Dr. Michael Cusanovich  
Regents Professor of Biochemistry and Molecular Biophysics  
Director, Arizona Research Laboratories (ARL) and ARL Division of Biotechnology  
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Participating faculty

Dr. Carol Barnes  
Regents Professor of Psychology and Director, ARL Division of Neural Systems, Memory and Aging and Director, Evelyn F. McKnight Brain Institute

Dr. Jennifer Barton  
Associate Professor and Director, ARL Division of Biomedical Engineering and the BME GIDP

Dr. John Hildebrand  
Regents Professor and Director, ARL Division of Neurobiology

Dr. Timothy Secomb  
Professor of Physiology and Director, ARL Division of Microcirculation

Dr. Nicholas Strausfeld  
Regents Professor, ARL Division of Neurobiology and Director, Center for Insect Science and the Insect Science GIDP

Dr. Donata Vercelli  
Professor of Cell Biology and Anatomy and Director, Arizona Initiative for the Biology of Complex Diseases

Dr. John Williams  
Professor of Aerospace and Mechanical Engineering and Director, Nuclear Reactor Laboratory

Dr. Konrad Zinsmaier  
Professor, ARL Division of Neurobiology and Director, Neuroscience GIDP
Perspective

It is abundantly clear that a key factor in the success of the University of Arizona over the last almost 40 years has been our commitment to and utilization of interdisciplinary models across the campus. This endeavor had its origin in 1972 with the creation of the Coordinator of Interdisciplinary Programs position in the Provost’s office, and was implemented through the creation of Graduate Interdisciplinary Programs (GIDPs). This was followed by the creation of the Arizona Research Laboratories (ARL) in 1979 to extend the success of the GIDPs by creating leading-edge research activities at interfaces, taking advantage of opportunities and achieving the goal of top ten Research University status. Indeed, a combination of ARL, GIDPs, and more recently BIO5, has given the University of Arizona a national and international cache and greatly enhanced its stature and success. Most importantly the presence of GIDPs, ARL and BIO5 has significantly contributed to our ability to recruit and retain truly exceptional faculty in many disciplines. In this context ARL has been hugely successful, typically generating 5 to 6 times more in direct expenditures (state, grant and contract, and auxiliary) than it receives in state funding. Equally important, the ARL participating faculty whose lines reside in other Departments and Colleges generate in excess of a 100 million dollars annually in research funding, in part as a consequence of their participation in the interdisciplinary interactions ARL affords (including joint grants across traditional boundaries). Examples of the successes include: Institute for the Study of Planet Earth, which recently shared a “sliver” of the Nobel Prize and graduated to a free-standing unit this July; Neural Systems, Memory, and Aging, which attracted a 5 million dollar gift to create the Evelyn F. McKnight Brain Institute; the Valley Fever Center of Excellence, which was transferred to the College of Medicine after establishing a national and international presence in ARL; Biomedical Engineering, which has generated 19 patents and 4 spinoff companies since 2000; and the Center for Insect Science, which has one of the nation’s largest NIH postdoctoral training grants, supporting 17 postdoctoral students annually. A hallmark of ARL has been excellence, and in keeping with that, ARL has played a key role in recruiting outstanding faculty both within ARL and in other Departments where the opportunity to participate in ARL activities has been an important factor. One measure of ARL’s success is the fact that among the 13 current faculty with appointments in ARL and including the ARL and Neural Systems, Memory and Aging Directors, there are 5 Regents Professors, one Member of the National Academy of Sciences, one Fellow of the Royal Society, and one MacArthur Fellow.

As we look toward the future, where interdisciplinary and collaborative programs are becoming even more critical to be successful at the leading edge, the ARL model (flexible, timely, nimble and excellence-driven) will undoubtedly become even more important in helping to achieve the Institutional goal of top ten public. Of note, in 1986 ARL was able to obtain a state-funded decision package to establish a national and international presence in ARL; Biomedical Engineering, which has generated 19 patents and 4 spinoff companies since 2000; and the Center for Insect Science, which has one of the nation’s largest NIH postdoctoral training grants, supporting 17 postdoctoral students annually. A hallmark of ARL has been excellence, and in keeping with that, ARL has played a key role in recruiting outstanding faculty both within ARL and in other Departments where the opportunity to participate in ARL activities has been an important factor. One measure of ARL’s success is the fact that among the 13 current faculty with appointments in ARL and including the ARL and Neural Systems, Memory and Aging Directors, there are 5 Regents Professors, one Member of the National Academy of Sciences, one Fellow of the Royal Society, and one MacArthur Fellow.

As we look toward the future, where interdisciplinary and collaborative programs are becoming even more critical to be successful at the leading edge, the ARL model (flexible, timely, nimble and excellence-driven) will undoubtedly become even more important in helping to achieve the Institutional goal of top ten public. Of note, in 1986 ARL was able to obtain a state-funded decision package to establish the ARL Division of Biotechnology which provides core services to the life science community and the private sector in genomics, biotechnology computing, flow cytometry, imaging (confocal and electron microscopy), human origins genotyping, and biological magnetic imaging. Literally hundreds of investigators utilize these services and technologies annually, facilitating their ability to compete nationally and internationally. Finally, the ARL administration is arguably one of the best business offices on campus, able to manage efficiently state, grant and contract funding and designed to support an extensive core service operation (rate studies, billing, personnel and related activities) and provides the administrative support for three GIDPs (Neuroscience, Insect Science and Biomedical Engineering). Table 1 compares ARL to several departments and Colleges and serves to illustrate the ARL effectiveness and productivity in both teaching and research. The metric used is the so-called “cost effectiveness ratio,” which includes SCH and research (both grant expenditures and indirect cost return). Just the faculty who have their primary appointments in the ARL were used for the ARL data in Table 1.

ARL has been home to many divisions over time, disbanded those that have failed to achieve critical mass (for example, Learning, Technology and Assessment, and Surface Science) and incubated and spun several out (for example, the Valley Fever Center to the College of Medicine in the early 2000’s, and last
July ISPE to the Vice President for Research). Thus, the goal of creating successful interdisciplinary activities and enhancing research has been magnificently met.

**Transformation**

In the context of Institutional Transformation, there are two options for ARL, both building on its strengths and record of high return on investment and excellence.

**Option 1**

*Reorganization and Strengthening Research and Graduate Education.* We expect that the very successful Divisions of Neurobiology and Neural Systems, Memory and Aging will move into a new School of Mind, Brain and Behavior (or something of a similar nature) and Biomedical Engineering is becoming a Department/School in the College of Engineering (this option has been under discussion for over a year). The remainder of ARL would be retained as a small unit that continues to support high quality, productive programs that contribute directly to the goal of becoming a top-ten public and more specifically to the University’s strategic goal of expanding efforts and impact in the biological sciences. The Divisions in the new structure would include: Biotechnology, the Center for Insect Science and its GIDP, Microcirculation, the Arizona Initiative for the Biology of Complex Diseases, the Evelyn F. McKnight Brain Institute, and the Nuclear Reactor (until its decommissioning in 2012). Finally, new Centers, Institutes, and Divisions could be housed in ARL for incubation and development, taking advantage of ARL’s long history of successfully supporting and nurturing highly interdisciplinary research that crosses College and Departmental boundaries. The specific programs would depend on the existence of a critical mass of faculty, opportunities at the federal level, and the needs of the State of Arizona.

*Impact.* The proposed restructuring will maintain a highly successful interdisciplinary model (do no harm), and provide a vehicle to expand into areas of opportunity or grand challenges to generate successful new activities that will garner new resources and facilitate interdisciplinary efforts.

*Process.* The proposal presented here has been coordinated with the Vice President for Research, and written and edited by the Directors of the current ARL Divisions. In addition each Division has solicited input from the participating faculty, staff and students.

**Option 2**

*Reorganization and Strengthening Research and Graduate Education.* If, for whatever reasons, the move of BME to the College of Engineering and/or the movement of Neurobiology and Neural Systems, Memory and Aging do not take place, we propose that they remain in ARL and continue to build on their huge success of the past. This would keep the core of ARL at or near its current size. In this context we would still propose to propagate the ARL model with new highly interdisciplinary units as described in option 1.

*Impact.* As in option 1

*Process.* As in option 1.
SPBAC Criteria

Centrality. ARL activities directly address the Institutional Strategic Direction – ARL engages graduate and undergraduate students in highly interdisciplinary research, provides world-class research in Biosciences and Biotechnology and in Biomedical and Behavioral Health, partners with and serves Arizona in providing services to Arizona companies, and generates patents and companies.

Quality of research, teaching, and outreach. As documented above, the quality of the faculty and research programs is excellent, and engages students at all levels in leading-edge research. ARL has significant outreach activities at the levels of K-12, working with the private sector (principally in the Bio-sector), summer camps and public presentations.

Productivity. The ARL has one of the highest returns on investment at the University, an exceptionally large fraction of Regents Professors, and consistently high levels of federal funding.

Efficiency. ARL is structured to leverage its state funds with grant and contract resources, as well as auxiliary funds, to support not only the more than 250 ARL employees, but over two hundred participating faculty with appointments in Colleges and Departments, with minimal overhead and investing in new technologies and new interdisciplinary activities.

Demand. The demand for ARL is reflected in the number and quality of faculty with appointments in Colleges and Departments that chose to participate in one or more of the ARL activities, and its ability to compete for training grants and research funding.

Budget Savings

Option 1. If NSMA, Neurobiology and BME are transferred to other constructs, the ARL budget would be reduced by ~$1.6 million. How this resource would be used by the receiving unit is unknown to ARL, so the savings if any are unclear. If new interdisciplinary units are formed, ARL is well positioned to provide high-quality, inexpensive infrastructure that facilitates successful competition for new grants/contracts and the development of new initiatives.

Option 2. If new interdisciplinary units are formed, ARL is well positioned to provide high-quality, inexpensive infrastructure that facilitates successful competition for new grants/contracts.

October 10, 2008
<table>
<thead>
<tr>
<th>College or Major Unit</th>
<th>Total Fall FY08 State FTE's**</th>
<th>FY08 State Expenditures***</th>
<th>FY08 Grant and Contract (Direct Costs)</th>
<th>Total FY08 SCH</th>
<th>FY08 ICR Earned</th>
<th>Fall State FTE's</th>
<th>State</th>
<th>Grant</th>
<th>SCH</th>
<th>Icr$</th>
<th>%University Expenditures</th>
<th>% SCH + % Grant per State Exp</th>
<th>% SCH + % ICR per State Exp</th>
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<td>0.86%</td>
<td>4.95%</td>
<td>0.67%</td>
<td>7.45%</td>
<td>6.50</td>
<td>9.39</td>
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<td>0.82%</td>
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<td>2.05%</td>
<td>17.45%</td>
<td>0.90%</td>
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<td>4.82</td>
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<td>2.54</td>
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<td>Mathematics</td>
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<td>510,120</td>
<td>48,822</td>
<td>1,264,080</td>
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<td>5.50%</td>
<td>1.60%</td>
<td>3.36</td>
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<td>2.82%</td>
<td>1.34%</td>
<td>3.61%</td>
<td>2.34</td>
<td>2.79</td>
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<td>Geosciences</td>
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<td>4,244,257</td>
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<td>0.99%</td>
<td>1.27%</td>
<td>1.36%</td>
<td>1.33%</td>
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<td>2.73</td>
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<td>Ecology &amp; Evolutionary Biology</td>
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<td>0.98%</td>
<td>1.10%</td>
<td>1.34%</td>
<td>2.26</td>
<td>2.64</td>
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<td>Speech, Language &amp; Hearing Sciences</td>
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<td>0.48%</td>
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<td>Tree Ring Laboratory</td>
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<td>Average of Comparison Departments</td>
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<td>3.94%</td>
<td>1.71%</td>
<td>1.75%</td>
<td>1.75%</td>
<td>3.33</td>
<td>3.94</td>
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<td>University</td>
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<td>3.94%</td>
<td>1.71%</td>
<td>1.75%</td>
<td>1.75%</td>
<td>3.33</td>
<td>3.94</td>
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</tbody>
</table>

* Model developed by Dean Eugene Levy for the College of Science
**Total Fall State FTE's excluding "Other"
***State Ag Extension and College of Medicin expenditures are not included in State Expenditures