PRIME
A Strategy to Advance Research at
The University of Alabama

Prepared by:
The Research Advisory Committee
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Executive Summary

The charge to the Research Advisory Committee by President Bonner and Provost Benson was to prepare a report on ways of increasing The University of Alabama’s research profile. This report previews the current research environment on campus, how UA compares to other peer universities, discusses ideas on how to promote research on campus, and advances the position that a strong research program at The University of Alabama is inextricably tied to a high-quality undergraduate experience and statewide economic growth, both of which benefit the citizens of Alabama.

The University of Alabama has a proven track record of setting a vision, identifying resources, implementing a plan, and achieving ambitious goals. To see evidence of this track record, one needs to look no further than the tremendous growth in the undergraduate enrollment or even the unparalleled success of the athletic program.

The University has taken the first steps in advancing research by investing in many new research buildings. Unfortunately, UA continues to lag firmly behind its peers on most benchmark metrics commonly used to gauge institutional research success such as: research expenditures (last in SEC and $70M behind next place Arkansas), NSF ranking (dropping from 180 in 2004 to 194 in 2011), and the Carnegie Foundation classifies UA as a second tier research university unlike most flagship universities, which are first tier.

To advance research at The University of Alabama, a University-wide strategic research plan is needed. This plan should synthesize college and department strategic research plans and articulate contributions and accountability for all faculty and administrators. The research culture must be improved at UA, which would require cross-campus interaction, research mentoring, research productivity recognition, and expanding outreach (focused on research accomplishments). Support and development efforts must be directed toward a research focus without jeopardizing the recent advancements made in the undergraduate program. Recruiting and retaining top research faculty will require advancements both on campus (progressive family and faculty oriented programs) and within the community (quality partnerships between UA and the city, schools, and developers) to make UA and Tuscaloosa equivalent or superior to top Universities and college towns from across the country.

The time is right to advance research at the University. Ambitious goals, a strong strategic plan, constituent buy-in, and appropriate resources lead to a formula that has produced unparalleled growth at The University of Alabama in the past. Similar growth in the research and graduate student enrollment at The University of Alabama will not only position the State of Alabama to compete in the new world economy, but will also launch The University of Alabama onto the national stage as a top research and education University.
Introduction

The crucial importance of having a research-intensive university is widely understood. However, such entities are threatened by many forces including economic challenges, emerging competitors, changing student demographics, and rapidly evolving technologies, just to name a few. This is particularly true in states like Alabama, where the ability to drive future economic growth is inextricably linked with the research-intensive universities.

The President of the United States stated the challenge in his 2011 State of the Union Address:

"The world has changed. In a single generation, revolutions in technology have transformed the way we live, work, and do business. The competition for jobs is real. But this shouldn't discourage us. The future is ours to win. But to get there, we can't just stand still. We need to out-innovate, out-educate, and out-build the rest of the world."

We must, as a state and particularly as the Capstone University for the State of Alabama, seek ways to invest in innovation, for by doing so, we create the jobs of the future. Investing in education prepares our citizens to fill these jobs. Building the infrastructure for a knowledge-based economy will ensure prosperity and security for our State. Key to the achievement of all three of these goals is a research-intensive university, which, through its research, creates the new knowledge required for innovation; through its advanced graduate and professional programs, produces scientists, engineers, physicians, artists, visionaries and innovators capable of applying innovation to create economic value; and through its development and deployment of advanced infrastructure, such as information and communications technology, provides the foundation for the knowledge economy.

But we as a State and as a University have not adequately invested in research, nor have we developed a strategy to support research. For many years, public universities like ours have seen steep reductions in state appropriations per student. Federal support for university research has also been declining. Meanwhile, Alabama business and industry have not fully partnered with research universities.

The unfortunate consequence of the low priority given to support research efforts at The University of Alabama puts not only the leadership of higher education and sustenance of undergraduate enrollment at risk, but also threatens the economic prosperity and security of our State.

The purpose of this report is to provide a roadmap so as to strategically develop a plan and the infrastructure to propel our research capacity to a point where we can out-innovate, out-educate and out-build the rest of the world.
In developing this plan we propose the adoption of a research vision statement, and a research mission statement that are University-wide. Concurrently, we also suggest that a set of measurable research goals be adopted by the University as a whole. It is the contention of this report to develop this plan with a focus on five areas, designated by the acronym, PRIME.

**PRIME**

- Promote research and graduate programs
- Recognize and invest in key research areas
- Increase the ratio of graduate to undergraduate students
- Modernize and streamline research support systems
- Empower faculty for research excellence

To set the tone for the development of this plan and associated infrastructure recommendations, the following sections will review the Current Situation, the Research Culture, Current Research Support, Quality of Life to Recruit and Retain top Researchers, and ending with specific Recommendations and concluding remarks.
Current Situation

Over the last decade, strong administrative leadership, a clear vision, and talented faculty and staff have positioned UA to become a premier student-centered research institution. During that time, some of the more noteworthy examples of institutional progress are enrollment growth, student-centered initiatives, and new construction and facility upgrades. Other than new buildings with the potential for research, examples of institutional progress in the area of research tend to be less frequent and less noteworthy.

Impressively, UA now either matches or outperforms its peers on many student metrics. As one example, UA’s enrollment has grown in quantity and quality from just over 20,000 and an average ACT of 23.6 in 2003 to nearly 34,000 students with an average ACT of 25.6 in 2012 (see Figure 1) placing the Capstone among the 20 largest flagship state universities in the nation (5th in the SEC) and making it the largest university in the state of Alabama. This growth is the result, in part, of planned initiatives focused directly on attracting high-quality students and providing them with an exceptional experience. Establishing the Honors College, expanding and intensifying recruitment efforts (including out-of-state recruiters), and raising scholarship funds are examples of highly successful initiatives that have propelled UA into the position of being a university of choice for outstanding students from across the state and nation, including 140 national merit and achievement scholarships in 2010 (ranking UA in the top 20 of all public and private universities). According to the US News and World Report 2013 rankings, initiatives like these have propelled UA to a #77 ranking among all National Universities, a #32 ranking among all public institutions (higher than any other university in the state of Alabama and trailing only the Universities of Florida and Georgia in the SEC), and #19 ranking among state flagship institutions.

In contrast to these student-centered gains however, the UA research enterprise has not experienced similar progress. Rather than being a leader in research, UA continues to lag firmly behind its peers on many of the benchmark metrics commonly used to gauge institutional research success. As an example, according to NSF, UA’s $56.6M in research and development expenditures in 2011 ranked 194th nationally placing the Capstone 49th among the 50 flagship state universities, ahead of only the University of South Dakota. UA ranked dead last among SEC schools falling nearly $70M behind the next lowest SEC member (University of Arkansas) and nearly $700M behind the University of Florida and Texas A&M University (see Figure 2). Perhaps more poignantly, consider that for every $1 that Florida and Texas A&M University spend on research UA spends a mere $0.07. The Capstone even lags behind its in-state counterparts, ranking 4th in research spending among other state universities behind UAB, UAH, and Auburn University. UA’s most recent NSF ranking has actually fallen from 176th in 2004 to 194th in 2011 (see Figure 3) during which time UA’s ranking was surpassed by such public institutions as the University of Toledo, the University of Wisconsin-Milwaukee, and the
University of Texas-El Paso – none of which are the flagship institutions in their home states (see Figure 4).

Significantly, of the public institutions ranked ahead of UA according to the US News and World Report, all had higher R&D expenditures than UA in 2011 with the next lowest (Clemson University) exceeding UA by more than $110M, spending roughly 3 times what UA spent. These research metrics suggest that many other elite public institutions have found a successful model for being both student-focused and research-active.

The potential economic impact of research spending cannot be overstated. For many universities, a majority of research expenditures comes from federal dollars. For example, in the FY 2012 70% of UA’s R&D spending ($27.3M) came from federal sources. Many of UA’s peer institutions, who receive a significantly higher number of federal dollars, are able to infuse hundreds of millions of dollars into their state, local, and campus communities annually. These dollars in turn help support and attract high quality graduate students and research associates. They fund equipment and space purchases and provide overhead for colleges and departments to
offer more competitive research start-up packages or teaching relief to attract new faculty, among other needs. In general, additional dollars from external research funding and associated indirect costs can dramatically ease pressure on campus budgets.

In addition to trailing national, regional, and state peers in the NSF rankings, UA is among the minority of flagship state universities that the Carnegie Foundation classifies in its second tier as “high research activity.” Three-quarters of flagships, UA System branches UAB and UAH, and all but 3 of the SEC institutions are classified in the first tier as “very high research activity.” Further, although UA is among the top 20 flagships in terms of student enrollment, the Capstone ranks in the bottom 20 for the number of research faculty (i.e., tenured or tenure-earning) giving UA more students but fewer research faculty than most of its peers. Even among select flagships that, like UA, do not have an affiliated Medical School (or Health Sciences Center) or School of Agriculture (as many land grant state institutions have) - a list that includes the University of Oregon, University of Colorado, University of Montana, and University of Nevada-Reno - UA ranks near the bottom on these and other research metrics.

While UA’s overall research portfolio appears largely unchanged over the past decade, there have certainly been some noteworthy research investments and advancements during this time. In 2010 for the first time in at least a decade (perhaps ever), UA topped the $40M mark for research and development expenditures and 2011 marked the first time that UA topped the $50M mark – what amounted to a 47% increase over a two-year span. In recent years, the University has added state-of-the-art research facilities in the Science and Engineering Quad and the Child Development Research Center in addition to maintaining active research centers like Center for Advanced Public Safety, Center for Materials and Information Technology, and the University Transportation Center for Alabama. UA will also house the National Water Center, a NOAA facility. In addition, some academic divisions like the College of Arts and Sciences ($12M in research awards in FY 2012) and the College of Engineering ($23M in research awards in FY 2012) and even some individual academic units like Chemistry, Physics and Astronomy, Psychology, Computer Science, Electrical and Computer Engineering, and Mechanical Engineering (each of which brought in more than $2M in research awards in FY 2012) are research and grant active.

Other noteworthy investments and advancements at UA include programs aimed at injecting highly-capable undergraduate students into the research process like the Emerging Scholars Program and UG Research Conference. Similarly, UA has funded a program to support postdoctoral research fellows to boost quality research and funding proposals in productive labs. Like most research institutions, UA has covered the out-of-state tuition difference for graduate students supported on external research grants. UA has also added personnel to increase and coordinate research development and networking activities as well as to facilitate protocol submission and review in the Office for Research Compliance. Finally, UA has made a significant investment in access to scholarly journals and archives. UA Libraries rank 36th among research libraries at public universities while offering access to 3.3M volumes, 100,000
scholarly journal subscriptions (a fivefold increase over the past 12 years), and the first digital humanities lab in the state of Alabama.

Unfortunately, these investments and advancements alone have yet to put UA on the steady incline toward levels of funding comparable to peers or toward “tier 1” status as a research institution. A closer comparison between UA and its peers (including other state flagship institutions and other SEC universities) reveals some potential impediments to research progress at an institutional level.

UA officially reports a 19:1 student-to-faculty ratio. While this ratio aligns with other flagship institutions, total student enrollment to fulltime faculty ratio of 25:1 ranks UA 45th among the 50 state flagship institutions and total student enrollment to research faculty (those in a tenured or tenure-eligible line) ratio of 36:1 ranks UA 47th. Also, despite having the 5th largest enrollment in the SEC, UA has the 4th smallest number (and 3rd lowest percentage) of tenure or tenure-track faculty (as of 2011). While UA’s faculty size has grown by 583 since 2005, just 95 (or 16%) of those are tenure or tenure-track positions meaning that only 1 of every 6 new faculty hires contributes to the University’s research mission and signaling that this aspect of teaching and research is “out of balance” on this campus. In fact, of the remaining 488 new faculty 395 have been at the instructor level and 93 as non-tenured faculty at the assistant and associate professor level (See Figure 5). The number of instructors is up nearly 150% over the past 8 years and non-tenure track assistant and associate professors (who typically have teaching but not research responsibilities) are being hired at a 1:1 ratio with tenure-eligible faculty. Additionally, although the student population has grown by roughly 54% between 2005 and 2012 (60% growth in undergraduates and 35% growth in graduate students), the research faculty has grown by only 12%. Consider further that in 2005, 67% of UA’s faculty members were either tenured or tenure-earning. By 2012 that percentage had dropped to 50% (See Figure 6 for comparison to SEC schools in 2011). These percentages undermine progress in research by indicating UA has too few research faculty for its size, by imposing heavier teaching loads on current research faculty (often for courses that require a special expertise, like many graduate level courses) - a condition which further reduces the time which a faculty member can devote to research, prepare proposals for external funding, participate in research related conferences and provide to citizenship within a research field (reviewer of proposals, referee for papers submitted to journals, etc.) – and by limiting the number of collaborative partners a research faculty member has on campus. These recent hiring trends could also have a significant, negative long term impact on UA’s viability and reputation as a research institution.
In contrast to having one of the 20 largest undergraduate enrollments among state flagship institutions, UA has one of the 20 smallest graduate enrollments. In fact, in 2011 only 16% of UA’s total enrollment was made up of graduate students placing UA behind 42 other state flagships and ahead of only Ole Miss in the SEC – that percentage fell below 15% in 2012 and projections are that the percentage of graduate students at UA will trend even lower in 2013 (See Figure 7); in spite of one of the fastest growth rates in the U.S. in terms of the total number of graduate students enrolled. The situation is dire in Colleges with greater research funding potential. For example, in the College of Engineering, between 2003 and 2013, the total enrollment increased by 138% while the graduate enrollment actually decreased by 10%. Thus, the percentage of graduate students in the college fell from nearly 20% in 2003 to only 7.5% in 2013.

For most flagships, like the Universities of Georgia, Kentucky, South Carolina, or Missouri, graduate students account for roughly 25% of the university’s enrollment (See Figure 8). In addition to increasing the number of graduate students, it is crucial to increase the quality of graduate students as well. The average GRE score for incoming graduate students at UA has remained mostly stagnant since 2006 (See Figure 9).

To change metrics like this UA must recruit and fund high-quality graduate students with nationally competitive scholarship and fellowship packages – a model the University has successfully used to drive growth in undergraduate enrollment. While internal funding support for graduate students has historically been strength of UA, in recent years the dramatic increase in undergraduate enrollment has pressed many individual colleges to re-allocate funding support from graduate students to temporary instructors. A simultaneous drop in the number of externally funded graduate assistantships has further reduced the number and percentage of assistantships available to recruit high-quality graduate students. The benefits of an investment in high-quality graduate students in clear: quality graduate students can advance institutional research efforts by
garnering later support from federal agencies, introducing new ideas, helping to execute a research agenda, becoming lifelong collaborators, and improving the university’s research reputation with outside entities to help attract new investments.

![UA Grad Students](image1.png)

![SEC Grad Students](image2.png)

![GRE Score Trends](image3.png)

While the UA administration should be applauded for prioritizing increased faculty salaries over the past decade, including the ambitious target of elevating salaries to the 75th percentile among the 31 members of the Southern University Group (SUG), there are still individual ranks and disciplines where salary levels are not nationally competitive – especially in highly fundable disciplines like physics and among new faculty members at the assistant professor level. For example, among 54 departments who participated in the 2012 - 2013 National Academic Physics Salary Survey (many of which were public institutions and state flagships), UA ranked last in salary average for new assistant professors in physics. UA also ranked 44th out of these 54 for average assistant professor salary, behind Auburn, UAH, and UAB among others. Importantly, the Department of Physics and Astronomy was one of only 8 UA departments with more than $2M in research awards in FY 2012.
At many universities, the faculty members who secure the highest number of external research dollars and attract the strongest graduate students are those that hold endowed chairs or professorships. These faculty members also tend to be among the most recognizable researchers in their respective disciplines. Universities across the country, including state flagships and other SEC members, have made it a specific institutional goal to increase the number of endowed professorships or chairs. For example, in its efforts to become a top 25 public research institution the University of Tennessee has added 23 new endowed chairs or professorships in the past 3 years. Similarly, in 2010 Auburn launched a campaign to specifically increase the number of professorships which has resulted in 95 new professorships and added $14M to the university’s endowment. Many other SEC universities have a significant number of endowed chairs and professorships including some with over 100. The University of Kentucky has 31 such endowed positions in their College of Engineering alone. The University of Florida has 47 in their College of Business Administration. In contrast, UA has a total of 59 endowed chairs and professorships, including only 4 in engineering and 15 in business, and, except for in the Law School, has not added a new Chair since 2008. This static approach to endowed positions has been costly to UA as many peer institutions have found success in attracting both donors to endow these chairs and professorships and high-quality, highly productive faculty members to fill those positions.

In conclusion, while the last decade has seen UA reach unprecedented heights in the “student-centered” portion of its mission, the “research” portion of its mission has remained largely inert.
Research Culture

While resources, the quality of students, and the structure of faculty work are critical to research success, so is research culture (Billot, 2011; Wilkes & Jackson, 2013). Faculty who define their professional identities, values and goals in terms of scholarly investigation are more likely to prioritize their time and expend their energies for research. For faculty in some disciplines, the research culture is relatively strong, the connection between grant writing and research is strong, and the practices of seeking funding are well understood. However, this is not the case across all disciplines.

Cross campus academic units and faculty have limited knowledge about one another’s research activities, and this restricts the possibilities for fruitful collaboration. Increasing interaction across and within units will: spark new research ideas, connect those who are less familiar with the research funding processes with those who are, and encourage the collaboration that is needed for successful funding of proposals. In addition, cross-discipline research activities provide unique opportunities for students to learn from their peers who come from different educational backgrounds and possess different skill-sets.

The Research Advisory Committee has identified some specific actions and activities, many of which are already in place at other universities, to help grow and nurture a culture of research and graduate education at the University.

Facilitating faculty collaboration

“First Friday or “brown bag” research sessions could be hosted by colleges on a rotating basis. These events could be campus-wide events or smaller events that involve only two or three Colleges. Faculty from the host college could briefly present and discuss current research projects in an informal setting, coordinated and moderated by the college’s research representative. These informal, collegial sessions would help faculty learn from one another, spark ideas, foster relationships, and share interests that could lead to collaboration on research projects and funding efforts. Although informal, faculty should be held accountable for their participation. A simple, straightforward guide or protocol for these sessions could make it easier and quicker to coordinate and lead them. Similar kinds of sessions could be held within individual colleges to promote internal community and collaboration among faculty from different departments. These efforts would be especially helpful for colleges that are split into different buildings.

The power of social network media may also be leveraged to foster faculty collaboration. UA could replicate the University of Michigan’s “M-Cubed,” a two-year pilot program designed to encourage UM faculty collaboration and innovative research projects – i.e., “bold research at the interfaces of academic fields where big breakthroughs tend to happen.” Academic units allot a monetary token ($20,000 at UM) to each faculty member who takes part. A faculty member
creates a project description on the M-Cubed website, and when two other researchers (one from a different unit) pledge their monetary tokens to the project, the project is “cubed,” the funding is received and work can begin. Presently there are some 170 cubed projects on the site.

**Mentoring**

Research has shown that mentoring has an important influence on academic productivity, job satisfaction, and personal development of junior faculty (Ambunjak, Straus & Marusic, 2006; COACHE, 2008; Williams & Blackburn, 1988). Mentoring feedback from senior faculty would help new and junior faculty understand expectations and processes for tenure and promotion; criteria for judgment of success; and the accepted research practices and routes to success in the field, including guidance about appropriate conferences, journals and funding avenues. Mentoring can take the form of one-on-one relationships between senior and junior faculty, or regular meetings between the junior faculty member and an ad hoc committee that reviews the faculty member’s progress. A formal plan for development with specific goals helps guide the mentoring. Mentoring for mid-career faculty whose research careers have stalled should also be considered. Faculty participating in research mentoring should be held accountable and appropriately recognized for success.

**Media publicity for research**

Publicity about research findings in the mass media will make it more likely that research is seen and cited by other researchers and can result in valuable contacts and the potential for collaboration. Quality mass media communication focused on research will motivate Alabama businesses to engage the University in new research oriented ways, thereby benefiting both the University and the State economically. The University’s public relations offices need to expand research publicity, but faculty need to push these efforts by proactively sharing information with PR staff at the college and university levels (and helping to ensure the accuracy of media reports). Along these lines, the University should consider producing a regular radio or television show that showcases faculty and student research. Such shows are not uncommon (e.g., University of Texas, University of Oregon, University of Delaware). During this semester, the University’s new Digital Media Center, which will house public TV and radio, WVUA-TV, and athletic department broadcasting, is scheduled to open in Bryant-Denny stadium; this transition period is a good time to consider new programming. In addition, faculty and units should leverage new forms of social media for the purposes of both publicity and networking.
Research awards

In addition to celebrating existing Blackman-Moody Award and Burnham Distinguished Faculty Award, the University should consider instituting additional new awards to recognize outstanding research work. Such recognition would increase motivation for research and raise awareness of research projects across campus. For example, a group of “top 15 researchers” could be recognized annually, according to criteria such as publications, research funding, and recognition within the faculty members’ discipline. Awards could be divided by broad disciplinary areas such as humanities, social sciences and physical sciences, to account for variation in research products and processes. Monetary awards or release time could be granted for a select handful of researchers within this group. The University of Utah and The University of Oklahoma grant these kinds of awards, in both cases funded through endowments.

Summary

A cultural change at a University requires buy-in at all levels. At a State University, cultural change even requires buy-in of state legislators. Undertaking a program to educate elected State representatives and community leaders on the financial and educational benefits to the State of a major research university will promote cultural change at UA. Hiring administrators, deans, department heads, and faculty who emphasize research and appreciate the overarching scholarly benefits gained from a strong research program and rewarding active researchers with appropriate teaching loads and support commensurate with their research work load will promote cultural change at UA. Providing a consistent campus-wide message that The University of Alabama will be a major research institute and stakeholders at all levels are committed to providing the necessary time, and resources to achieve this goal will produce the desired research culture at The University of Alabama.
Research Support

The University has historically focused on undergraduate education. Considering that the Office of Research has existed for less than 10 years, cross campus organization and support for research is relatively new. However, with the remarkable growth in student enrollment (both quantity and quality) as well as new research building infrastructure, the University is at a crossroad that can energize the research enterprise that will not only benefit the communities UA serves (including student, faculty, and staff), but also contribute to Alabama’s economic development. However, advancing research will require a concerted effort to modernize and streamline the research support system. The research support system must seek to help researchers recognize and tap into new opportunities, reduce organizational barriers, and onerous policies and procedures, facilitate access to advanced technical, computer, and software resources, and cultivate an environment for high research productivity.

The key ingredients for a successful outcome are: (1) an organizational structure conducive to proactive communication and feedback, (2) qualified and well-trained staff who are engaged in the research mission, and (3) motivated faculty with enthusiasm for research. The administration has the power and responsibility to actually realize these outcomes. The following discussion offers specific action in targeted areas to help modernize and streamline the research support system.

Research Proposal/Project Support

The Office of Research (OR) provides essential support for the preparation and submission of research proposals, and subsequently for the management of the funded research projects. A growing research enterprise will require UA to strengthen these services, in conjunction with other entities on campus such as accounting and purchasing support systems. For example, the University of Alabama E-Research Initiative led by the University Libraries is a partnership among the Office for Research, the Office for Information Technology, and the University Libraries. This effort directly supports the creation of strong data management plans in grant proposal stage and is building out the capacity to host data throughout the life of funded projects and beyond that to support data sharing, an increasing funder requirement.

Action items to improve proposal preparation include: (a) customized funding opportunity e-mails or related assistance to faculty who might not otherwise monitor existing databases, (b) work-study student support to perform trivial tasks (graphing, drawing, copying, etc.) during proposal preparation, (c) revamped Office of Research website with improved functionality and easy access to information; at UA home page, the link for “research” should be at a more prominent location, preferably adjacent to “academics” instead of towards the end, and (d) developing and instituting a pragmatic and consistent matching fund policy.
Currently, most UA research projects are governed by state policies and procedures which can be cumbersome. Nationwide, research intensive institutions utilize Research Foundations to manage research business. For example, The University of Alabama at Birmingham research foundation is part of the Institute for Innovation and Entrepreneurship (IIE) that strives to be a first-in-class institution created to serve as the nexus for UAB innovation, entrepreneurial educational models, applied research, management of intellectual property, and an entry point for industries seeking to collaborate with UAB. At UA Huntsville, the Research Institute carries out applied research and engineering programs, principally to meet the needs of Department of Defense customers, but with significant related work for NASA and private industry. A Research Foundation offers the flexibility and can accelerate and simplify research grant initiation and management. By utilizing our research foundation and conducting research business through it, UA will attract high-profile researchers and operate on par with top research institutions across the country.

UA has made strides in project account management system whereby principal investigators can access account information online. However, faculty are either not aware of this resource or find the information too difficult to understand and utilize, e.g., account categories do not match the proposed budget. A simple project account management system is necessary, with its functionality improved developed with faculty input to meet actual faculty needs. Faculty should also be trained in using and interpreting the system, which will require live training sessions offered by knowledgeable support staff members.

UA’s purchasing policies and procedure should accommodate the unique challenges and requirements of purchasing materials, supplies, and equipment for research. The process should be streamlined so that research purchases can be made without delays and/or inflated costs. A simplified purchasing process should be developed with input from faculty to meet actual research faculty needs. Faculty, students, and departmental staff should also be trained in the use of this system, which will require frequent live training sessions offered by knowledgeable purchasing staff members.

The cost of cutting edge instruments is rising exponentially and is becoming unaffordable at an individual researcher level. When new instruments are acquired at UA through research grants, after the warranty from the manufacturer runs out, this equipment is unprotected and will be abandoned if serious damage occurs, for example, by natural hazards. UA’s insurance policy covering major research instruments and equipment is not effective and requires an overhaul. Interdisciplinary Centers of Excellence housing cutting edge instruments are cost-efficient places where analysis and technique development take place. Examples include Centers similar to the CAF but for other fields of science (e.g., a Center of Excellence for Isotope Analysis and Research).

Intellectual property protection, technology transfer, and commercialization are important outcomes of faculty research, and UA has invested in these activities. The process begins with
the completion and submission of an invention disclosure. The number of invention disclosures received can be used to measure a University’s “innovation capacity.” The national average (according to Association of University Technology Manager’s FY12 Facts & Figures) is one invention disclosure per $2.62M of sponsored research expenditure – UA has a more positive number of one disclosure per $1.55M of research expenditure. In addition, many disclosures require additional research work, and university support. Providing resources to help address the gap between initial disclosure and a marketable technology is extremely valuable, and would help generate additional licensing/technology transfer activity. UA can promote these activities by: (a) providing incentives and recognition for commercialization/technology transfer activities; and (b) making resources available to help navigate the gap between early stage discoveries and marketable technology. Moreover, patents, commercialization, and technology transfer activities should be formally considered in tenure and promotion evaluations as well as merit raises.

**Cyber Infrastructure**

With the addition of several new building (e.g., Science and Engineering quad) the research space at UA has improved greatly. However, cyber infrastructure and technical support capabilities have lagged behind. The technology infrastructure for research is highly dependent on the capabilities of the network and the accessibility to high performance computing platforms. It also requires support for the computational, visualization, and simulation capabilities often demanded for interdisciplinary research.

The UA network is currently undergoing a complete refresh that will be able to provide gigabit connections to all parts of the campus and to the advanced Internet-2 and National Lambda Rail research networks. UA is currently in the third year of a six-year renovation that will provide a highly available and redundant network core as well as dual ingress and egress routes to the major network connections in Atlanta. In addition, the wireless system of the campus is currently undergoing a transition to the next generation of wireless that will provide much higher density and bandwidth to the classrooms and laboratories. The research community will require not only increased bandwidth but also encryption and secure virtual private networks for collaborative research efforts.

High Performance Computing is a necessary research tool and enabler for those requiring computational analysis, visualization, simulation, and spatial analysis. The UA will need to improve this element of its cyber infrastructure to compete for the larger collaborative grants in the Big Science areas. The more prestigious research universities have a cyber research staff in place to support the faculty and staff who utilize these tools in their advanced cyber infrastructure initiatives.
IRB Process

UA’s IRB process has several positive aspects. For example, the IRB website provides tools to assist users with the IRB process, guidance and advice is available through IRB staff, IRB staff is very serious about their positions, and comments and feedback from IRB are helpful. However, some research opportunities are not being pursued at UA because of the IRB process.

The burden of the IRB process, especially for first-time human-subject researchers, limits proposal submissions and therefore awards. There are often significant delays (several months) in getting through the IRB process. Some of the concerns noted by investigators are as follows. 1) Each submission is an entirely new review and not just a check on previously cited requests to adjust or clarify. It is not clear why the proposal is returned to the entire committee for review after each revision (the chair or a designated person could validate the changes). 2) Inconsistencies in review and approval. For example, an informed consent document was approved by the IRB for one study, but when a nearly identical document was submitted by the same PI for a nearly identical study, the IRB required substantial revision. 3) The level of detail requested appears to be beyond the intent of the IRB process (for example: “What is the name of the room that you will hold sessions in at DCH?”). 4) Whether IRB member fully understand their directive or purview. At times, comments tend to critique research aspects of submitted protocols that are not at all related to the human subjects aspects of those protocols. As each round of review takes another month, requests to justify research methods and technologies that do not pertain to human subjects concerns can be extremely frustrating.

In addition, to facilitate the communication necessary for efficient protocol amendment and approval, researchers should be invited to attend IRB meetings. With the current IRB process, researchers can attend IRB meetings, but they are not allowed to enter the room to discuss/clarify items in their application. After waiting for as long as 2 hours, a member of the Office for Research Compliance will relieve the faculty member and let them know they will receive written notification of the revisions requested by the IRB. Even after requesting to speak to the IRB to obtain verbal clarifications on requested revisions (the written requests can be very unclear and confusing), researchers are told that they are not allowed to enter the room to make clarifications. In summary, the IRB process is bureaucratic and not a motivator for either faculty or graduate students and their advisors. The actual IRB process is entirely different from the 1-hour information session claiming that the IRB process is streamlined and not complex.

While researchers at many universities find the IRB process frustrating, one of the issues particular to the UA IRB is the UA Office for Research Compliance. Members of this office give researchers the impression they are viewed as the opposition, rather than as members of the UA research team. The role of this office should be to facilitate and promote research while complying with federal guidelines rather than to police the faculty who perform research. Also, members of this office give researchers the strong impression they do not want to communicate with them (emails and voice mails are not answered). As a result, the length of time it takes for
each back-and-forth step with the Office of Research Compliance for protocol edits/amendments is unacceptably slow.

**ITAR Process**

International Traffic in Arms Regulations (ITAR) governs research and information that is deemed sensitive by the US government. Much of this work revolves around Department of Defense (DoD) research and development. UA’s close proximity to the Huntsville area provides an opportunity to engage in DoD research, but such involvement can be ITAR controlled.

Though UA has made significant strides to engage work in this area, UA researchers are still hampered in a variety of areas. This includes the recruitment and availability of qualified US-citizen graduate students for hiring; lack of communication on the processing and approval of ITAR projects that are being reviewed through UA’s compliance office; and timely UA response to getting ITAR programs qualified so that the work can begin. In terms of the latter issue, many DoD projects are time-sensitive, with expected deliverable milestones. Though some delays are unavoidable depending upon the timeliness of and governments’ response, it would be beneficial for UA researchers to be able to track and be informed of any delays so that they can communicate and be responsive to the funding agency. A common concern for many ITAR-focused researchers is that they do not receive updates or responses to emails that inquire about the status of programs currently under compliance review. Besides, many research institutions routinely engage in ITAR projects because they have developed procedures to reduce the approval times to no later than typical research grants.

**Graduate Student Recruitment**

The University of Alabama has a very strong and effective undergraduate recruiting mechanism that operates at the national level. Although UA has been effective in growing the size of the graduate program and in attracting students from underrepresented groups during 2006-2012, the overall percentage of graduate students with respect to all students at UA has gone down. In general, graduate students typically select a university based on accessibility and reputation. Accessibility to a graduate program is often limited by financial constraints (availability of tuition and stipend support), while a University’s reputation is based on past performance. With a University wide graduate recruiting plan focused on improving accessibility and reputation, UA can successfully compete for top graduate students at the national level, which requires strategies different from undergraduate recruiting. It requires partnership among The Graduate School to maximize the applicant pool size and quality, departments and research faculty to attract and retain grad students, and central administration and Office of Research to increase stipend availability and size of financial packages. UA can promote graduate recruiting activities by: (1) leveraging successes of undergraduate recruiting mechanisms for graduate recruiting at key Universities, (2) tying University and College funding for graduate studies to faculty research rather than the graduate student, and (3) expecting faculty, departments, and colleges to attract and retain graduate students by improving program performance.
Quality of Life to Recruit and Retain Top Researchers

According to the National Research Council, one of the ten best ways for research institutions to “stay on top” is to focus on improving productivity (Kiley, 2012). Tangibles affecting recruitment and retention of top faculty, who will be focused on advancing the research mission, include the following: spousal placement; pre-tenure sabbatical leave; parental leave for the birth or adoption of a child; access to top quality child care and elder care resources; and a community committed to: excellent public schools, varieties of shopping options and cultural attractions, and a healthier citizenry through public projects (bike paths, sidewalks, parks and other greenways). These quality of life factors should become part of The University of Alabama’s strategic research plan, if in fact it aspires to emulate its Tier 1 competitors.

Spousal Employment

Because two-career families have become the norm, not the exception, facilitating career opportunities for spouses and partners is key to recruiting and retaining top research faculty. In recent years, the University has increasingly demonstrated its support for spousal hires with funding from the office of the dean or the provost. Attracting and retaining faculty committed to a productive research agenda would be significantly enhanced if the University were in a position to consider expanding and formalizing its spousal hiring practices. For example, in those cases in which funding alone is preventing or discouraging spousal hiring, guaranteed temporary funding for one or more years would enable the department hiring the spouse to identify departmental funds to retain the person over time. At some universities, the primary department provides funding for an agreed upon number of years. In some cases, that funding decreases gradually each year (e.g., 25% per year) in order to afford the secondary department sufficient time to acquire funding to reappoint the spouse annually. This or other more formalized funding options would both facilitate the hiring process.

It should be noted that not all faculty spouses seek employment at the University. Rather, some seek employment in the community. This can prove exceptionally challenging for newcomers who lack a social or professional network to make introductions or “put in a word” with employers in the community. The University could ease a spouse’s job seeking challenges off campus if an office for that purpose were created. As an alternative to creating a formal placement office, the University may wish to consider creating less formal services for job-seekers to become more easily aware of employment opportunities in the community. Just as much progress has been made in recent years to assist newly hired faculty to integrate socially into the community, facilitating job searches for spouses, whether on campus or off, would contribute significantly to attracting and retaining top research faculty.
Child & Elder Care Resources

Child care is an area where The University of Alabama has excelled in terms of quality of care provided. However, only 39 of the approximately 114 slots at the state-of-the-art Child Development Research Center (CDRC) are allotted to faculty. With over 1500 faculty, a birth rate of about 140 faculty children per year, and a three- to four-year wait list at the CDRC, The University of Alabama has fallen short in terms of its ability to readily provide access to high quality child care, which is absolutely essential for young productive faculty members with families. The RAC is aware of a recent post-doctoral hire that fell through in the College of Arts & Sciences as a result of untenable child care options at UA, a situation that will be exacerbated as UA grows and that can only be mitigated if The University of Alabama invests in expanded child care facilities, not just for faculty, but also for student parents. The University of Oregon, just by way of example, provides approximately 120 child care slots to a similar sized faculty, and another approximately 200 slots for children of students. Elder care resources similarly free faculty up to perform at the highest levels. Institutions like New York University, which have partnered with community providers to connect faculty with elder-care resources, are good examples of the kinds of institutions from which to learn.

Parental Leave

The period leading up to tenure is one of the most critical for striking a work-life balance. It goes without saying that innovative projects require time and focus, hence the strategic appeal of pre-tenure research support in the form of a fourth-year sabbatical (see more on research support below). Just as importantly, it is precisely during the first decade of post-graduate employment that faculty develop and grow their families. While spousal placement is one of the best guarantees for retaining top faculty; so too are generous and equitable parental leave policies. The RAC notes that some of the best examples of such policies are at institutions like Georgetown and Lewis & Clark College, where adoptive or birth mothers are granted a full semester of paid maternity leave, and fathers, a course release. Similarly, flexible scheduling, including temporary reassignment to part-time status, course releases, and the ability to combine a leave with FMLA benefits make institutions like The University of Oregon leaders in this area. The RAC is aware of recent resignations resulting from institutional inflexibility with respect to parental leave, part-time status, or work hours.

Research Support

Just as striking a proper work-life balance plays a key role in the period leading up to tenure, a teaching-research balance is equally crucial. The transition from graduate student to tenure-track assistant professor can be fraught with many challenges. From the outset, the new assistant professor is confronted with two co-equal priorities: a record of successful teaching and a record of ongoing research productivity. Both require time, and for many assistant professors both require a year or more to gain the necessary degree of balance and quality to ensure positive
annual evaluations from students and peers. Finding time to teach often proves easier than finding time for research, as class time is fixed according to a schedule that cannot be postponed. Thus, the rigidity of the classroom schedule causes the research agenda of some assistant professors to become of necessity a secondary priority because of a lack of time management experience.

To ensure that tenure-track faculty are afforded sufficient time for research, The University of Alabama should consider developing new opportunities to support junior faculty members’ research efforts. Georgetown University could provide a model for such support. The Georgetown Junior Faculty Research Fellowship Program provides one semester of leave time at full pay to non-tenured, tenure-track assistant professors. An additional $15,000 is made available to the faculty member’s department to cover teaching obligations in order to maintain the quality of the educational programs. The junior faculty member, in turn, is granted a semester of release time from teaching to focus on the substantial completion of research that will contribute to positive forthcoming tenure and promotion reviews. Normally, these awards are made during the “middle stages” of a faculty member’s tenure process. Other models for enhancing research support for non-tenured, tenure-track faculty may exist at other universities, or The University of Alabama could develop different funding models which other universities might adopt.

Summary

Importantly, these quality of life issues have a real, measurable economic and social impact on the University and the local community. They increase the chances that faculty choose to reside in Tuscaloosa by motivating the purchase of a home in town, support of local businesses, enrollment of children in local schools, attendance at local events, participation in local activities, and generally motivate faculty to embed themselves more deeply and more permanently in the community. Each of these improves the chances that a faculty member will make long term contributions, through their research and scholarly efforts, to the University.
**Recommendations**

During the past decade, The University of Alabama has enjoyed unprecedented growth in student enrollment, quality of students, and campus infrastructure. This growth has largely shielded UA from the adverse effects of National budget deficits and reduced State funding for higher education, while greatly improving UA’s economic situation and its positive impact on the community and the region. UA’s recent successes are however not an accident. They are the result of a clear vision and well-crafted strategy and implementation plan executed by the then president Robert Witt and his administration that correctly recognized UA’s real capacity and its tremendous potential for growth in 2003.

A decade later, UA is at a similar cross-road if one recognizes that its research capacity is vastly under-utilized. Growing UA’s research enterprise is an unprecedented opportunity which will attract world-renowned faculty to our campus and place UA among the Nations’ top research universities, while retaining its current key strengths. Increased research productivity and scholarly output will raise UA’s recognition around the world, cultivate a stimulating environment to recruit and engage the best and the brightest students, enrich the local community, and cultivate a knowledge-driven regional economy poised to provide prosperity far beyond the initial research funding investments.

*The RAC recommends UA to articulate and adopt a university-wide research vision and mission statement; this statement must be broadly known, understood, and embraced by the administration, faculty, staff, and students.*

Enhancing UA’s research profile will also require a well-crafted research strategy and implementation plan, which should be built upon the five core recommendations offered by the RAC using the acronym **PRIME**. The philosophy behind each recommendation is explained followed by suggested action items prioritized to achieve the desired outcome.
**Promote Research and Graduate Programs**: UA’s research and graduate program successes must be made known to the public, peers and professional colleagues, prospective students and families, program managers and law makers, etc. Promotion will require professional staff as well as direct outreach by the faculty, staff, and students.

- Employ PR professionals to promote research and graduate program successes at major University events such as football games and sporting events, freshmen orientation, convocation, etc. Educate UA recruiters about research and graduate programs and develop attractive brochures to distribute at undergraduate recruitment and community events. Employ television, radio channels, and web-based media outlets for research outreach.

- Place “research” tab at a prominent location (e.g., next to academics) on the UA home page, improve appeal and contents of the research website, and make links to individual research faculty websites created and maintained with the help of professional web support staff.

- Increase presence in Washington, DC, Montgomery, AL, and federal research centers to educate law makers and funding agencies about UA research and graduate programs. Engage and educate alumni about UA research to attract endowment funds to support the graduate programs.

- Promote UA research enterprise as the catalyst to attract new investments/industry to the state while highlighting the link between research productivity and economic development.

- Encourage faculty to develop multi-disciplinary seminar series programs that will invite prominent speakers and researchers to the campus, and follow these events with networking receptions to facilitate collaboration among researchers.

- Encourage faculty to promote UA research by taking national and international leadership roles in professional peer organizations, attending national/international conferences, especially as plenary and featured speakers, conducting panel reviews for funding agencies, presenting invited seminars at reputed institutions, national labs, and research centers, and engaging in community outreach activities such as summer schools for high-school students and teachers.

- Involve graduate and undergraduate students in multi-disciplinary national competitions to promote UA research while fostering a sense of community among the students.
Recognize and Invest in Key Research Areas: Expect each department/unit to develop a strategic research plan identifying the top and peer departments in the country. Each department/unit should compare their research profile against the top and peer institutions, and develop actionable steps for improving UA’s research profile using measurable criterion. A set of quantitative and qualitative measures should be developed to: evaluate and recognize research productivity, create a competitive research environment, and identify key research areas in support of the research vision and mission.

- Seek alumni, industry, and potential donor support to invest in competitively created endowed chair positions aligned with the research vision of the University in all colleges. Employ these positions to attract eminent scholars and top researchers to the campus, as well as to retain and reward outstanding research faculty already on campus.

- Make investments in emerging research areas and cluster hires based on competitive proposals from faculty or administration demonstrating past successes and/or potential for securing significant external funding. Hire new faculty to support the strategic research thrust of individual departments.

- Encourage cross-disciplinary collaboration among departments and colleges, and help create networking opportunities through innovative university-wide seed grants. This activity would also help establish research centers, in non-STEM fields with significant funding potential, for example, Humanities and Education.

- Develop consistent metrics/criteria to assess the productivity of research clusters and centers, make it known to all, and employ the metrics annually to review performance and returns on investments, and based on the results, implement necessary corrections and/or changes.

- Create a new faculty orientation and mentoring program focused on research. The program will introduce new faculty to the research enterprise at the university including the Office of Research resources, labs facilities, research centers, accounting and purchasing polices, research expectations, etc. Mentorship by a research active faculty will help new faculty to quickly adjust to the environment, and thus, become a productive member of the research community.

- Create a program to invite and host “Eminent Scholars,” such as members of National Academy of Science, National Academy of Engineers, top researchers, retired company executives, etc., to campus for mini-sabbaticals (say 1 month).
Increase the Ratio of Graduate to Undergraduate Students: Coordinate and synergize efforts of the Office of Research and The Graduate School to enhance the University’s reputation and access for recruiting high-caliber students into graduate programs. Reputation refers to the perception by peers and potential applicants about the quality of the graduate programs. Access refers to the ability of a student to meet the financial needs during the graduate studies.

- Establish a target graduate student enrollment percentage that is in alignment with Tier 1 research institutions. Increase from the current 15% to 25% of the total student enrollment. For a total student body of 36,000 this would signify research-focused graduate student enrollment of about 9,000. An estimated $100M per year is needed to reach this target, with the majority of the support generated by external research funding. However, significant redirecting of existing internal graduate funds as well as new investments in research and graduate programs are needed to realize this ambitious yet feasible goal.

- Utilize the highly-effective nationwide undergraduate recruiting mechanism to recruit graduate students, with particular focus on large and reputed universities. Leverage graduate recruiting opportunities at sports and community events, booths at national meetings, visits to university campuses, etc., accompanied with professionally prepared, high-quality recruiting materials focused on UA research and graduate programs.

- Link Graduate School and other UA fellowship awards to faculty research and follow-up to ensure that the fellowships are indeed employed as investments to increase research. Similarly, allocate GTA funds to enhance research, and prioritize these funds as investments to increase research productivity measured by external funding, quantity and quality of publications, and other measures of scholarly output.

- Enhance accessibility by providing supplemental/matching funds to recruit, retain, and rewards high-caliber graduate students otherwise funded on research grants, by establishing endowed graduate fellowships, especially in the College of Engineering, and the College of Arts and Science, and by coordinating and strengthening institutional support for faculty-led graduate fellowship grant applications (e.g. GAANN, IGERT, GK-12, etc).

- Elevate stature of graduate studies across the campus by engaging UG students in research, educating them about various competitive fellowship and scholarship, and preparing them to compete successfully; by engaging and empowering graduate student organizations on campus to understand and accommodate their social, cultural, and professional needs; by revising graduate student course work requirements to be in line with research-centered universities.
**Modernize and Streamline Research Support Systems**: Change the current “silo” approach for research support to an “integrated” approach whereby research faculty input and feedback are essential part of the decision making process. Modernize and streamline the research support systems by removing impediments to research productivity. It will require well-trained support staff employing the core philosophy of “what can we do to make it better for you ..” instead of “we cannot do this because of …”.

- Regularly survey research faculty to identify support issues and/or obstacles during all stages of proposal preparation (grant opportunity alerts, networking events, website support, matching fund policy, etc.) and research grant management (accounting, purchasing, hiring, etc.), institute necessary improvements, and make them known to the end users through personal communications, live educational seminars, on-line presentations, etc.

- Revamp the Office for Research Compliance to consult with faculty in structural and procedural decisions including but not limited to those that directly or indirectly affect changes to the IRB process. The objective is to reduce the bureaucratic burden on investigators and to increase ease and decrease the time for approval while fulfilling universities obligation of protecting human subjects. The role of Office of Research Compliance must be changed from that of policing research to facilitating research while ensuring compliance with federal guidelines.

- Learn from sister institution to more effectively engage research foundation structure for managing funded research projects. Timely approval of fast-paced ITAR grants requires effective communication and feedback between the Office of Research Compliance and investigators.

- Employ faculty input to enhance cyber infrastructure support such as increased bandwidth, encryption and secure virtual networks for collaborative research efforts, and high performance computing.

- Facilitate the creation of interdisciplinary research centers housing state-of-the-art instruments and equipment that is operationally maintained in a cost-effective manner with the oversight of competent technical staff. Overhaul UA’s insurance policy for major research instruments and equipments to improve functionality with emerging research needs.

- Provide incentives and recognition for commercialization and technology transfer activities, make investments to reduce the funding gap between early stage discoveries and marketable technology, and consider patents, commercialization, and technology transfer activities for tenure, promotion and merit raises.
**Empower Faculty for Research Excellence:** Embark upon a cultural change to dispel the notion, real or perceived, that faculty research and graduate programs are of secondary importance on the UA campus.

- Establish research awards (similar to University’s Blackmon-Moody Award and Burnham Distinguished Faculty Award) in each college to recognize excellence in research by individual faculty measured by relevant metrics such as external funding, quality and quantity of publications, and scholarly output in relation to peer institutions. Organize a university-wide annual gala event to present these awards, which would develop networking and an aura of accomplishment among the research community.

- Implement a faculty-feedback mechanism to directly evaluate research staff and administration including Associate Deans of Research. Develop and employ mechanisms to: track and quantify return on research investments, identify productive research faculty for endowed positions and award nominations (internal and external), and hold faculty and administrators accountable for internal investments.

- Expect each department to develop criterion to evaluate faculty research productivity by making comparisons with peer institutions, for example, employing online resources such as Academic Analytics Database. Both quantitative and qualitative factors must be utilized to evaluate external funding, publications, and appropriate scholarly activities of each department. Attention to quality would encourage faculty to strive for high-impact venues to publish research within their particular field (this may include Nature, Science, prestigious journals or conference proceedings in the field, monograph, etc.).

- Mandate that each unit employs a differential teaching policy whereby the teaching load is linked to research productivity of the faculty as measured by external funding, publications, graduate student supervision, and other scholarly output. Thus, less research active faculty would be expected to take on a greater share of the teaching load.

- Improve quality of life factors to recruit and retain top researchers by implementing policies for spousal employment, access to top quality child care and elder care resources, parental leave for birth or adoption of a child, pre-tenure sabbatical leave, and by developing partnership with the city to facilitate excellent public schools, varieties of shopping options and cultural attractions, and a healthier citizenry through public projects.
Concluding Remarks:

The Research Advisory Committee has developed a set of recommendations that we believe are necessary to enhance the research profile of The University of Alabama, and to move up UA’s research ranking among peer institutions. A clear research vision and mission, and dedication and investments to realize it are necessary. Over the next decade, these recommendations would significantly increase graduate student enrollment (without compromising undergraduate enrollment) and launch the university, from the present cross-road, towards an exciting path with unmatched opportunity to replicate and sustain university’s growth and prosperity during the previous decade. The positive outcome will however depend upon a university-wide strategic research plan executed in a timely manner. Thus, the Office of Research must develop and execute plans to implement these recommendations. The RAC represents research faculty from across the campus and therefore, would be an excellent resource to help develop such plans.

References


