.
8. The UA should work with its sister universities, ASU and NAU, the Board of Regents, and business and industry to increase public awareness of the close correlation between research investment and GDP growth and hence the advantage to Arizona’s citizens of maintaining and enhancing its strengths in research and development activity at its universities.

The C11 recognizes that significant changes in UA’s operation might be necessary to achieve the goal of maintaining and enhancing the quality of the UA’s research program in the current financial climate. We urge the entire UA community - faculty, staff, students, alumni and friends - to work together to achieve this goal which we believe is essential to the future well-being of all Arizonans.

⁵ See NRC report on Convergence: http://www.nap.edu/catalog.php?record_id=18722

Introduction. The University of Arizona (UA) has compiled a remarkable record as a Student Centered Research University, an accomplishment recognized by its status as a Research I university and in its membership of the American Association of Universities (AAU). The UA's research achievements have been immensely important not only to the university community, students, staff and faculty, but also to Tucson and Pima County, to Arizona and to the nation. It is no accident that the Tucson area is known as "Optics Valley", that Tucson has been recognized as the "astronomy capital of the world" and that the UA has established a world-wide reputation as a pioneer in fields as wide ranging as anthropology and heart transplant surgery. With annual sponsored research income of ~ \$500M, the UA research effort also makes a substantial contribution both directly and indirectly to the Arizona economy, estimated to be over \$1.2B annually using standard leverage factors. But above all, university research programs attract and inspire the smart and motivated students that create the new ideas and develop the novel products that have enabled the US to maintain a high standard of living and a leadership position in the world. Continuing this great tradition – and indeed meeting the self-imposed challenge of doubling the research program by 2023 - is a major goal of the recently developed "*Never Settle*" initiative, endorsed by UA President Ann Weaver Hart.

There is, however, growing concern as to how this goal can be achieved given the ever more stringent financial constraints within which the UA is currently operating. Perhaps the most acute problem is maintaining the quality and productivity of the faculty in the face of retirements or departure of those members who have led the university's research funding success and been instrumental, by their very presence, in attracting high-quality younger faculty to the UA. In the absence of adequate resources to permit competitive salary and start-up offers to new faculty who are capable of generating the research programs and funding necessary for their execution, the UA's research capability risks entering a downward spiraling path. It has taken decades to build the quality of the UA's research program, but destroying it can occur relatively rapidly. This would be a tragedy not only for the UA and its students but also for Tucson and Arizona, which would lose their ability to attract high value-added commerce and industry and hence to ensure a rising standard of living for their citizens. The Committee of Eleven, as an elected council of the faculty, has therefore undertaken the current study with the goal of identifying ways, within the framework of the "*Never Settle*" program, to enhance the national/international standing of UA research, and to move forward on the challenge of doubling the UA's research efforts by 2023.

The challenge, of course, is to accomplish this in an environment where the effective value of the state support of the university is unlikely to increase. One might argue that if Arizona wishes to improve (or even maintain) its standard of living relative to other states, it should be investing in the research and education programs that inevitably underlie such progress. Significant change in legislative priorities cannot, however, be anticipated in a time short enough to solve our problems. Increasing the level of private support could help enormously in ensuring the continued improvement in the quality of the faculty and the student body, which is essential for maintaining and enhancing the international standing of the UA. While generating private resources is often thought of as the purview of the UA Foundation, faculty can and should be enlisted to help in developing private resources, are generally willing to do so, and should be involved far more actively in this effort than is currently the case. However, as a representative committee of the faculty, the C11 believes it is important to examine the UA's internal structure and dynamics with the goal of ensuring that the UA's research programs continue on an upward trajectory. This is the purpose of the current white paper.

Potential for Change. During the presidential terms of Richard Harvill, John Schaefer and Henry Koffler, the UA underwent a major development of its research programs. That development took place in an

era of rapidly expanding federal research funding, greater support from the state and a higher degree of flexibility within the institution, as the enhanced research activity was relatively new. None of these conditions applies today, so that continuing on an upward spiral of research activity inevitably demands a re-assessment of our current research infrastructure and organization, much of which was put in place in an earlier and more favorable epoch. In the spirit of faculty governance, it is appropriate that such re-assessments and the resultant impetus for change should be developed and implemented by the faculty within the framework of the “*Never Settle*” initiative. Given the absence of expanding external research resources, re-examining and re-allocating resources is the only clear, short-term way of moving forward on the research priority, which is essential to maintaining the overall quality of the UA research effort.

As is generally the case in large, well-established institutions, there is a tendency for processes and programs to endure long after they have outlived their usefulness. While change usually causes discomfort, it is often easier to contemplate within a positive framework such as “*Never Settle*”. Since enhancing the UA’s research status is a widely supported aim, this should become a frequently and loudly stated element in the UA’s program priorities. To be successful it needs to be reinforced by a series of actions aimed at achieving that goal. We intend to present, in the body of this white paper, some areas in which change should be considered. However, the general principle guiding such evaluations should be to what degree the activity in question adds value to the UA’s research enterprise and consequently contributes to the quality of the faculty and the student body. Programs and processes – indeed even individual roles – should not be continued simply because they have existed for a long time. By re-allocating resources from any such “low value-added” activities, funds can be generated either to provide direct assistance to existing research efforts or to enable renewal of research excellence in the University through appropriate new high-quality faculty hires and seed money for promising new research activities. These needs were met in the past largely through a combination of resources in the VPR’s Development Fund and ICR return to the Colleges and Departments but they are now grossly inadequate to the purpose. At a minimum such resources could be reprogrammed to provide direct, useful support for existing high quality research programs

Documentation of Process and Issues Raised. The C11 has been motivated to develop this white paper by a strongly held view among its members that the UA is facing serious problems in maintaining the excellence of its research programs. These views reflect similar concerns expressed by the faculty colleagues whom C11 members represent and have apparently been confirmed by the recent COACHE survey of UA faculty opinions. To carry out the project the C11 Chair Patricia Hoyer appointed a subcommittee of John Hildebrand, Doug Jones, Steven Schwartz and Peter Strittmatter (Chair) and participated actively throughout.

The C11 has been assisted greatly by input from many individuals whom it hereby wishes to acknowledge and thank. Special thanks are due to:

- a. The Office of the Vice President for Research, in particular Caroline Garcia and Julia Puntenny.
- b. The Deans of the following Colleges: Agriculture (Shane Burgess/Parker Antin), Business (Len Jessup), Engineering (Jeff Goldberg/Brian Ten Eyck), Pharmacy (Lyle Bootman), Science (Joaquin Ruiz), Social and Behavioral Sciences (JP Jones/Cecile McKee). For Medicine we received input from VP for Health Sciences, Skip Garcia in his role as interim Dean.
- c. The Director of Bio5 – Fernando Martinez.
- d. Members of the Council of Administrative and Business Officers (CABO); Kelly Grimm, Jeff Ratje, Susanna Richards and Lisa Rulney.

The broad recurring items of concern may be summarized as follows:

- (1) Difficulty in recruiting and/or retaining top faculty due to inadequate resources;
- (2) Lack of support for promising new research endeavors;
- (3) Ever increasing bureaucratic burdens on faculty and departmental staff combined with decreasing resources to deal with them;
- (4) A growing concern that the pendulum has swung too far toward risk aversion and compliance, thereby stifling innovation;
- (5) A perception, as documented in the recent COACHE survey, that support for research excellence ranks low in the priorities of the UA leadership.

While emphases on particular issues differed somewhat, the C11 was impressed by the overall consistency of the input it received both in regard to problems and possible solutions. That input is reflected in later sections containing recommendations for potential ways of moving forward. Before proceeding, however, we wish to present some data relevant to the current situation.

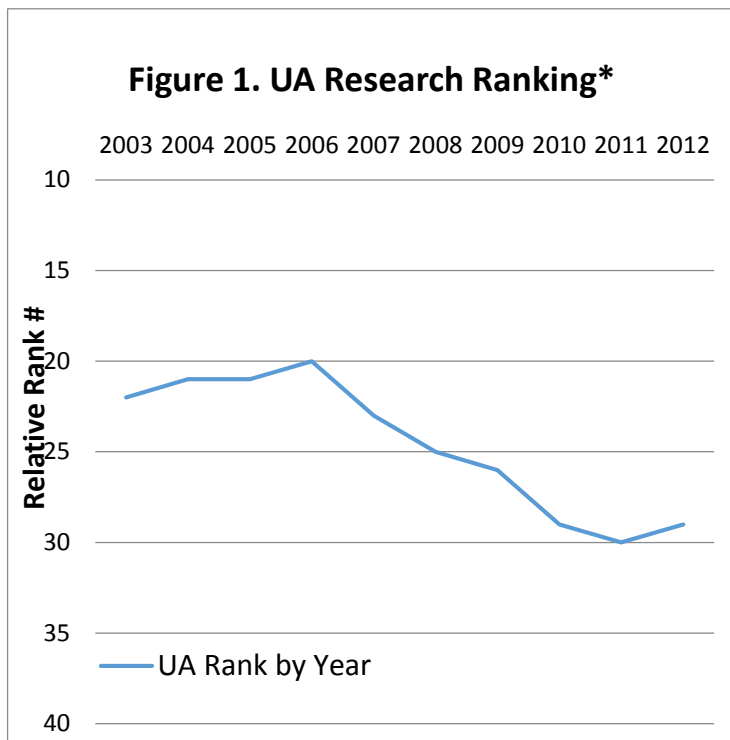
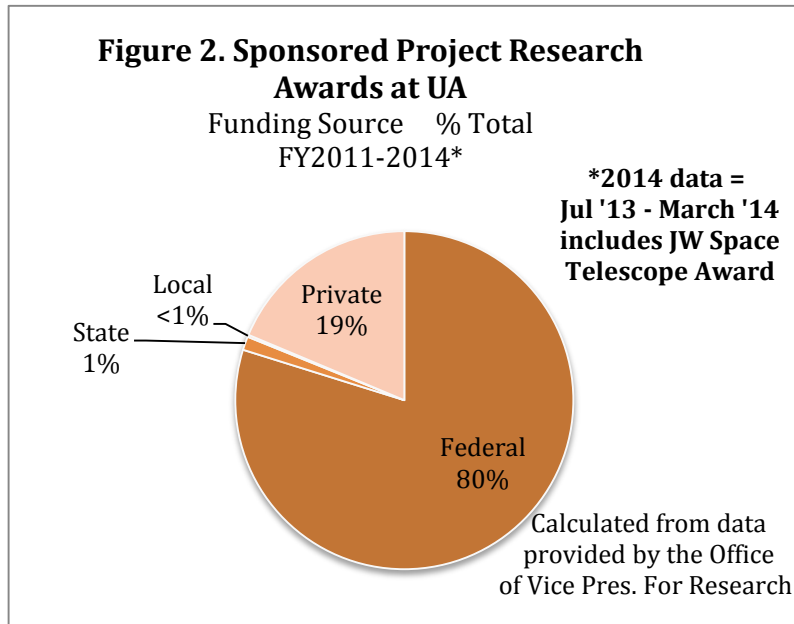


Figure 1. UA ranking by R&D expenditures 2008-12 for all US Universities – according to the NSF’s Higher Education R & D (HERD) Survey.

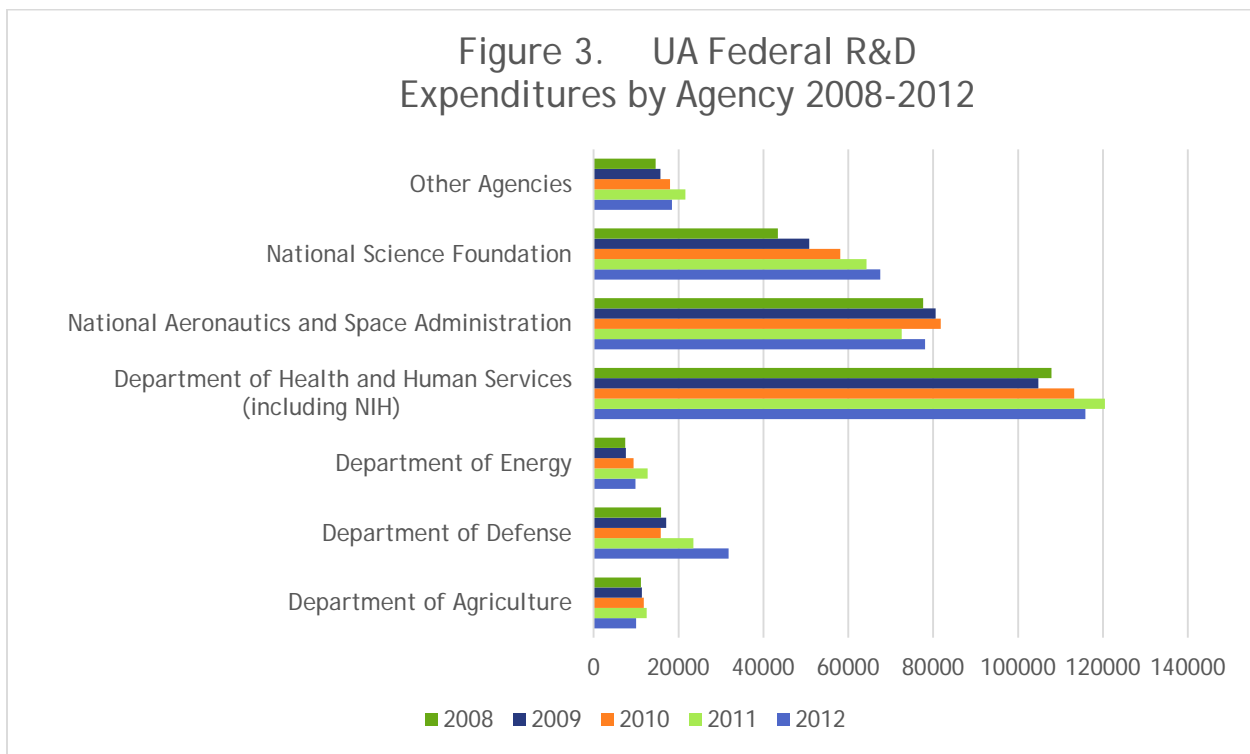
UA Research Profile. The UA is a member of the American Association of Universities (AAU) and, like other member universities, maintains the strong research program that is a criterion for membership of the Association. The UA has also set itself the goal of doubling its sponsored research expenditures over the next decade. Figure 1 shows the ranking of the UA by R&D research expenditures among all US universities. While still good, the ranking has declined significantly and is likely to accelerate, absent resources for faculty hires. Appropriate measures need to be taken to correct this if the UA is to maintain its international reputation as a strong research school – and certainly would be required to meet the doubling goal to which it has committed to ABOR.

In Figure 2 we show the sources of UA external research funding, the great majority of which (80%) derives from federal agencies with most of the balance (19%) coming from private sources. It is noteworthy how little is received from state or local sources.



In the context of federal research funding it is useful to determine how the UA is faring in funding from different agencies. This is shown in Figure 3 for the period 2008-2012. The largest single source is HHS/NIH followed closely by NASA and then the NSF. UA funding from HHS/NIH shows at best very modest growth while NASA is essentially topped out. NSF alone shows steady growth that, if maintained, is reasonably consistent with the doubling goal by 2023. Funding from the other federal agencies is relatively small but resources from DOD show an encouraging recent upswing that can hopefully be maintained. A remaining question is how well

Figure 2. Sources of UA Sponsored Research Funding 2011-14



Figures 3. UA Federal Sponsored Research Funding by Federal Agency 2008-12.

UA is doing in attracting the available research funding at the various federal agencies.

Figure 4 accordingly shows the fraction of federal research funding provided through each federal agency and the fraction of UA research support received from each in 2012. The UA is clearly excelling in

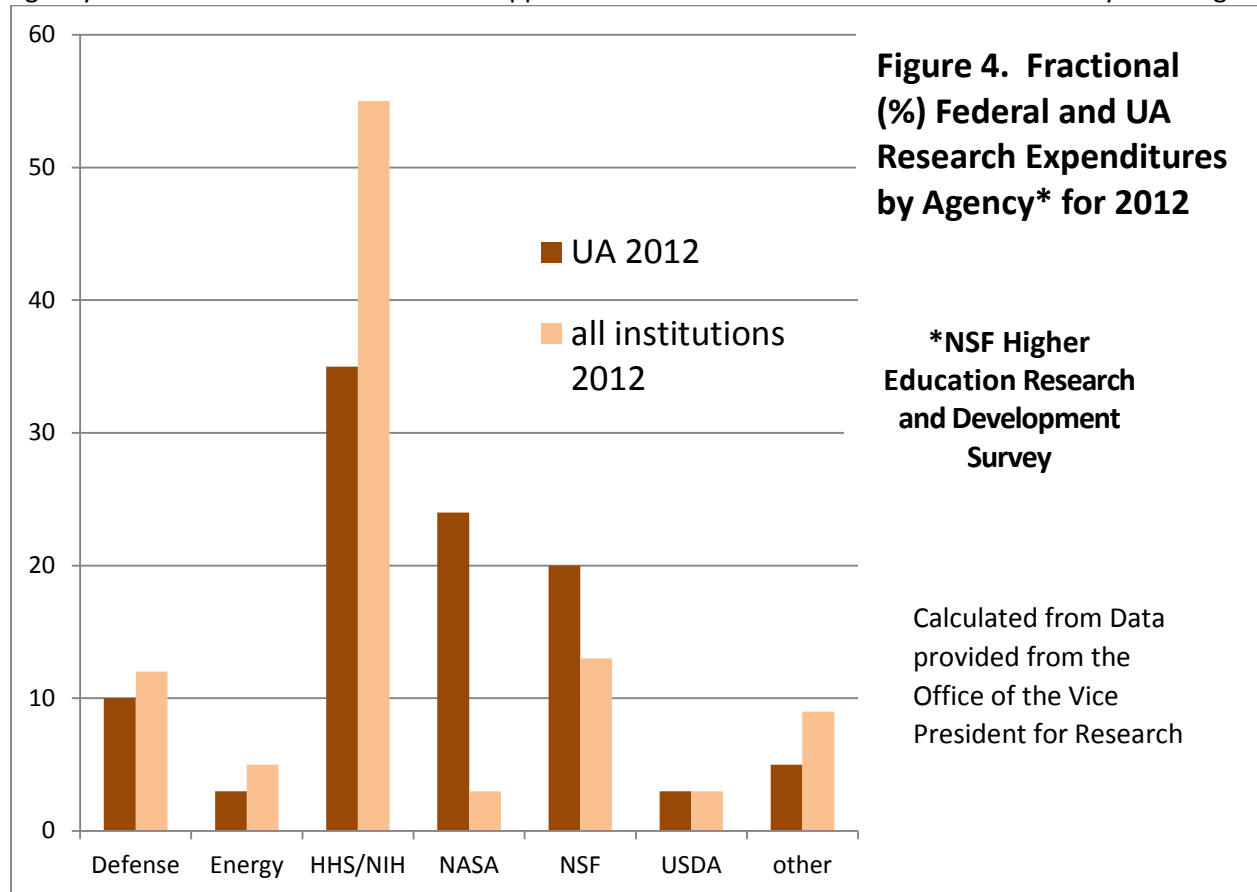


Figure 4. Fractional Available Federal Research Resources relative to fractional research expenditure within UA by Federal Agency.

funding from NASA and doing very well with respect to NSF⁶. The amount of NIH funding is low in both absolute terms (Figure 3) and relative terms (Figure 4). Overall the UA achieves funding at close to the average level from all other agencies except HHS/NIH, where the UA is receiving significantly less than the nationally available share. The UA's doubling goal for research funding requires that the absolute numbers shown in Figure 3 increase. It is clear from the data that improvements in funding from HHS/NIH would help enormously in the doubling endeavor.

⁶ The "above average" performance with NASA and NSF requires that other UA success fractions are below average as the total is 100%. The lower UA success rate at HHS/NIH is not ascribable to this constraint.

**Table 1. Sponsored Project Research Awards by Sample Colleges
FY2011-2014***

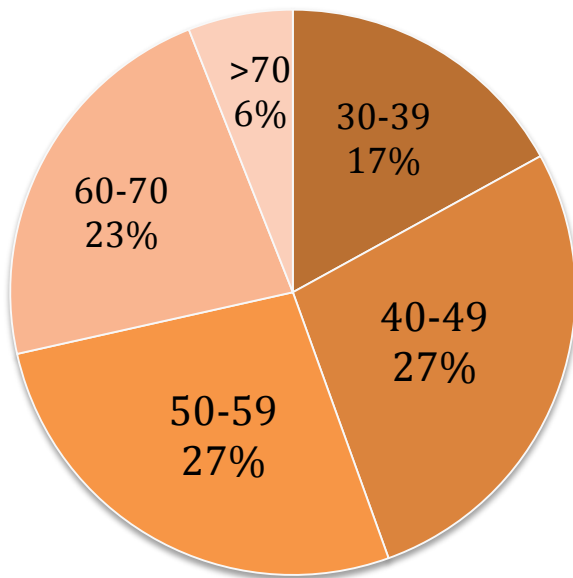
College	Total Dollars
Architecture	\$ 809,903.00
CALS	\$ 112,624,108.00
Education	\$ 18,117,026.00
Engineering	\$ 91,815,089.00
Fine Arts	\$ 20,823.00
Humanities	\$ 1,662,836.00
Medicine Phoenix	\$ 17,654,511.00
Medicine Tucson	\$ 340,144,952.00
Nursing	\$ 10,071,931.00
Optical Sciences	\$ 91,055,142.00
Pharmacy	\$ 39,637,124.00
Public Health	\$ 31,637,124.00
Social Behav Sciences	\$ 28,811,154.00
Science*	\$ 628,783,736.00
other	\$ 102,817,517.00
Grand Total	\$ 1,515,436,012.00

***2014 data =
Jul '13-March '14
College of Science includes
JW Space Telescope Award**

Calculated from data
provided by the Office
of the Vice Pres. For Research

A third question relates to the research productivity of the individual UA colleges. The C11 recognizes that opportunities and funding sources are very different for individual disciplines. Nonetheless it is instructive to look at the actual funding by college – averaged over the last almost three years. This is shown in Table 1. The College of Science (COS) currently generates the largest sponsored research support. The total is strongly influenced by NASA funding for major Space Science projects at Planetary Science/Lunar and Planetary Lab and Astronomy/Steward Observatory. This is reflected in the strong UA performance in fractional acquisition of NASA funds as shown in Figure 4. The success with NASA has required organization of large teams and close collaboration with the aerospace industry to prepare the proposals and execute the projects and is indicative of steps that might be taken with the creation of large interdisciplinary groups in other research areas. COS also contributes strongly to the UA’s sterling performance at the NSF. COS is followed in sponsored research by the College of Medicine (COM) although in most AAU universities the order is reversed. The doubling goal would, however, require significant increases in dollar funding across many colleges, even if COM were to reach the national average in its share of federal funding.

Figure 5. U of A - T/TE Faculty Age Distribution 2013 % Total



Extrapolated from President Hart's presentation to ABOR Nov. 2013

Figure 5. Age distribution of UA Tenure/Eligible Faculty for 2013

Faculty Demographics. Figure 5 shows the current age distribution of the AY 2013 tenured (T) and tenure eligible (TE) UA faculty. Almost 30% are above the age of 60 and many are likely to retire in the next few years. This implies the need to replace some 500-550 faculty members over the next decade or so if the level of effort is to be maintained let alone doubling total research funding. Figure 6 (derived from data provided by the VPR's office) shows the sponsored research awards (in \$) generated over the ~ 3 year period from July 2011 to March 2014 by faculty in those same age groups. It is immediately clear that those over 60 are still remarkably productive with over 40% of the award value generated by 29% of the faculty members. While selection effects undoubtedly influence the details (e.g., research productive senior faculty are likely to retire later), their departure over the next 5-10 years will represent a very serious loss to the UA. In normal circumstances one might expect the curve in Figure 6 to remain roughly constant in time as individual faculty get older – move to the right in Figure 2 – and are replaced mainly by young faculty at the left.

To maintain a reasonably stable (hopefully increasing) form of Figure 2, funds must be made available to:

- (a) Recruit very promising young faculty; this involves paying competitive salaries and providing recruits

with adequate start-up funds so that they can build successful research programs and essentially move along the curve of Figure 6 as they advance in age;

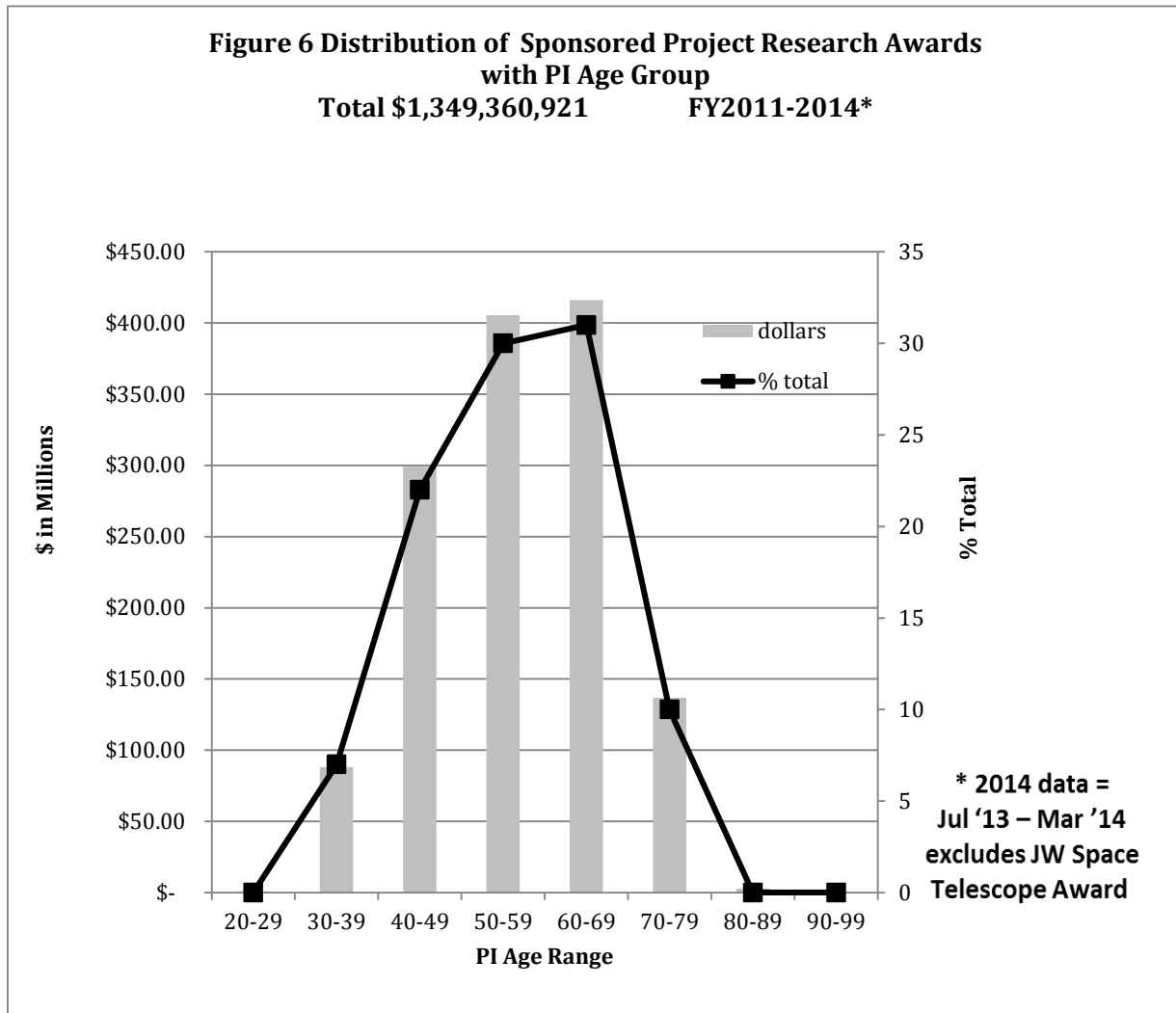


Figure 6. Distribution of Sponsored Research Awards by PI Age Group – 2011-2014.

(b) Ensure that the UA can retain those in the middle age ranges and provide continued support for their upward path; again competitive salaries are required as well as institutional commitment to the pursuit of novel ideas.

(c) Provide adequate seed funding (\$10-15M) for development of especially promising new ideas as a basis for generating external support.

The overall problem exists throughout the University although the financial extent varies strongly among the colleges. However, we think it appropriate to use, as an example, the situation in the College of Science, which is currently the UA's largest recipient of research funding. Its research productivity must be maintained if the research standing of the UA is to be maintained and especially if the quest to double UA research funding is to succeed. The age distribution of faculty within the College of Science is similar to that shown in Figure 6 for the University as a whole. Thus of 339 total faculty, 99 are older

than 60. Stated differently, the College of Science, one of the primary drivers of research excellence at the University, will need to hire ~10 new faculty members each year for the next decade. This in turn will require competitive salaries, which are continually increasing because of more attractive offers from private institutions and better-funded universities, as well as additional start-up funds totaling ~\$7M per year for COS alone depending on which disciplines are involved. Several recent searches have attracted superb candidates but have failed due to non-competitive salaries and startup packages arising from lack of funds available to either the College of Science or the Office of the Vice President for Research. At the current rate of hiring the College simply will not keep pace in quality and quantity with the expected retirements over the next years. Similar remarks apply throughout the University. Given the inevitable departure of faculty who contribute heavily to existing research excellence, it is absolutely critical, if the University of Arizona is to maintain research strength, that a sustained, consistent and appropriately funded hiring plan be implemented so that young scholars, with exciting new research programs, can be hired before the existing research excellence is lost and the UA becomes less attractive to such people. Such a hiring plan will be a great challenge and involve significant adjustments in the way UA does business. Such change is the essence of the “*Never Settle*” plan and essential for its success.

Ways Forward - Creating an Upward Spiral. The following discussion is based on the premise that the UA wishes to maintain and enhance its standing as an internationally distinguished research university and is willing to make the changes necessary to ensure that outcome. Success in this endeavor will enhance the experience of students as they work with and learn from creative faculty; it will also bring benefits, economic and cultural, to the local community, the state and the nation.

A *sine-qua-non* for such success is to maintain and enhance the quality and productivity of the UA faculty. This is a multi-faceted endeavor and will require implementation of policies and creation of attitudes that maintain long-term upward pressure on the quality of UA research/teaching programs – that is, set the UA on an upward spiral of achievement for the indefinite future.

There are many systematics that can contribute to ensuring the desired upward spiral. As in any large and complex organization involving many independent and creative people, the path cannot be directed in detail from the top. Rather the leadership needs to put in place a system of “carrots and sticks” to provide the upward pressure.

To achieve renewed research momentum within current funding constraints, we see no alternative but for the UA leadership to realign priorities within the University so that funds can be directed where they are most urgently needed, namely to maintaining and enhancing the overall excellence of the faculty. In the following we discuss in general terms some of the possible areas for change, recognizing that implementing those changes will be difficult.

The first and major requirement for enhancing the UA’s research standing is for the UA leadership and faculty to make clear that this is a top priority for the University. The best way to achieve this is by taking immediate action. We suggest the following initial steps:

- Make immediate provision of additional resources to allow faculty hires with competitive salaries and start-up funds; an augmentation of at least \$10M is required for this recruiting season and will need to be increased in subsequent years.

- Establish a salary enhancement plan based on the research priority so that the UA can retain its most creative and productive faculty. Among its peers, the UA currently pays the lowest faculty salaries making retention of key individuals very difficult (see Figure 7).

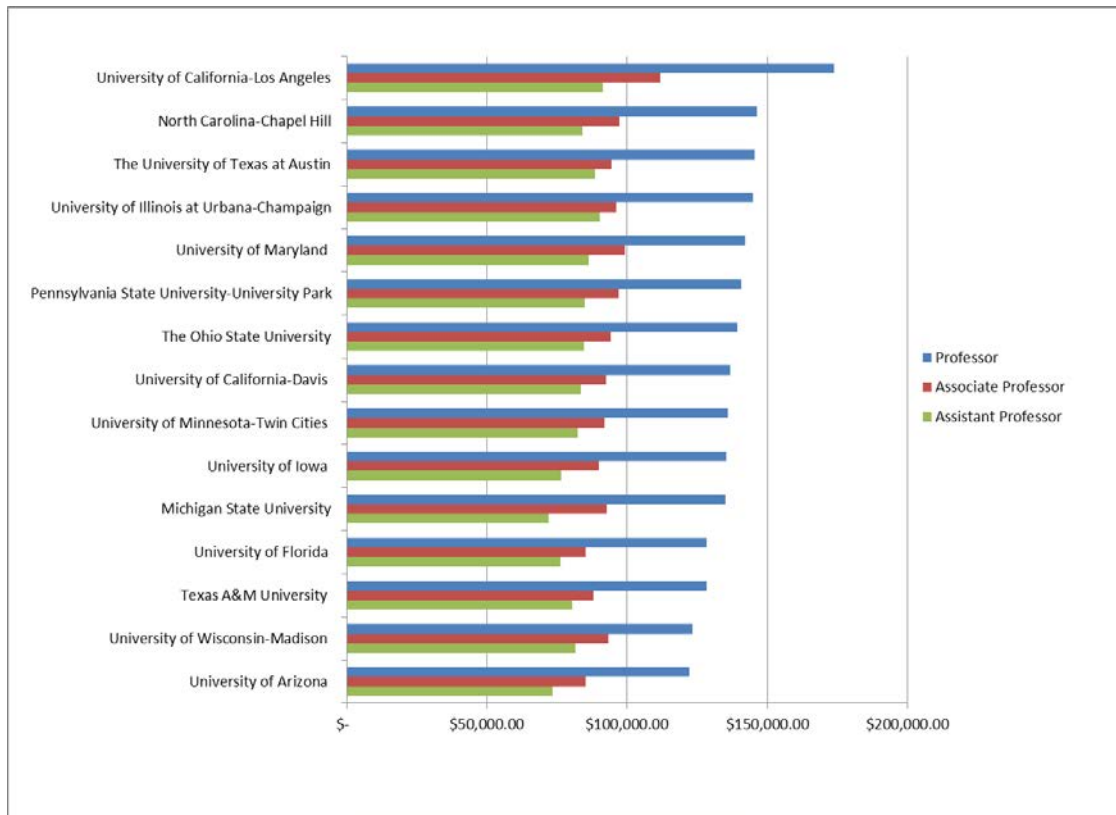


Figure 7. Faculty salaries for Assistant, Associate and Full Professors at the UA and its peer institutions, illustrating the poor competitive position of the UA.

- Initiate a review of ways in which procedures and service units could be changed to provide more effective support for the research endeavor; this may involve adjusting reward structures and changing or perhaps eliminating certain administrative functions.
- Examine ways in which UA’s research activities could be structured differently, for example through the creation of interdisciplinary schools or institutes to optimize the research function among departments and colleges.

Even with some new resources anticipated from tuition and enrollment increases, the first action will require that funds be reallocated from elsewhere in the University and is viewed as a first step in a process that will likely have to continue for some time to come. The purpose of the second two actions above is to establish processes whereby the changes can be implemented incrementally over the next few years, accompanied by corresponding changes in funding. This will require review of many options before determining which should be implemented, assisted by data made available through the RCM process. Such a detailed review is beyond the scope of this white paper. Rather we attempt in the following paragraphs to suggest some general areas in which changes should occur and the directions they might take if UA is to maintain, let alone enhance its international reputation as a distinguished

research institution. To succeed, this will require a united effort on the part of the entire UA faculty and staff, alumni, friends of the University and business interests.

a. Clearly Establish the Research Priority. To succeed in this effort, it is essential for the UA leadership to re-establish the research/teaching priority within the University, a priority first established very clearly during the Harvill and Schaefer presidencies. This is largely a matter of creating an atmosphere of respect and encouragement for the research/teaching enterprise and those that lead that effort, namely the faculty⁷. The research priority should be further emphasized, beyond provision of resources for hiring new high quality, by:

- Ensuring that sufficient funding is available to allow the research enterprise to flourish. This level can be estimated from the successful provision made in earlier times for returning the equivalent of 30% of ICR funds to the colleges and departments that generated the funds.
- Increasing the VPR's Development Fund budget to at least \$20M;
- Increasing the priority of fundraising in support of the research/academic mission by the UA Foundation. Endowed chairs, research fellowships and graduate scholarships are urgently needed to redress the very poor standing of the UA relative to its peers in this regard.⁸

As the research priority becomes clear a number of beneficial changes are likely to follow, namely:

- The University's service units will be seen to support the faculty rather than policing them. Scarce resources will be put to use for positive, creative purposes;
- The overall quality and morale of the faculty will go up as the UA recovers momentum in its research mission, as will the quality of the educational program and the student body;
- UA donors will increasingly support the research/teaching mission of the University by endowing chairs, research positions and student scholarships.

b. The Organization of UA Research. Much of the UA's research activity is organized traditionally around individual faculty members and their departments; the UA reward structure is geared to this type of organization. While this has worked well in the past and will continue to work well in some fields in the future, it does not account for the UA's current standing as a research institution (e.g., AAU member) or appear to be the best path to maintaining, let alone enhancing, that standing. Certainly doubling the UA's research expenditure in a decade cannot be achieved with small individual PI grants (~\$100K- \$200K each) since this would require a major increase in the size of the faculty, an unlikely occurrence in the foreseeable future. Furthermore it fails to recognize that much current research activity – especially in the sciences, engineering, medicine etc. – is increasingly interdisciplinary and requires active participation on the part of individuals belonging to many different departments. For such endeavors the C11 recommends encouraging the continued development of research “schools” or “institutes” to address major research areas (e.g., Bio5, Space Sciences).

To enhance the overall research efforts we suggest the following steps be considered:

⁷ We use the term faculty in a broad sense to mean UA employees that are tenured, tenure eligible and those with research professor or equivalent titles.

⁸ The recent pledge by James Wyatt of \$10M (with an equal matching requirement) toward graduate scholarships at the College of Optical Science represents an excellent example of effective ways forward in this area.

- Adopt a “can do” attitude, including a willingness to take risks where the potential rewards justify so doing.
- Decide on areas in which the UA either wishes to maintain and augment existing research strength or wishes to develop new capability. This requires judgment on the part of UA leadership, recognition that UA cannot afford to build research strength in all areas and recognition that appropriate resources must be invested in the selected programs.
- In selecting new fields of research endeavor, the UA should be opportunistic (a good program leader and/or funding is available) and seek to be the first in the area. (UA has the capacity to initiate new programs but not to catch up with wealthy institutions like Harvard once they invest in an area.) Adequate initial resources must be provided internally so that the program can become well established before others catch on.
- Examine the appropriateness of the way in which UA research activity is currently organized (see footnote 5). This is currently based on departments that have been configured around the needs of undergraduate education. Faculty appointments and graduate programs would become focused increasingly on the research institutes or schools, working with the departments that would have primary responsibility for the undergraduate programs.⁹
- Shrink (slowly but steadily) programs that fail to contribute substantially to research or academic excellence so that resources can be used more effectively in supporting the overall research priority.
- Consider establishment of a research organization that is outside the UA formally – like the UA Foundation - so that it can operate to a greater extent outside the purview of the state/ABOR. This could also be linked with efforts to commercialize UA discoveries and inventions through Tech Launch Arizona (TLA) as with the newly announced Catapult Corporation (CatCorp).
- Recognize that a substantial fraction (almost 30%) of UA research funding is generated by non-tenure track faculty. Given the likely evolution of state funding in Arizona, success of the UA research enterprise is likely to depend increasingly on such research faculty. Steps should therefore be taken to make the UA a more attractive location for them and their research programs.
- Promote, in conjunction with the Office of Global Initiatives, more international collaboration since developments in many other countries are on a steep upward trajectory both in quality and in funding.
- Develop a strategy for enhancing the sponsored research program in the College of Medicine without denying critically needed investment in the research programs of other colleges. The recent preliminary agreements between the Banner Health organization and the Arizona Health Network might facilitate additional investment in the College of Medicine research program while maintaining or even increasing funding levels on the main campus. Certainly this would be a welcome outcome.

c. Streamlining Processes and Procedures for supporting UA Research. There is a growing perception that administrative processes in connection with the UA research effort have become steadily more complex and burdensome over the last several years – a trend not unique to the UA but unproductive nonetheless. Among the manifestations of this trend has been multiple and overlapping levels of checking – of “policing” rather than “trusting”. As one frustrated correspondent stated in regard to compliance issues:

“Multiple and sometimes competing compliance units make routing and navigating through the system complicated and bureaucratic. A unified research administration would be helpful.... ”

⁹ Some tentative steps in this direction have been announced by Provost Comrie and VPR Espy in a memo dated September 26, 2014 regarding “Cluster Hiring”.

And, of course, it would cost less.

Furthermore it is unclear whether the policing actually succeeds in reducing the problems which it is supposed to address.¹⁰ According to the New York Times,¹¹ Charles Munger, Vice-chairman of Berkshire-Hathaway, offered this counter-narrative to the distrustful culture of most businesses today:

“Instead of filling your ranks with lawyers and compliance people, hire people that you actually trust and let them do their job.”

We believe that the UA could, to advantage, simplify its administrative processes by adopting a more trusting approach to its employees and requiring that they act in accordance with the University’s top priority of enhancing the overall research/teaching effort.¹² Each procedure might then be assessed on the basis of the net value it adds to the overall research priority.

More specifically we suggest:

- Recognize that multiple overlapping administrative procedures are costly in terms of central staffing needed to carry out the function, departmental staffing to respond to them and distraction of faculty from the creative work which they can uniquely provide to the research program.
- Review the value/cost ratio of each administrative activity and service function. Reduce or eliminate as appropriate based on the ratio of cost to value-added to the research enterprise.
- While *Financials and Analytics* have the potential to assist the research enterprise, work needs to be done on providing the “doers” – the faculty and project staff – with the information they really need and in a form that is readily accessible. This will require listening to and acting upon the needs of the doers, rather than simply telling them what they will be given – as has frequently been the case in the past.
- Adjust the University’s accounting system to be more helpful to research-oriented departments/institutes – especially those undertaking major (multi-million dollar) projects. Feedback on financial status needs to be essentially on demand and fairly accurate; for management purposes it does not need to be precise but it does need to be fast.
- Develop more nimble ways of handling research proposals and in particular reduce the number of approvals required to the greatest extent possible. Avoid requiring signatures from people who add no value to the process - and often do not have time to read what they are signing.
- Reverse the trend of the last decade where ever more administrative burden has been placed by central administrative offices upon the departments while resources to handle these burdens have been steadily cut. Doing so will also reduce the growing perception that the faculty and research staff are there to serve administration rather than the other way around. Such a change will also help with faculty morale.
- Ensure that responsibilities of individuals, departments or institutes are clear and that when things go amiss, deal with the responsible parties but avoid subjecting the entire campus to increased rules and burdens.
- Adopt a UA equivalent of the European Union’s principle of “subsidiarity”, namely that decisions/responsibilities should be assigned to experienced lower- or mid-level administrative staff who are as close to the action as possible.

¹⁰ Ref Margit Osterloh and Bruno Frey,

¹¹ New York Times, May 6, 2014

¹² In an email message dated October 7, 2014, SVPR Espy announced welcome changes in the research administration services that appear to move in this direction.

Generally, our recommendation is to trust more, simplify wherever possible and make sure that centrally provided services are truly needed not just impositions. The goal must be to assist the faculty to accomplish their research and teaching mission and to minimize distractions from it.

d. Strengthen the Reward and Penalty Structures to Generate an Upward Spiral. Generating an upward spiral of achievement requires a system of incentives and penalties – of “carrots” and “sticks” – that facilitate the desired outcome.

In a university, the available incentives are usually focused on matters of promotion – which is usually accompanied by salary increases. These considerations apply to essentially all university employees although the procedures are different for faculty and staff. We offer the following suggestions in the UA context:

- For faculty, promotion is principally framed in terms of tenure, which clearly has considerable positive economic value to the individual and significant potential negative value to the institution if mistakenly granted. Tenure evaluations and decisions are among the most important faculty activities and are a major factor in enhancing the overall quality of the research programs.
- Make clear what is expected of faculty in promoting the upward spiral of research endeavor and enhancing the UA's national and international standing. Make these expectations more significant in reaching tenure decisions, and insure their rigorous application at each stage in the review process.
- In this context, we support continuation of the current UA policy of automatically permitting a department that makes a negative recommendation on tenure to recruit for a replacement. *We also urge that the UA consider adopting a policy of normally denying a recruitment opportunity to a department that makes a positive tenure recommendation that is subsequently declined at the College or Provost's level.*¹³
- Ensure regular faculty review of the various University services and administrations and incorporate the input into the resulting action plan. While such reviews are already taking place there is a growing faculty perception that the results are too often ignored. Some C11 members believe that RCM may address this issue.
- There is a widely held perception that many of the UA service units are slow to act and charge exorbitant fees. They can do so because they have an effective monopoly. We suggest that the UA should start modest-scale experiments in permitting wider use of external sources to see where economies can be achieved. This should provide a very meaningful quantitative measure of value-added by the services in question and a strong incentive to potential more efficient performance.

e. Encourage Entrepreneurial Activity. Many university based research activities have significant commercial potential and can generate very positive interactions with and support from the local community. An oft cited example is Stanford and its interaction with Silicon Valley. The UA has helped the Tucson area establish a reputation as “Optics Valley” but much needs to be done to create a UA-connected commercial hub. As the interaction with the community grows we expect this to boost the support provided to the UA both through the UA Foundation and through collaborative projects. We believe that:

¹³ A majority of the C11 supported the suggestion highlighted in italics; a minority disagreed. This footnote acknowledges that fact and represents a compromise to enable completion of the white paper without further delay.

- The efforts recently initiated through the Tech Launch Arizona (TLA) organization are well conceived although still at a very early stage.
- The plan recently announced by the University/TLA and the UA Foundation to establish the Catapult Corporation (CatCorp) through which donations to the Foundation could be used to invest in local startup companies exploiting UA developed technologies is welcome. These companies would ultimately provide income (but not profit) for further investment in research and development at the UA.
- The UA and its sister universities in Arizona should work with Arizona industry to support the expansion of Science Foundation Arizona to expand the basic and applied research activities within the state and thereby generate growth in Arizona's GDP¹⁴ and improve the standard of living for its citizens relative to the remainder of the country.

Concluding Remarks. The purpose of this white paper is to:

- (a) Document the enormous challenge facing the UA if it is to maintain its high international standing as a research university despite the current difficult funding situation both within the state and in the federal research budget.
- (b) Express its strongly held view that meeting this challenge is essential not only for the University but also for the future wellbeing of Tucson and Arizona.
- (c) Suggest some possible approaches to meeting the challenge by making changes in the way the University operates.

The C11 clearly recognizes that making the changes needed to achieve the goal of continued development of UA research activity will not be easy and will require the full commitment of all members of the UA community. It will also mean reducing or even eliminating some current activities. This, in turn, requires a willingness to move the UA further from the operating norm of its peer institutions but the C11 believes that this will be to the long term benefit not only of the University itself but also to Arizona. We cannot expect to excel if we configure ourselves in the middle of the pack among our peers. We need to be willing to be different and to lead rather than to follow if we are to succeed in this effort. Certainly that is the spirit of the "*Never Settle*" plan.

Finally the C11, as a committee elected by the faculty, reiterates its purpose in developing this white paper is to focus attention and stimulate discussion on the challenge facing the UA in maintaining and enhancing the quality of its research programs in the face of ever tightening budget constraints – a subject of concern to an overwhelming majority of the faculty. The Committee recognizes, however, that this white paper is neither an exhaustive study nor one that has been endorsed by the faculty as a whole. Rather it represents a good faith effort by the C11 to address a topic of broad faculty concern and to stimulate action that will enable UA to continue its upward trajectory in research.

¹⁴ As stated in the American Academy of Arts and Sciences report "Restoring the Foundation" (ref footnote 3) "The predominant driver of GDP growth over the past half century has been scientific and technological advancement" and "Research is the lifeblood of a high-tech economy and plays a critical role in the economic and personal well-being of most citizens."

COMMITTEE OF ELEVEN



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Peter Strittmatter, **VICE CHAIR**,
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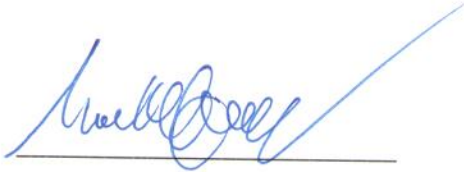
John Ulreich, English



Maria Zedeno, Anthropology

ADDENDUM TO THE SIGNATURE PAGE

1. At the time of approval of this report, there are two faculty vacancies on the Committee of Eleven, yet to be filled.
2. The following committee members agree generally with the spirit of the report. However, they are in strong disagreement with the statement cited in footnote #13 on page 16.



Marlys Witte, MD
Committee Member



Lynn Nadel, PhD
Chair of the Faculty
Ex Officio Committee Member

Dated: