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# **Enhancing UVA's Recognition As a Research University**

**Prepared by:**

**The Washington Advisory Group  
an LECG company**

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## Enhancing UVA's Recognition as a Research University

### *The Washington Advisory Group an LECG company*

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## EXECUTIVE SUMMARY

The *purpose of this report* is to assess UVA's current standing as a research university and suggest steps UVA might take to achieve its stated goal to "increase significantly the prominence of UVA as a research institution in science and engineering."<sup>1</sup>

The *current state* of UVA can be summarized as follows: UVA is widely and deservedly given high marks for undergraduate education, but receives modest marks for research.

Our assessment identified *strength and weaknesses* that influence UVA's quest for research prominence. These include:

- Strong base of programs, faculty, students
- Attractive location and campus
- Distinguished history of institution
- Collegiality
- Mixed standing in the ratings of research universities
- Did not participate in the 1990 decade of national research expansion
- Departments static or declined for a decade
- Lack of diversity in faculty and students
- An environment that could be more open and transparent

The report identifies *operational actions* that could improve UVA's research standing. Chief among these:

Allocate \$1 billion over 5-7 years to bolster science, medical and engineering schools to allow hiring of experienced star faculty, balanced by high potential and research active junior faculty and graduate students.

Aggressively project UVA's plans, research accomplishments, and new image to the global academic community, federal and state officials, potential students, and donors.

Translate strategic planning that results in agreed to goals and conclusions into Operating Plans for Schools and Colleges and each department. Based on administration commitment to resource allocations, plan implementation must be transparent to faculty.

Broaden the income stream by increasing activities with industry, intellectual property rights (IPR) exploitation, foundations, and the Commonwealth.

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<sup>1</sup> University of Virginia Request for Proposal, "Academic Consulting and Advisory Plan" October 23, 2006. p. 3.

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Increase faculty participation in U.S. science policy matters nationally and internationally, and focus on getting faculty elected to membership in prestigious academies and societies and as recipients of significant science and engineering honors.

In the ongoing UVA \$3 billion campaign for funds highlight strengthening programs in the sciences and engineering and focus on making this case to potential contributors.

Establish priorities for UVA's investments in building a ranking research university based on a "bottoms up" approach followed by an iteration with outside knowledgeable experts.

On the basis of the findings in this report, an overall allocation something like 60% to the SOM and 40% to CLAS and SEAS could be supported.

There are *administration and support actions* that could help UVA improve its stature as a research university:

UVA needs to move from a school and department centric organization to a university centric one. In particular it needs to:

- reduce restricted funding at the departmental and school level;
- retain a higher percentage of F&A returns for central purposes and control;
- utilize the Capital Campaign for pan-UVA projects and purposes, especially graduate research improvement;
- consolidate some of its Foundations to achieve more coherent objectives and reduced administrative expenses;
- centralize more of the space planning and space administration.

Consider using additional debt to construct facilities where the flow of grant and contract funding is likely to continue.

Greater use of appreciated endowments could be justified.

More focus on and encouragement of increasing IPR and IPR licensing.

Center management and greater participation in new Federal Center competition is needed to strengthen multidisciplinary research.

Automate the sponsored program application process and sponsored program administration.

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Consider strengthening administrative departments to support higher research grant activities and increasing space and maintenance support.

Within individual *Colleges and Schools* the following actions could strengthen UVA's research position:

### CLAS

Increase the size and federal research income of departments to the median level of the top 20 departments of institutions of comparable size.

It is timely for the next Dean of CLAS be a scientist of stature.

Do not split CLAS.

### SOM

Invest in the growth of the basic sciences in SOM and encourage collaboration with CLAS and SEAS.

Enhance clinical translational research with Center for Translational Research.

Expand the Department of Public Health Sciences to a School of Public Health.

The Medical Center and SOM could achieve greater synergies and financial returns from joint investments in biomedical, behavioral and health services research.

Revisit the desirability for common management of Health System and SOM.

Support the Cancer Center in developing early phase clinical trials capability.

### SEAS

SEAS needs to recognize that its size limits disciplinary offerings.

Exploit strength in BME, MSE, SIE, CS and ECE.

These departments require growth in facilities, faculty, and graduate students.

Decide if SEAS wants to continue offering Civil and Aero Engineering.

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## I. INTRODUCTION

In October 2006, the University of Virginia (UVA) issued a Request for Proposal (RFP #END 102306 – Academic Consulting and Advisory Plan) seeking an “experienced firm to provide consulting services for its academic plan.” Under the leadership of the University’s Vice President and Provost, and in collaboration with faculty, students, deans, the Board of Visitors, and senior administrators, UVA was in the process of developing a ten-year plan to guide academic decision-making and realize its vision for 2017 – to be the foremost public institution in the nation. The University’s goal over the next ten years is to significantly improve its capacity to perform leading research and become a world leader in select fields.

UVA understands that to achieve prominence as a research institution, it must increase the quality of basic, applied, and translational research in the physical and bio-medical sciences and engineering in a manner consistent with its strategic objectives. The University proposes to accomplish this by embarking on a campaign to raise funds that would underwrite the recruitment of some 155 research active faculty, attract high quality graduate students, and provide space and facilities for new hires and to address the deficiencies that exist today. In support of these initiatives and as a consequence of them, an environment conducive to competitive, high impact, cutting edge research will be created, and the enrollment of graduate students of the highest standing will increase, along with research productivity and quality. Pan-University research and collaborative research will be encouraged.

In January 2007, The Washington Advisory Group, an LECG company, was awarded the contract to carry out activities proposed in response to the academic consulting RFP. The scope of the requested activities focused on reviewing strengths and weaknesses in order to “increase the quality of basic, applied and translational research in the [physical, biological and bio-medical] sciences and engineering”<sup>2</sup> programs at the University, taking into account faculty quality and productivity, space and facilities, infrastructure, financial resources and other factors critical to achieving the desired goals. In March 2007, President John T. Casteen III announced the creation of a new Commission on the Future of the University. This review and assessment is an input to the Commission and an important step in describing UVA’s current stature as a research university, identifying and recommending ways to leverage existing strengths, and helping UVA to focus on priorities that elevate the University.

The Washington Advisory Group reviewed background materials and conducted two fact-finding visits to UVA. The first visit, to review the science and engineering strategy and programs, was conducted from April 3 through April 6, 2007. Led by Erich Bloch and Frank Press, The Washington Advisory Group Team included Martina Newell McGloughlin, Gilbert Omenn, Roy Schwitters, and Eugene Wong. Meetings were held with deans, faculty, students, and university officials to gain insight into UVA’s

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<sup>2</sup> University of Virginia Request for Proposal, “Academic Consulting and Advisory Plan” October 23, 2006. p. 3.

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programs, strengths, challenges, plans, and aspirations in the sciences and engineering. A review of UVA's management and administrative structure was conducted from May 15 through May 17, 2007 by Erich Bloch and James (Jay) Morley. (Brief biographies of all team members are included as Appendix A. Meeting schedules and participants for each of the visits are included as Appendix B.)

### II. GENERAL OBSERVATIONS

#### Purpose of Report

As noted above, The Washington Advisory Group's primary task is to provide the Commission on the Future of the University with a comprehensive assessment of UVA's current standing as a research university and make recommendations for how it can achieve greater distinction and recognition in this arena. This ambitious goal to increase UVA's capabilities and notably enhance its relative standing nationally as a liberal arts and science and research university with strengths in the humanities and social sciences, the natural sciences and engineering, and the professions was articulated and initiated by Thomas Jefferson himself. That legacy remains an inspiration and catalyst for the University.

To achieve this goal UVA needs to face the fact that, despite its stellar national rankings for undergraduate education, the graduate research programs in the College of Liberal Arts and Sciences (CLAS), the School of Medicine (SOM), and the School of Engineering and Applied Sciences (SEAS) generally do not rank as high nationally and internationally as the university's leadership and faculty desire, nor do they rank favorably with other institutions deemed to be peers. UVA's Board of Visitors and Administration have announced as their goal elevating UVA's quality as a research university and improving the external perception of that quality. The relevant faculty support this goal. This report assesses how UVA is positioned to achieve this goal and steps it can take to realize this objective.

#### State of UVA

There are a number of advantages that provide a solid base on which to build the future and there are some significant disadvantages that the institution needs to resolve.

*An Attractive Location.* Charlottesville provides a location where the general quality of life for faculty members and their families is evident. In addition, the cost of living compared to some other university locations, like California, Chicago and others is significantly reduced. This is a big plus in the competition for academics who otherwise might be attracted elsewhere.

*A Compact Campus.* The research laboratories are mostly housed on the one campus with contiguous schools of Arts and Science, Medicine, and Engineering, an adjoining

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hospital and nearby Law, Business and Education schools. This furthers interchange of ideas and spontaneous synergies between colleagues from the same or different disciplines that other institutions with spread-out facilities can achieve only with special efforts.

*Collegiality.* A strong spirit of collegiality among faculty members and departments is evident from our discussions and interaction on campus. This coupled with respect for the impressive undergraduate student body gives UVA an advantage in today's research environment where there is more than ever before a focus on multi-disciplinary activity, translational opportunities that require the collaboration and close interaction among diverse disciplines from the sciences to the humanities.

*A Strong Base of Programs and Faculty.* UVA has strong, but not uniformly so, faculty and programs with some real luminaries and pockets of excellence. These and other programs and researchers form a base on which one can build a more research competitive university.

*A Mixed Standing in the Rankings.* While UVA is ranked number 24 by *U.S. News & World Report* (USNRW)<sup>3</sup>, mostly due to its outstanding undergraduate program, UVA ranks only number 47 for FY 2005 in the key research indicator, namely the NSF ranking of federal research expenditures<sup>4</sup>, and does not rank in the top 100 on the Academic Ranking of World Universities (ARWU) 2006.<sup>5</sup> If one looks at the important leading American universities, it is exceptional that UVA ranks so highly for its undergraduate program and so modestly as a research university.

The reason for this dichotomy between education and research attainment seems to be the fact that most science and engineering departments at UVA have remained static or have actually decreased in faculty size since 1990. We are told that this may have been due to wrong judgments, to State funding crises and/or bias of some earlier administrators in favor of humanities rather than science and engineering.

Whatever the circumstances that gave rise to this situation, in the period of the 1990's to the present government funding of academic research grew from about \$11 billion to \$22 billion in constant 2000 dollars. Most leading universities took advantage of the extraordinary funding opportunities at NSF, NIH, DOE, NASA and other agencies over this period, enabling significant growth in university income, increasing faculty sizes in the science, engineering, and medical fields and allowing laboratories to be built with borrowed funds and amortized from federal overhead payments. Today and in the foreseeable future, government funding is likely to increase at a much slower rate.

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<sup>3</sup> *U.S. News & World Report*, "America's Best Colleges 2007 Edition."

([http://colleges.usnews.rankingsandreviews.com/usnews/edu/college/rankings/rankindex\\_brief.php](http://colleges.usnews.rankingsandreviews.com/usnews/edu/college/rankings/rankindex_brief.php))

<sup>4</sup> National Science Foundation, Division of Science Resources Statistics. 2007. *Academic Research and Development Expenditures: Fiscal Year 2005*. NSF 07-318. Ronda Britt, project officer. Arlington, VA. (<http://www.nsf.gov/statistics/nsf07318/>)

<sup>5</sup> Institute of Higher Education, Shanghai Jiao Tong University, "Academic Ranking of World Universities" (<http://ed.sjtu.edu.cn/ranking2006.htm>)

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*Other Comments on Rankings.* It is important to be concerned about rankings, as long as in response one does not put programs or activities in place strictly to satisfy some ranking goal rather than to advance the strategy of the university.

The annual federal funding for R&D is probably the best generally-comparable metric. It is feasible to count just research grants, or add training grants, research contracts, and other vehicles of funding, including construction grants. For UVA as a whole, the most favorable metric is federal funding for research grants. For the SOM, the most relevant metric is NIH funding for research grants. It is tempting to try to adjust for the size of the faculty or the size of the full-time instructional-track faculty, but such numbers are not generally comparable across institutions.

*Culture and Environment.* Like all great institutions, UVA has its own environment and culture deeply anchored in Jefferson's original ideas of what a university should be. UVA does well to continue this tradition, but at the same time it needs to accommodate to today's realities and become more welcoming to a student body and a faculty that is more diverse than in the past and requires a more open and participative environment.

We understand that the appointment of a Vice President and Chief Officer for Diversity and Equity in November 2005 was an important addition to the Administration. In addition however, there needs to be a visible concern and action by faculty and administration to increase women and minority faculty and minority students and to make them, especially the latter, feel more welcome. We would recommend that the University through this new office monitor its progress in fair detail. It is not very complimentary when undergraduates will not consider UVA as their choice for graduate education, not because they are looking for a new venue, but because in their mind the graduate programs lack standing; and graduate students feel the environment is too rigid and diversity in race, dress or behavior is not welcome.

*Visibility and Image.* As UVA undertakes its process of change, it must make a directed effort to project its new image and its new aspirations. A number of visible actions are required:

- Publicize and provide more information about UVA's research activities and successes;
- Encourage faculty to be more active on the national scene in National Academy committees, projects and studies;
- Ensure that select faculty members spend extended time in national research granting agencies and offices;
- Grow candidates and work for the election of UVA researchers to the National Academy of Sciences (NAS) and Engineering (NAE) and the Institute of Medicine (IOM) and other prestigious honor societies here and abroad;
- Be the driving force and location of choice for symposia and conventions in subject areas that are priorities in UVA's strategy.

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We need to point out that visibility in Washington with national agencies and professional societies and action bodies is not assured by the geographic closeness of Charlottesville. Presence and active participation and leadership are important.

*Centers.* Commensurate with the growth of interdisciplinary research, UVA like most universities has a large number of Centers, namely over one hundred. Of these, there are only a small number that are prominent and indispensable to the mission of the university. Others have a role to play in teaching, community activities and to round out the curriculum and academic tracks. There does not seem to be a prescribed path for establishing a Center and monitoring its activities or any process for closing down a Center that has outlived its purpose or has been deficient in its performance.

We also note, except for the Medical Center, a lack of UVA participation in the competition for Center grants like the National Science Foundation's (NSF) Engineering Research Centers (ERC) or Science and Technology Centers (STC) and others that offer substantial research funding over a number of years. This is missing a vital opportunity to increase research funding and an opportunity to enter into frontier science and engineering fields.

*Plans and Strategies.* The University's earlier Virginia 2020 Commission report is an impressive document. That report seems to have engaged many faculty; it generated support for high priority thrusts in biodifferentiation, nanoscience, computing and information science, and aging. However, there is a lot of frustration about the modest overall progress on those priorities and the lack of persistence in implementing the report's recommendations.

The University has certainly implemented the Board of Visitors Distinguished Faculty in Science & Engineering program with a "budget" of \$165M. In the past 3 years, seven successful recruitments have been announced, mostly individual targets of opportunity, yet rather well matched to priority S&E areas in the Virginia 2020 plan. Three are current members of the NAS or NAE; the others are considered potential candidates.<sup>6</sup> The cost of these high-profile recruitments ranges from about \$1M for Yates to \$30M for Yeager and his department.

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- <sup>6</sup>
- Joe Campbell from UT/Austin as Lucien Carr III Professor of Electrical Engineering and Computer Engineering, an innovator in fiber-optics and sensors, the first to arrive (Jan 2006)
  - Stephen S. Rich, epidemiologist and geneticist from Wake Forest known internationally for his work focusing on the genetic basis of diabetes, who will establish and develop UVA's Center for Public Health Genomics.
  - John T. Yates, Jr. (NAS member), astrochemist from Princeton, then Pittsburgh, with 45 years of experience in surface chemistry and physics, important to nanotechnology; he was attracted by strengths in Chemistry and Astronomy; he received the American Chemical Society 2007 Peter Debye Award in Physical Chemistry
  - Christine & Bernard Thisse, from The Institute of Genetics and Molecular and Cellular Biology at University Louis Pasteur in Strasbourg, France, in developmental biology and morphogenesis using zebrafish and genome-wide gene knockout technology.
  - Mark Yeager, cardiovascular clinician-physiologist/ion channels, recruited from Scripps Institute in La Jolla to chair Physiology.

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The challenge is to select individuals who are still in the highly productive phase of their career trajectories, well-funded, able to bring research funds with them, and magnets for recruitment of junior faculty and graduate students and for engagement of faculty across related fields. There is some criticism within the University community about the presumed opportunity costs of the most expensive individuals, and there are groups of faculty disappointed that individuals they felt deserved consideration for the BOV status, and required much more modest investments did not attract interest or investment by the upper Administration. At the same time, there certainly are faculty proud that such prominent individuals are being recruited, with expectations that they will raise the reputation and funding levels for the University and will attract young scientists and students to their groups, centers, and departments. A summary interpretation of these challenges is that prominent senior recruits can generate excitement and new capabilities, but such hires should not be a substitute for a steady approach to recruiting more junior, already funded faculty who will be responsible for UVA's standing in science, engineering, and biomedicine for the long term. While the BOV Distinguished Faculty program is a good one, it needs to be augmented in parallel by hiring more junior researchers who have the capability of becoming "stars" themselves.

### A Needed and Achievable Goal

The Washington Advisory Group is encouraged by the UVA Ten-Year Academic Plan released in December 2006 and the beginnings of the new Provost's consideration of a UVA Plan for the Future. The status of the Ten-Year Academic Plan is unclear, and we are told there is some uncertainty about its prospects. However, it is one of the best analyses we have seen in our practice as consultants to many universities that want to improve their national image. The following is a short selection of the kinds of investments described in the plan that UVA must make to improve in its ranking as a research university:

1. Create 300 new faculty positions of which some 155 will be in the sciences and engineering fields (including medical sciences).
2. Replace 277 faculty retirees with research competent hires.
3. Add new space or refurbished space suitable for modern research.
4. Establish a graduate student support fund (\$200 million endowment).
5. Other, important but less costly investments.

The Washington Advisory Group estimates, very roughly, that any plan that has the goal of raising the stature of UVA as a research university will require funding in the range of \$1 billion over a period of 5 to 7 years. UVA's competitors will also be increasing investments to increase their research performance, so the relative improvement in standing of UVA might be limited. Nevertheless the improvement of the quality of UVA's research will certainly be noticed favorably and adding new faculty who have a track record in research will increase the University's research funding. In discussion with the President, he indicated that this level of investment was not out of reach. A more ambitious goal, namely \$2 billion over 10 years, thereby striving to double the level

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of federal research grants to UVA, would provide even greater prominence for the university.

In considering the allocation of such investment across schools, the following merit consideration:

- Current distribution of federal research funding at UVA between life sciences (includes medical) on one hand and physical sciences, engineering, environmental, mathematics, and psychology on the other is roughly 70% versus 30%.<sup>7</sup>
- As Virginia's Flagship University UVA needs to be well rounded in its research activities as is the case with most of the top ranking institutions.
- NIH will remain the largest funder of academic research, although Congress and the President agree to increase the flow of resources to physical sciences and engineering.<sup>8</sup>
- SOM is currently the most important component of the reputation ranking of UVA and is likely to remain so. The Basic Sciences in CLAS and SEAS have historically been underinvested compared to competing institutions. Nevertheless, a foundation of quality exists on which to grow research productivity and build new activities.

### III. DISCUSSION OF MAJOR SCHOOLS AND ACTIVITIES<sup>9</sup>

#### A. COLLEGE OF ARTS AND SCIENCES (CLAS)

##### General Impressions of CLAS

A Strong Foundation: There are eight science departments in CLAS: Astronomy, Biology, Chemistry, Environmental Science, Mathematics, Physics, Psychology, and Statistics. From a national reputation perspective, two departments are outstanding (Astronomy and Environmental Science) and there are definitely areas of excellence in others.

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<sup>7</sup> J. V. Lombardi, et.al. *The Top American Research Universities* (The Center for Measuring University Performance, Arizona State University, 2006) p. 44.

<sup>8</sup> Committee on Science, Engineering, and Public Policy. *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (Washington, D.C. The National Academies Press, 2007) p. 141.

<sup>9</sup> Except where otherwise noted, data regarding number of faculty and students, rankings, and research funding were provided to The Washington Advisory Group during its on-campus meetings April 3-6, 2007. Rankings designated as USNR are from *U.S. News & World Report*, "America's Best Graduate Schools 2008 Edition" (<http://www.usnews.com/usnews/edu/grad/rankings/rankindex.php>) for graduate school and programs and from *U.S. News & World Report*, "America's Best Colleges 2007 Edition" ([http://colleges.usnews.rankingsandreviews.com/usnews/edu/college/rankings/rankindex\\_brief.php](http://colleges.usnews.rankingsandreviews.com/usnews/edu/college/rankings/rankindex_brief.php)) for undergraduate program rankings.

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The UVA CLAS departments in the sciences that we visited comprise, in the main, dedicated teachers most of whom strive to be active in research in their respective scientific fields. They have a good sense of the most important areas of current research, where they stand in addressing the important scientific questions, where they want to go to improve their research capabilities, and their rank among other competitive institutions.

For CLAS science departments, the total research expenditure is about \$45.3M for 187 faculty with a modest average of \$242K per faculty member.<sup>10</sup> Most departments are suboptimal in faculty number when compared to their top tier peers. With some exceptions (for example, Caltech, Princeton), if one plots number of faculty against NRC ranking, there is a clear correlation. The more top class faculty the more funding they bring in and the more and better quality graduate students they attract. The combination leads to higher funding and enhanced reputation.

Recovering from Stagnation: Unless the science departments of CLAS achieve significantly improved rankings, UVA cannot realize its goal of attaining national standing as a research university. Some of the issues discussed as university-wide at the end of this report have special relevance to CLAS.

The recent period of reduced and flat budgets and hiring freezes hurt the science departments at UVA, some more than others. In several cases, departments feel they are "playing catch-up" and request the resources and faculty lines to regain the sizes they previously had. We are persuaded that in all cases, there are good strategic arguments being made based on new scientific directions and current strengths to justify requests for additional positions. Likewise, departments that fared better during the period of extreme fiscal constraint also see faculty growth as being essential to retaining or improving their current national rankings. In both categories, growth in research-active faculty is being requested. *Such growth, if adequate in number, funded and managed well, is probably the single most important step that can be taken to improve the research standing of UVA's CLAS science departments.*

Of course, the vital resources of research space and startup funding must also be secured to go along with recruiting. Two special areas of concern at UVA are the relatively poor condition of several buildings that house some of its science departments and the age profile of the faculty – these issues are by no means unique to UVA, but they make it even more difficult to effect significant growth in research productivity that would receive national attention.

We concluded that all of the science departments we visited warrant the kind of growth outlined to us and reported here if UVA is to achieve significantly higher standing as a nationally important research university. We trust the judgments of these departments to select the most important areas in which to hire, recognizing that any particular hire represents a complex negotiation between the department, the dean, the provost and other

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<sup>10</sup> Data provided to The Washington Advisory Group by UVA in email dated 6/21/07. Faculty data as of Fall 2006; research expenditure data for 2006.

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officers of the university regarding research area, startup support, potential fit with multidisciplinary priorities, and other factors.

Overcoming a History of Disappointment: Without knowing if the faculty comments are justified or not, The Washington Advisory Group needs to report a widespread sense of malaise and frustration in the science faculty within CLAS. It derives from the feeling that UVA's low standing as a ranking research university is due to a long history of comparatively low priority for science in the allocation of internal funds.

Various strategic planning efforts in the recent past (and underway now) have not helped the situation. Stated goals from previous planning efforts, including projected hiring and fund raising plans, failed to materialize as advertised, leaving departments frustrated and faculty unwilling to contribute more time to efforts perceived as being unable to achieve tangible results that benefit their department or their work.

When departments and their faculty members perceive themselves to be unrecognized by the university's leadership, strategic planning suffers because the main incentives become to protect current, limited assets rather than to seriously plan for the future. This is a serious matter at UVA. For example, too many research-active faculty members we interviewed expressed no knowledge of, or any particular interest in the ongoing activities of "the Commission" which is currently planning initiatives for the university's ongoing major fund raising drive. These faculty members are dubious of top-down efforts to define research directions with token requests for faculty input. Such approaches are often too-little/too-late and can alienate dedicated faculty members.

Indeed, the accumulated frustrations over unfulfilled growth plans, unsolicited strategic research directions promulgated by the university, and perceived minimal efforts for significant involvement of faculty in actual planning exercises, prompted some individuals we interviewed to propose separation of their departments from CLAS. We do not think that such a separation will enhance the research stature of UVA, or that it has significant support, but mention it here as evidence of the beginning of a breakdown in trust between university administrators and a number of science faculty members that deserves attention by all concerned. Regaining a sense of teamwork and trust among *all* the science departments in CLAS should be an important objective for the new dean and provost.

Graduate Students: Along with publications and research funds the ability to attract top tier graduate students is a leading indicator of recognized quality. Of particular importance and not generally recognized is the fact that quality research-active graduate students can enable their faculty advisors to compete more successfully for federal research grants. UVA must make the necessary investments to attract quality graduate students.

A worrisome example: We are told that with 7 incoming students per year, distributed among 27 faculty, the average faculty member in Biology sees a new student once every four years. Biology has had assistant professors come up for tenure never having

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supervised a graduate student. This is a serious problem, one that can significantly damage the career development of junior faculty.

Laudatory Goals of CLAS: We emphatically agree with the goals of CLAS as stated on its web site<sup>11</sup>, but suggest that it will take a concerted effort in rebuilding trust and establishing realistic plans on the part of the college and the science departments to achieve these admirable aspirations. We view the science faculty at UVA to be well positioned to contribute to realistic research planning.

As the university and its science departments develop their future programs, everyone should be mindful of the national consequences of their efforts. The special UVA undergraduate student body is one example – they and their shared experiences at UVA are a national treasure. A substantial investment across the board in its science departments will be noticed throughout the scientific community. In pursuing these investments, we hope that UVA will be agile enough to respond to special national needs and opportunities.

One example is the new National Radio Astronomer Observatory (NRAO) science center to be located in Charlottesville. This will be an important national scientific resource; how UVA responds to it can make the difference between the center being another federal science facility or developing, along with UVA, into a scientific establishment that will shape an important area of astronomy for generations to come. Such rare opportunities are special.

Concluding Observation: The College is arguably a key to UVA's distinction as one of the best universities in the country in which to seek an undergraduate education. Liberal arts majors increasingly will need high quality introductions to science and statistics as they prepare for productive roles in an ever more technology-based globalized economy. So, demand for teaching by the science departments is sure to rise. At the same time, CLAS will have to be substantially more productive in research if UVA is to rise in national stature as a *research* university. It is important to note that this goal is now an expressed aspiration of the Board of Visitors and the Administration and has the support of the Science Faculty. Also, as Virginia struggles to find its place in the rapidly changing global economy, it will realize that competing states view the high or increased

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<sup>11</sup> From the *College and Graduate School of Arts & Sciences 2005-2015 Strategic Plan* (<http://artsandsciences.virginia.edu/strategicplan/index.php>):

“Recognizing that discovery takes place across the entire range of creativity, scholarship, and research, a set of interrelated principles guide our plan:

1. We must sustain the health of our departments and programs as they evolve.
2. We must add as many faculty as we can afford, both to reduce the student: faculty ratio and to build research capacity.
3. We must improve support for the graduate students who make a research-intensive teaching institution possible.
4. We must increase the amount and quality of instructional and research space in the College.
5. We must be willing to challenge fundamental aspects of what we do, from advising and teaching to advanced research initiatives.
6. We must encourage programs that integrate discovery and teaching at all levels and across traditional boundaries.”

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standing of their research universities as important parts of a strategy for economic growth.

Success in achieving this goal will depend primarily on two factors: a) availability adequate financial resources to support recruitment of new research proven faculty and to improve the space and infrastructure for existing and new faculty, and b) know-how and success in identifying and competing for such individuals. *The Washington Advisory Group believes that the UVA faculty has the know how and can successfully identify top flight candidates. The availability of resources and their wise allocation will be the overriding factors that will determine success.*

### **Comments on the CLAS Science Departments**

#### **Astronomy**

The UVA astronomy department comprises 15 teaching faculty, all but 2 of whom are involved in research, 10 post-docs, 7 research scientists and 8 support staff. They are always in the black by UVA teaching metrics. Their target faculty size in the 1998 plan was 16-17. They have more post-docs now; they are stretched, with new courses proposed for undergraduate majors and graduate students.

This department is ranked in the top 20.<sup>12</sup> External research support last year totaled \$2.6 million which yields a modest \$175,000 expenditure per faculty member for the year. A \$10 million gift in 2000, intended to be made available at the rate of \$1 million/year over 10 years, has enabled the department to establish an IR instrumentation development laboratory on campus. This timely, actually accelerated investment made it possible for faculty to "buy-in" at a number of state-of-art observing facilities by contributing IR cameras and unique expertise. The department traditionally focused its research in theory, but has broadened to today's nearly equal mix of observation and theory. Currently, the department has 28 PhD students. At the undergraduate level, the department teaches 1,000-1,200 non-majors every semester; there are 21 students majoring in its programs. The department is involved with summer teacher workshops and various public outreach activities.

A unique resource to UVA astronomy is the presence on campus grounds of the home office of the National Radio Astronomy Observatory (NRAO) which operates the Greenbank Observatory, the Very Large Array and the Very Long Baseline Array, all world-class instruments for radio astronomy. Currently, the NRAO is building the Atacama Large Millimeter Array (ALMA), a \$1B project located in Chile which is scheduled to be completed and begin science operations in 2012. The North America ALMA Science Center will be located in Charlottesville, but, as yet, its relationship to UVA astronomy is unclear. The department seeks a major collaboration with the ALMA science center. This will entail building faculty strength in relevant areas of science and promises many opportunities for collaboration in research, teaching, training and

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<sup>12</sup> National Research Council, *Research-Doctorate Programs in the United States: Continuity and Change*. National Academy Press, Washington, D.C. 1995.

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outreach. *This is an exceptional opportunity for Astronomy (and Physics) that should be encouraged by investments which will ensure substantial benefits for UVA Astronomy.*

Washington Advisory Group team members were present at the NAS ceremony on May 29 when UVA infrared expert Professor Mike Skrutskie was awarded the James Craig Watson Medal for his monumental work in developing and completing the Two Micron All-Sky Survey. This was a one of a kind opportunity before an audience of 300 of the nation's leading scientists to help brand UVA as a rising research university. We took the opportunity of this occasion to discuss UVA Astronomy with a leading American astronomer. She ranked the department as about number 12 in the U.S., and added that it has always been known to have a few faculty members with national "name recognition". She agreed that the presence of the ALMA Center on the campus presented an exceptional opportunity for the department to become a world level center for millimeter wavelength radio astronomy.

### Chemistry

The chemistry department has 25 tenured/tenure-track (TT) faculty from CLAS and two members from other UVA schools. Most faculty members are active researchers. The department prides itself on the interdisciplinary work carried out by its faculty as well as the breadth of technical areas represented. Their undergraduate program is among the top 10 producers of bachelor's degrees in the US. The department ranked nationally as number 42 in USNWR's 2007 graduate program rankings and could not maintain even this relatively low standing, dropping to number 50 in the recently released 2008 rankings. This is too low for UVA's research aspirations. The department may not be big enough both to produce top quality undergraduates in relatively large numbers and achieve eminence in graduate research. It lacks the necessary infrastructure, TA's and other support for graduate students.

The department has sought for many years to grow to 28-30 faculty members on a sustained basis in order to carry out their programs and raise their national rankings. They participated in the successful BOV distinguished faculty recruitment and recently made an offer to a highly regarded junior person. One measure of their current standing is that retention of faculty members is a real issue. For the requested growth and to deal with faculty recruited away, they seek permission for two recruitments per year for several years. In addition to faculty lines, the limiting resource for recruiting new faculty is startup support.

### Environmental Sciences

Environmental Sciences is an active and highly ranked department based on interdisciplinary teaching and research. Unlike many other universities with environmental programs, centers, or departments, it has strong programs in the basic sciences in physics, chemistry, and biology, as well as environmental policy studies. This is an aggressive, competitive, go-getter faculty with several high profile multidisciplinary programs in ecology, hydrology, geosciences and atmospheric sciences.

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The Department ranks number 5<sup>13</sup> among presumed peers, including Duke and UC Santa Barbara.

Environmental Sciences has approximately 100 graduate students, 100 undergraduate majors and conducts classes attended by about 2,000 undergraduates. There are 22 TT faculty and 15 research faculty. Major renovations of on-campus space and new off-campus research facilities have been opened in the past 5 years. Environmental Sciences has a very positive faculty and a popular program. The department is very excited about the plan to become an independent Graduate School of the Environment, although The Washington Advisory Group team never saw a rationale for such a change.

The department plans to increase to 36-40 faculty members in the new School. It aims to raise \$100-125M. It has a major prospect for endowed chairs. The department receives \$4.5 to 6M per year of federal funding from multiple agencies. Research expenditures are estimated as \$224K per faculty member, some of which comes from the PTJ Fund.

Environmental Sciences is an example of a highly ranked, well-financed department that knows how to raise research funds and allocate them effectively.

### Mathematics

The department had 32 TT faculty in 2001 which fell to 23 during the hiring freeze. An expected recruitment of a highly-recognized mathematician didn't materialize, leading to frustration in the department. They have hired 6 new faculty in the past two years giving them a faculty size of 26 at present. There are approximately 6 adjunct faculty for teaching applied courses, 40 graduate students and 5 post-docs, all of whom teach.

All TT faculty, graduate students and post-docs are engaged in research. The Pratt endowment is very important to their research, funding visitors and graduate students. Department of Education grants support some US post-docs and NSF grants support some graduate students. The fixed-to-diminishing funds from the Pratt endowment are a source of concern to the department.

Math considers its peer institutions to be Duke, North Carolina, Michigan, Texas (Austin), Illinois and Penn State. Its USNWR ranking is 38, while its peer institutions have rankings from number 7 to 29. *One does not typically find such a low scoring Math department in high quality research universities.* The department feels left-behind by the UVA administration because of the effects of the hiring freeze, during which time the number of students taking "service courses" in math doubled, and what they perceive as meager return from UVA for the major teaching role they perform.

Mathematics would like more help from the administration to anticipate expected retirements with timely hires and to raise endowment for the Institute of Mathematical Sciences. At modest cost compared to the experimental sciences, Math could move up in national rankings.

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<sup>13</sup> Information provided by Department and noted by F. Press during briefing on April 4, 2007.

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### Physics

The physics department ranks 35, just above UNC and just below Duke in the USNWR rankings. It has 33 TT faculty, down from 43 in 1993. Most are active in research. The department has a diverse research program funded by approximately \$6.2 M/year in outside grants which support 5 research-active faculty, 10 senior research scientists and 92 full-time graduate students working toward PhD degrees. Not counted in the outside grant total are additional service accounts at DOE national laboratories which are part of competitively awarded grants that directly support work by UVA faculty members and their students and research associates. Funds from the Pratt endowment (which have declined from approximately \$400K/year to \$300K/year) and university overhead return (25% of the 54% overhead rate is returned to the department and used for staff that supports research and supplies) come to the department. Approximately 200 undergraduate students major in physics.

The department offers graduate research opportunities in a broad range of experimental and theoretical topics that span most of the active areas of current physics research in the US. UVA scientists and students have a presence at several international laboratories including Fermilab, Jefferson Lab, CERN and the Paul Scherrer Institute where there are unique research tools and strong international collaborations in experimental and theoretical physics.

The chair and his colleagues stated that the most critical resource needed by the physics department is additional faculty lines. They have 3 faculty searches underway. Their goals include restoring the number of faculty to its size before the hiring freeze was imposed, increasing the number of women on the faculty (presently, there are 3 women members), strengthening parts of their research programs in existing areas of atomic and nuclear physics, expanding into areas of astrophysics/cosmology and quantum-computing, and enhancing their technical research infrastructure to be more competitive with good physics departments elsewhere. Based on the dynamism of the Physics briefings, *The Washington Advisory Group team feels that this department could climb significantly in the national rankings if its 1993 size of 43 were restored (a 30% increase in faculty size).*

This department occupies the exact same footprint as they had fifty years ago. To carry out these goals probably requires additional space and instrumentation; the department is requesting support from the university to develop plans for a new physics wing of a campus building. Actually, they believe the cost would be quite modest (\$4M), since their building was designed to have another wing.

Physics participated in one of the BOV distinguished faculty recruitments which, ultimately, was unsuccessful but the group felt the effort was worthwhile.

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### Biology

Biology ranks number 42 in USNWR, on the same level as Purdue, Penn State and Ohio State, but well below UNC (number 26). The TT Faculty numbers 27, unbelievably the same since 1968. We are told that this is only 65% of the size of the median for top 20 Biology Departments (as may be true for other several other CLAS science departments). There were no retirements or hires for 10 years until one senior and two junior faculty were recruited this past year. Rundown bio labs reflect the low ranking.

The undergraduates are taught by quality scientists assisted by 11 TAs for Introduction to Biology, alone. Nevertheless, there is a need to modernize courses: there is only one course in genomics, none in bioinformatics. There are multiple opportunities for joint teaching and collaborative research between CLAS and SOM. Prominent examples exist in Chemistry and Biology. Further opportunities exist in genomics, bioinformatics, brain imaging, and a wide range of cell biology and biochemistry areas.

Current annual research expenditures are \$8.3M, which comes to about \$300,000 per year for TT Faculty. Hopefully, recruitment will generate a major increase in funded work in this department. There have been remarkable improvements in the department during the past 4 years – from autocratic leadership and factionalized faculty to collegial Ecological and Evolutionary Biology and Cell and Molecular Biology subgroups, with good linkages. Promotions and tenure review are regularized; annual reviews occur for faculty.

A frequently mentioned frustration is the failed senior faculty search for the Ivy Chair (\$1.5M) in Morphogenesis and Regenerative Medicine. They had three good female candidates; needed \$600-800K for renovations. The reason given was that they could not mobilize the support of the Dean, Vice President or Provost. Other frustrations:

- Graduate student support is inadequate and not competitive with national quality departments.
- This department seems leery of BOV recruiting costly older “free agents”, using the sports analogy. It would prefer to recruit a number of assistant professors to build for the future. Nevertheless, a strong BOV hire, who chose to affiliate with Biology for his/her primary appointment and wants to help Biology improve could be significant.

### Psychology

Psychology ranks first or second in the number of undergraduate majors at UVA and its graduate research programs are highly rated nationally. They graduated 970 majors last year and have 100 graduate students. The faculty comprises 32 TT professors and 3 "general faculty"; the group is active in research and is successful in securing grant funding. This department was ranked number 17 in the 1995 NRC survey; the

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developmental psychology program has been ranked number 2 in USNWR and is currently ranked ninth.<sup>14</sup>

Psychology was able to continue hiring faculty during the period when other departments in CLAS were under the freeze, but do not have any active faculty searches underway at present. They are requesting two new positions next year and would like to add 12 more positions in the long run to be able to keep up with the teaching demand and retain their present favorable national research ranking. The biggest impediments to hiring are lack of space to house and equip new faculty and the lack of a state-of-art brain imaging facility. They participated in a recent BOV distinguished faculty recruitment which failed because of lack of space. They feel they are competitive in hiring junior faculty and in recruiting top graduate students, though they remain in cramped space in Gilmer Hall.

### B. SCHOOL OF MEDICINE (SOM)

#### **Overview of the School of Medicine**

The University of Virginia School of Medicine has had a fine research reputation for decades and ranks within the top third, close to the top quarter, of medical schools in NIH research grant funding. Its inclusion in Mr. Jefferson's original plans for the Academical Village should always be a guiding light for the University.

The University community must recognize that medical research and funding for medical research are highly competitive enterprises. Many other strong universities have similar goals to lift their national ranking and move up the ladder on various metrics. Most increased their research space and faculty size during the doubling of the NIH budget (1998-2003), opening new buildings just as the NIH budget reached the present plateau, putting tremendous pressure on faculty seeking grants and institutions to finance the buildings. As a consequence, the number of proposals submitted to NIH per year has doubled since 2004, with the percent funded cut in half.

NIH Funding Metrics: From 1998-99 through 2003-04, the UVA SOM doubled its NIH funding from \$80M to \$180M, matching the percent increase in the NIH budget during those years (14 percent per year). For FY2006, UVA SOM had \$134M in NIH funding (<http://grants2.nih.gov/grants/awards/trends/dheallinst05.htm>), ranking number 32 (number29 if one compares research grants only). With 352 research grants, a great many SOM faculty are clearly competitive. To rank, say, 5 positions higher, from number 32 to number 27, the gap in FY2006 was from \$134M to \$149M (Yeshiva University); to ten positions higher at number22, \$167M (University of Chicago), and to top 20 as number 20, \$176M (University of Alabama at Birmingham). The total research funding from all sources was \$175M from 1,047 awards to faculty across the 7 basic

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<sup>14</sup> Ranked 9<sup>th</sup> in *U.S. News & World Report* "America's Best Graduate Schools 2008 Edition" (<http://www.usnews.com/usnews/edu/grad/rankings/rankindex.php>). Previous ranking information provided during departmental briefing on April 4, 2007.

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science, 20 clinical departments, and 9 research centers of the SOM. Internal Medicine, Cell Biology, Molecular Physiology & Biophysics, Biochemistry, Pediatrics, and the Digestive Health Center lead the list and represent half of the total.

UVA Ten-Year Plan: The 2006 UVA 10-Year Academic Plan presented explicit goals and plans for the School of Medicine. As part of growing the total University faculty by 300 and replacing 277 projected retirees, the SOM was planned to grow by a net of 65 faculty (over retirements and departures), with start-up investments of \$500K each (\$32M for additions and a similar or larger amount for replacements). This expansion of the faculty was expected to help the SOM grow from a stated \$146M in research expenditures to \$196M over 10 years, which is only a one-third increase, or less than 3 percent/year. That pace is unlikely to match the competition, assuming NIH funding does not collapse altogether. To go further, and double the research funding by the end of 10 years (a compound growth rate of 7 percent) would presumably require three times the start-up investment and concomitant facilities investments. Furthermore, it is our experience at other institutions that the start-up packages required for highly sought-after beginning faculty are now in the range of \$800K, not including the salary line. The 10-Year Plan projected 145,000 sq. ft. for SOM to add the 65 faculty, of which 92,000 sq. ft. were in plans already and 52,000 sq/ ft. would have to be added as a second phase for the MR-7 building. To double the research funding, proportionately more space would be needed. Finding footprints that enhance collaboration and maintain the spirit of the University may require using parts of sites like South Lawn, rather than relying upon peripheral sites off campus or at the edge of the campus.

In summary, to double the NIH research funding from the FY2006 \$134M would require that the existing faculty and their replacements maintain that funding level (no small feat in today's environment) and that about 280 faculty be added who bring in an average of \$500K in annual research funding from NIH. Startup costs would be comparable for a similar number who will be replacements for retiring or departed faculty. At \$500-800K per start-up package, and 1000 sf per (junior) faculty lab, these estimates are \$280M to \$450M for start-ups for new faculty, something similar for replacement faculty, and 280,000 sf of space. A substantial endowment for graduate student support would require roughly \$40M to provide \$20K per year for each 100 graduate students.

Universities and their schools of medicine nationally are investing in growth in faculty and in facilities; it is costly to hold one's ranking and retain one's faculty. NIH is putting more emphasis on translational research, which requires infrastructure for clinical studies and interdisciplinary strengths. UVA has a fine record and present strengths in the biomedical basic sciences; several of these departments await recruitments of new chairs in the near future, which will require investments that are relatively affordable. The 20 clinical departments have a broad range of size and research emphasis.

The total investment calculated above (roughly \$880M over 10 years) should keep the SOM in its present ranking. Depending on the timing and success rates for retention and recruitment, the expansion of space, and the competition for major grants, this investment could help UVA move up a few notches nationally. That would be a major achievement,

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since competitors are making as large or larger investments. However, an investment on this scale is more in line with doubling UVA's federal research funding across the board and, as noted on page 6, would require a university-wide investment of \$2 billion over 10 years.

In pursuing its faculty expansion, SOM should consider that if it can recruit faculty already well funded and able to transfer a good portion of those funds, that would save a fallow period of 2-3 years before beginning faculty are expected to strike pay dirt with their NIH R21 and especially R01 grant proposals. However, such faculty may cost even more for start-up and facilities and student support than the \$500K or even \$800K cited above. And the cost of upgrading the facilities and equipment for the existing faculty or their replacements must be covered.

Assuming the faculty growth could be achieved within five years, the 280 additions can be translated to 56 per year, spread over 27 departments, plus very roughly a similar number as replacements. It should be understood that broad-based recruitment strategies require a well-organized, well-financed, time-consuming effort. More focused investments, as proposed in the Virginia 2020 Commission Vision, as exemplified with the BOV Distinguished Faculty recruitments, and as demonstrated by the recent developments in Orthopaedics and in Psychiatric Medicine, can yield distinction and enhanced reputation in those fields much faster than reputation associated with broad metrics like rankings for research funding. Finally, with the pressure on the NIH budget, it is certain that more grants should be sought and won from non-NIH federal and non-federal sources, including the Commonwealth of Virginia, industry, and private foundations.

As a measure of distinction at the individual level, the Medical School has relatively few members in the Institute of Medicine, just 8, of whom 5 were elected from 2000 to the present. The total University has 14 members, of whom 3 are emeritus.

**The 7 Basic Science Departments:** Biochemistry & Molecular Genetics, Biomedical Engineering (discussed under Engineering in Section C), Cell Biology, Microbiology, Neurosciences, Pharmacology, and Physiology. These departments rank 23, 16, 4, 15, 24, 25, and 10, respectively, in NIH funding for FY2006. The total dollar amounts (FY2005) are \$8.9M, \$1.6M (+ \$2.7M in SEAS), \$13.9M, \$9.0M, \$3.9M, \$5.9M, and \$11.7M, respectively. The basic science funding model comprises salary lines and administrative staff by formula (50% for faculty) and 9.3% of overhead generated. New faculty are expected to offset 50% of salary on grants by the end of the third year. There is an incentive plan for exceeding 50% on grants.

### **Biochemistry and Molecular Genetics**

Biochemistry is a remarkable example of well-planned, strategically re-directed research. About 30 years ago, 11 of the 12 faculty worked on membrane biophysics and biochemistry, some collaboratively with the pioneers of signal transduction via cyclic nucleotides in Pharmacology. During the 1990s, after numerous retirements and failed

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chair searches, the department re-emerged with a striking focus on nuclear structure and function, with a national reputation as “chromatin central” and a top-10 ranking. Faculty and graduate student numbers grew rapidly, and total research funding grew from \$2M in 1996 to \$11M in 2005.<sup>15</sup>

This department has 19 faculty and are in the process of hiring 3 more. They recently lost one of the highest profile mid-career faculty in the SOM, David Allis, a pioneer in work on the “histone code” for epigenetic regulation, who has moved to Rockefeller University after receiving the Gairdner Award. Biochemistry has close relationships with Microbiology, Pharmacology, Pathology, and several of the SOM research centers. They are establishing a computational genomics center. They are seeking clinical investigators for combined proposals and feel that strengthening of clinical research is important for the whole School. They emphasized their efforts to coach junior faculty on grant submissions and to organize multi-investigator grants. The very active chair is approaching retirement.

### Cell Biology

Cell Biology illustrates the importance and complexity of theme-driven recruitment and growth strategies, tied to the 1999 Virginia 2020 Commission Plan that recommended an emphasis on “biodifferentiation”, now the Institute for Morphogenesis and Regenerative Medicine. Recruitment of an Institute director was accomplished in 2002, with simultaneous appointment of the director as chair of Cell Biology. This department developed research strengths and a strong national reputation over 20 years in cell adhesion, cell migration, intracellular transport and trafficking, and reproductive cell biology. As home of the large Cell Migration NIGMS/NIH “glue grant”, Cell Biology ranks in the top-5 in NIH research dollars. The pace of faculty recruitment has recently accelerated, including a high-visibility husband and wife BOV team from France, Bernard and Christine Thisse, and three junior faculty during 2006-07. The Vice President for Research and Graduate Studies (VPRGS) report for FY2006 documents extensive renovation of laboratory space, \$11.5M in state funds to expand the program, and renewal of the federal grant (PI R. Horowitz) with a five-year budget of \$22.5M.

The physical proximity of CLAS, SEAS, and SOM is a major asset for this highly collaborative department and Institute. A new interdisciplinary research and education building will enhance their central location. Core facilities are critical to the Institute and to researchers throughout the SOM and the University.

### Microbiology

This department has 26 primary faculty, of whom 13 are fully involved in research, plus 22 joint appointees. Their strengths include cell signaling and identification of therapeutic targets in cancers, cellular immunology, and viral and bacterial pathogenesis. They have one of the largest training programs, with 112 students supported by five

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<sup>15</sup> Data from departmental briefing April 5, 2007. Data provided by UVA in email dated June 21, 2007 indicate total research expenditures for 2006 of \$9.2M.

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different training grants and 80 mentors within the Microbiology, Immunology, and Infectious Diseases program. Microbiology illustrates the volatility of rankings by NIH dollars for individual departments. They went from number 5 to number 15 when the PI on a large grant moved to a different department within the Medical School. The field of infectious diseases is particularly strong at UVA, bridging Microbiology and the clinical departments. This department also has a strong base for collaborations with clinical department cancer researchers.

The faculty is quite senior, so additional hiring and preparation for transitions in leadership must be planned. They also emphasize the need for state-of-the-art instrumentation and facilities and for support of graduate students.

### **Molecular Physiology and Biophysics**

Physiology is a highly ranked department, with \$13M in research funding and a high average H factor of 32.5 (H-index is a combination of number of publications and number of citations per publication). They have 15 faculty with strengths in structural biology, membrane biophysics, and vascular biology. One of their major programs is a Center for Biological Timing under current (and departing) provost Gene Block. Another prominent faculty member, highlighted in the VPRGS report for 2006, Klaus Ley, is departing for La Jolla. Such transitions remind us that recruitment works in both directions, so the institution must both replace and expand the faculty. In general, it is more costly to recruit than to retain high-performing faculty. On the other hand, openings represent opportunities to move the institution into new research domains.

The UVA has just signed Mark Yeager of Scripps in La Jolla to be Chair of Physiology as a BOV appointment. He is a physician-scientist using high-resolution electron cryo-microscopy and computer imaging to explore the molecular architecture of membrane proteins and viruses as supramolecular assemblies. He was part of a \$14.5M NIH Roadmap center grant for innovative membrane protein technologies; it is not clear how much of that funding is transferable to UVA. Quality and amount of research space and competitiveness for grant renewals and graduate students are major concerns. They also noted that the pressure to recover salary on grants has decreased the commitment of many faculty to teaching responsibilities.

### **Neurosciences**

Established in 1986 as the 6<sup>th</sup> basic science department, Neurosciences has just 8 faculty, but is surrounded by an interdepartmental program with 71 faculty from 14 departments – one-third each from CLAS (Biology, Psychology), SOM basic sciences, and SOM clinical departments. They offer an undergraduate major (25 students) with lab experiences, and they have K-12 outreach programs, including Brain Awareness Week. They show \$3.9M in NIH funding. They are trying to build interest in a Mind-Brain Institute, embracing molecular, cognitive, and sensory research across the lifespan. They are also interested in the Institute on Aging, one of the Virginia 2020 Priorities, which is still an embryonic activity with social scientists offsite at a shopping center location,

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hardly a major interdisciplinary research thrust. Some commented that the logic of building on Charlottesville's national reputation as a retirement destination should be acted upon, with both laboratory science and social research.

### Pharmacology

Pharmacology faculty emphasized that someone needs to stand behind the 10-Year Plan. One frame of reference is a claimed \$200M in state funds at the Medical College of Virginia for their dean to improve science. Long-sustained work on G-protein coupled receptors and signaling is the signature of this department. Pharmacology has good ties with Chemistry around the adenosine and sphingosine-1-phosphate chemistries that have generated a good part of the UVA licensing and royalty income over quite a few years (recently expired). There is some skepticism about a top-down push for drug development in an academic department; "no academic department of pharmacology is successful in drug development". It is true that drug development is a very risky and very costly business, as biotech and pharmaceutical companies have demonstrated, and it is very unlikely that a university department will carry pharmaceutical work all the way through development. However, the key role for universities in drug discovery and subsequent drug development is identifying new pathways and new mechanisms, as was done brilliantly at UVA by Gilman and Murad 30 years ago. With regard to the Commission on the Future, these faculty leaders emphasized that the sciences should be just as eminent as humanities. "Why not add a science corridor to the sides of the South Lawn Project?" As with Biochemistry and Microbiology, the new dean will need to plan for a chair search in this department.

**The 20 Clinical Departments:** Among the large number of clinical departments, it is generally expected that the research engine and by far the largest number of faculty are in Internal Medicine and its 10 divisions. Smaller departments may be foci of distinction. We met with chairs and faculty from Orthopaedic Surgery, Pediatrics, Psychiatric Medicine, Neurology, and Internal Medicine. These interactions are probably representative of the rest of the clinical departments.

### Orthopaedics

After a prolonged search for a Chair of Orthopaedics over 3 years and 2 interim chairs, then-dean Carey in 2001 approached Cato Laurencin, MD, PhD, at Drexel/Allegheny in Philadelphia. A persistent recruitment effort was successful---just as Carey retired and Garson was hired as Dean. Laurencin has a background in Chemical Engineering and active programs in polymers and tissue regeneration in Chemical and Biomedical Engineering, as well as Orthopaedics. He has 25 graduate students and fellows in these research labs. This group is an active focus for the NanoQuest initiative of the University. Though the work is highly relevant, ties with the Morphogenesis & Regenerative Medicine Institute and with Rheumatology in Internal Medicine have yet to develop. Laurencin has been appointed a University Professor and has been elected to the Institute of Medicine. He serves on the Commission on the Future of the University. The department now has 21 faculty, of whom 15 are clinicians and 6 are PhDs. They are

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highly integrated with the Department of Biomedical Engineering. They already have reached number 19 in NIH rankings.

### **Psychiatric Medicine**

In just 2.5 years, the Department of Psychiatric Medicine, under another new chair (Bankole Johnson), has moved from a base of \$600K in research funding to \$14M in research awards in the current year. Physician-investigators were recruited who brought grants with them to Charlottesville and have aggressively sought new funding. A major focus on psycho-pharmacology, preclinical drug development, and labs for evaluation of street drug users has emerged, funded in part on research contracts from NIH. They are working together with Psychology, Neurology, and Radiology to enhance neuroimaging resources for research.

These developments reflect a strong push from the Dean for a change in culture to more entrepreneurial faculty leaders with broader vision and willingness to embrace biotechnology, as the Psychiatry chair experienced at Cambridge University and more recently noted at Oxford University (UK). Psychiatry is placing its bets on ascendant young investigators. The chair reports personal conversations with the UVA President and the Dean, both of whom have expressed interest in the exploitation of biotechnology relationships. There is media interest in the drugs under development, especially for treatment of alcoholism.

These two small departments – Orthopaedics and Psychiatric Medicine – have had exceptional invigoration in the past 2-4 years. They reflect an entrepreneurial imprint emerging in the School of Medicine that could generate substantial growth in research funding and national reputation and may be a model for leadership and accelerated growth in research funding in other departments throughout the SOM and the rest of the University.

### **Internal Medicine**

Internal Medicine is a strong department, with 20-25 percent of the research funding of the SOM. Within Internal Medicine, Infectious Diseases, Gastroenterology, and Endocrinology have long been and continue to be strengths. Adult and pediatric Endocrinology have traditionally dominated the use of the General Clinical Research Center. In contrast, Cardiovascular Medicine (Cardiology) has been decimated by defections and problems, putting a lot of pressure on the Chair to invest in rebuilding this important and clinically very busy division. Chair Bob Streiter came 9 months ago from UCLA; half of his recruitment package came from the Medical Center and half from the Dean. He asserts that the department is seriously under-resourced. With the tight NIH payline, research funding has dipped during the past 3 years, requiring that precious departmental funds be used to bridge investigators short of funding and seeking new grants.

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The Infectious Disease/International Health, Allergy and Immunology, and Pulmonary divisions were featured. The Infectious Disease division has two training grants, 10 clinical fellows with NIH K-08 early investigator awards, 2 with Burroughs Wellcome fellowships, and faculty with 11 R01 NIH grants. Internal Medicine has 13 endowments, including 7 chairs with \$1M or more in endowment. Biodefense-related research has been a big move in this unit, illustrating the need to be nimble about federal funding. Steve Rich has been recruited under the BOV program from the National Human Genome Research Institute (funded half by BOV and half by SOM). Allergy & Immunology has had continuous NIH funding for 24 years, including 17 years for the Asthma Center, with lots of collaboration with Pediatrics.

The faculty with whom we met had numerous complaints about the tension between the hospital and clinical research programs, mostly over billing, income, and communication of policies and decisions. They lamented faculty departures across the whole SOM. They emphasized the need for sufficient funds to recruit new chairs in critical departments and provide the resources to reinvigorate those departments, and the same for divisions within Internal Medicine. They also called for better staff-supported core facilities and mentoring for grant submissions.

Internal Medicine is by far the largest department of the SOM and is an engine of broad-based research and research collaborations in all leading medical schools. The UVA department has \$38M in current NIH funding and multiple foci of strength and good funding. Most of its 10 divisions are under pressure to generate clinical services, reimbursement for those services, and clinical components of salary. Individual divisions of the Department of Internal Medicine are equivalent in size to many of the clinical departments. Failures in Internal Medicine reverberate. The new chair of Internal Medicine has major challenges re-invigorating the critical division of Cardiovascular Medicine, as well as enhancing the rest of the department.

### **Pediatrics**

Pediatrics has a busy clinical service and is operating in the black, which is quite unusual for departments of pediatrics. They have 26 active clinician-investigators and \$8.8M in total funding and about \$6M in NIH funding. There are research strengths in Child Development, Nephrology, Pulmonary, and Hematology/Oncology. Notable work has been reported on cystic fibrosis, airway S-nitrosothiols in severe asthma, and apnea of prematurity. About 14% of their patients are enrolled in research protocols (162 protocols). They are improving the research infrastructure of the department and have an internal grants committee making seed grants from funds generated by the Children's Miracle Network telethon. They have submitted \$6.7M of grants so far this year to NIH. They are anxious about the very tough funding environment at NIH. Three of their faculty have become department chairs, including the UVA chair, Robert Chevalier. Another who moved up to a larger role is VPRGS Gomez.

The department has many limitations in space, faculty time, and discretionary funds to build research. Their research funding placed them in the top quartile nationally a few

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years ago, but they have slipped to the median due to a departure and the confluence of clinical pressures and NIH funding constraints. Nevertheless, they proudly reported that all the faculty subscribe to the academic mission.

### Neurology

Neurology was described as a healthy department clinically and in clinical research. They need resources for start-up packages. Their primary competition has been Pittsburgh, Emory, Vanderbilt, and Kansas in recent recruitments. They are interested in the SOM's Clinical and Translational Science Award (CTSA) proposal to NIH to build clinical research infrastructure. The faculty member who met with us emphasized the UVA focus on education, noting that the highly regarded Darden School of Business has essentially no PhD students. Most of the Neurology faculty are in the clinician-educator track, as are most of the clinical chairs. Neurosurgery had a very strong research base about 20 years ago, but has become primarily clinical currently. Current total research funding figures are \$6.4M for Neurology and \$0.8M for Neurosurgery.

### General Issues for Clinical Departments

The SOM needs to have multi-year plans and resources for recruiting clinician-investigators, especially in this era of emphasis on Clinical Translational Research at NIH. It needs research cores, including Bioinformatics and Clinical Informatics, to support large numbers of investigators more efficiently and to facilitate recruitment. It needs a larger number of young investigators winning K12, K30, K08, and then R21 and finally R01 grants, with a higher percentage of K08s being converted into R01s (now 25%). The initiative to create a strong department and then a School of Public Health could provide essential infrastructure (biostatistics, epidemiology, health services and health management research) for clinical research. The Dean's Research Committee noted fewer than 20 patient-centered R01 grants. One needs scale in order to compete for larger NIH awards, especially Roadmap initiatives. Several faculty complained about a "limited tolerance for excellence", especially if the individuals are "high maintenance" – apparently based on a few key departures. Yet, when the university recruits "NAS-caliber" BOV faculty, some complain that \$20M could have recruited up to 20 excellent junior investigators. As at any institution, there are numerous divergent views of similar circumstances.

Dean Garson (now Provost-designate) has announced plans for priority investments in Clinical Translational Research and in Public Health. These cross-cutting investments have substantial potential to leverage and enhance capabilities in multiple areas of the SOM and other parts of the University and could potentially attract major donor support. Again, however, both are now popular areas and increasingly competitive, just as Morphogenesis and Regenerative Medicine has become a very popular, competitive area of research and applications.

The NIH is demanding dramatic shifts in effort and organization to enhance clinical and translational research. The SOM has submitted a CTSA proposal, whose funding is

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essential for sustaining the General Clinical Research Center and clinical research training grants. With the increased difficulty nationally in renewing or securing new R01 NIH grants, the SOM faculty are often reluctant to work on collaborative projects unless there are incentives and efficient assistance to organize compelling proposals. There is also a lot of stress on allocation of time between research activities and teaching for basic scientists and between those responsibilities and clinical duties for clinician faculty. Internal metrics and incentives for research need to be examined in light of these other duties important to the institution.

Finding time for individual faculty to do research on top of clinical and teaching, let alone committee and administrative, responsibilities is difficult; a part-time researcher cannot readily compete these days. Thus, leading clinician-investigators need a faculty time and income model that facilitates serious research without too much of a salary penalty. Research cores are key to making clinician-investigators efficient and effective; they are certainly important for PhD investigators, as well. Clarity of appointments to the clinician-educator track versus the clinician-investigator track can avoid a lot of angst at periodic evaluations and especially for required promotion decisions.

### Medical Center Funds Flow Model

The Dean explained to us that there is at present a negotiation between the SOM and the Medical Center, with the SOM the subordinate partner in deciding what SOM salaries, support functions, and investments should be paid for in whole or part by the Medical Center. This negotiation between the SOM and the Medical Center for funding of the academic base and recruitment of faculty needed by both should be a regular, not an ad hoc, process. A regular schedule with multi-year commitments is required, together with larger funds transfers, to the extent feasible within the financial performance of the Medical Center. It is critical for the Medical Center and University leadership to recognize that strong educational and residency programs and cutting-edge research achievements build the reputation of the Academic Health Center and attract patient referrals.

All academic medical centers have a Funds Flow Model for the distribution of clinical income and for reinforcement of appropriate incentives to increase clinical services and clinical income. Healthy clinical finances permit more support of the academics; research discoveries and applications to clinical problems attract patients; high profile faculty and programs attract better residents, fellows, and graduate students; and better trainees make faculty more productive. All of these synergies enhance philanthropic prospects, too.

Thus, the Medical Center and the SOM should jointly recognize the potential for greater synergies and better financial returns from joint investment in enhancing the full range of biomedical, behavioral, and health services research, bioinformatics and clinical informatics, electronic medical records and efficient IRB support.

### The 9 Research Centers

In an era of heightened appreciation of the need for multidisciplinary and translational research, cross-departmental and cross-school research centers are a very useful organizational mechanism. They facilitate large-scale proposals for federal funding. The SOM has been relatively successful in this domain. The centers and their FY2005 total funding levels are Beirne Carter (\$5.2M), Cancer (\$4.3M), Cardiovascular (\$2.5M), Cell Signaling (\$2.7M), Reproduction (\$1.6M), Study of Mind and Human Interaction (\$0.1M), Diabetes (\$0.2M), Digestive Health (\$7.5M), and General Clinical Research Center (\$3.7M).

### **Cancer Center**

From its inception a major strength of the Cancer Center has been expertise in cell signaling. Building on the tradition of the Nobel Prize-winning discoveries of G-proteins by Al Gilman and NO as a second messenger by Ferid Murad, cell signaling permeates much of the basic science in this Cancer Center, and provides mechanisms for clinical translational research. Since its designation as an NCI Clinical Cancer Center and its first Core Support Grant in 1987, the UVA Cancer Center has grown to 196 faculty in 30 departments, and considerably improved its competitive funding from all federal and non-federal sources in 2006 over five years earlier. Its six basic science programs are quite strong: cell signaling, endocrinology, immunology, migration and metastasis, structural biology, and molecular genetics. Translational developments with immune therapies and biomarkers are promising. However, major expansion in clinician-investigator faculty and space is required to be competitive in clinical research. Recruitments for clinical leadership and cancer control leadership have been protracted, meaning that competition for the Comprehensive Cancer Center designation from NCI will be deferred for some years. Like other research centers, the Cancer Center does not have authority to make primary faculty appointments. Philanthropy is a major opportunity for the Cancer Center.

## **C. SCHOOL OF ENGINEERING AND APPLIED SCIENCES (SEAS)**

### Overview of SEAS

In the most recent ranking by USNWR, the School is ranked number 37 among graduate programs and 34<sup>th</sup> among undergraduate programs. It is comprised of the following eight departments:

- Chemical Engineering (ChE)
- Civil Engineering (CE)
- Computer Science (CS)
- Electrical and Computer Engineering (ECE)
- Mechanical and Aerospace Engineering (MAE)
- Material Science and Engineering (MSE)

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Biomedical Engineering (BME) (jointly with the School of Medicine)  
Systems and Information Engineering (SIE)

The first six departments represent classic core disciplines found in almost every engineering school and Biomedical Engineering is a relatively new area for engineering schools. Systems and Information Engineering is somewhat unusual in its name; its substance however is covered by many departments of industrial engineering and operations research.

Of the core departments, Computer Science, Electrical and Computer Engineering and Materials Science and Engineering show a great deal of dynamism and are frustrated by their continued low ranking. The other three all show serious weaknesses that call for early attention. Biomedical and Materials are both doing well and enjoy relatively high rankings. Systems and Information Engineering shows a good deal of vitality, but probably because of its somewhat unusual name is unranked.

There are several characteristics of SEAS that are quite pronounced. First, there is a strong correlation between newness and quality. Second, there is very wide disparity in quality among the departments, more so than in most engineering schools. Third, several topics are covered by multiple departments, sometimes more than two. Finally, SEAS is small and broad at the same time. Each of these is potentially a problem and an opportunity.

The eight departments in the School fall naturally into three groups. The three departments in newer areas: BME, MSE and SIE are energetic and high quality departments that are performing very well. CS and ECE are making some progress in breaking out of the pack. Both are ranked at the bottom of the top third among peer departments, an acceptable place. These 5 departments can be the hallmark of SEAS. All, especially BME, SIE and CS require growth in faculties and graduate students and need to be given funding and resource priority.

### **Review of Individual Departments**

#### **Chemical Engineering (ChE)**

This is a small and aging department. It has the lowest number of undergraduates among the departments in the School. Several senior faculty members are retiring, but no coherent plan for replacement appears to be in place.

However, ChE has several bright spots. Its faculty includes two renowned prize-winning researchers on *catalysis* and two young faculty members who recently received NSF Career Awards. It is active in three of the most exciting areas of research in engineering: *biotechnology*, *energy*, and *nanotechnology*. The department has 11 tenured and tenure track faculty and an undergraduate class of 121 students, a graduate class of 50 of which 90% are PhD track students. Its external research funding is \$2.2M and its research expenditures \$1.6M. In the most recently available USNWR rankings the department

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ranks number 33 among graduate programs and number 25 among undergraduate programs, one of the most highly ranked SEAS departments.

The strength of the department is in energy catalysis, the dynamics of complex chemical and biological systems, a newer interest in nanostructure materials and bio-molecular engineering.

The department has much to offer and it would not take much to make this an even more vigorous and well-recognized department. ChE needs focus, strategy, and leadership and probably an increase in faculty to bootstrap themselves into a more robust position.

SEAS should give the department some positive attention and support. It is an easy department to energize and one of its lower-hanging fruits.

### Civil Engineering (CE)

CE has a faculty of 12 FTEs, an undergraduate class of 167, and a USNWR rating of number 41. It is grouped into three research areas: *transportation*, *environmental*, and *structures*. Transportation enjoys a reasonable level of research funding, while the other two areas have very little funding. CE wants to change its name to Civil and Environmental Engineering and to adopt "sustainable infrastructure" as its unifying theme. Sustainability is an emerging and popular theme for teaching and for policy analysis. Sustainability requires careful explication for a research strategy. It can be so broad as to embrace the entire University. It must be focused to attract funding from external sponsors.

While *Transportation* is a reasonably strong group, it alone can hardly make a viable civil engineering department. Judging from the presentation, the faculty in CE is dispirited and needs help. This is a very weak department in any comparison group. Without substantial help from the Dean and the University administration, the future viability of CE is in serious doubt. In fact, it is not unreasonable to suggest that UVA consider closing the department, salvaging what it can, combining it with other programs in UVA (e.g., environmental activities), phasing out the existing commitments to students and faculty over a three year period, and letting Virginia Tech with a more substantial and more vigorous department be the Virginia school for CE. (For comparison: USNWR ranking of Virginia Tech CE is 10 vs. 41 for UVA.)

### Computer Science (CS)

We were very impressed by the quality of leadership shown by the department chair who is a strong and enthusiastic advocate for the department and for the profession. The department has 25 tenured and tenure track faculty and an undergraduate class of 300 students, 100 doctoral students and 12 post-docs. Its externally funded research awards are between \$6M and \$10M annually and expenditures per year are \$7M. USNWR ranking of the department is number 29. Focus areas for research are Cyber Physical

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Systems, High Performance Computing and Secure and Dependable Software. There is also close cooperation with the Humanities in an Institute devoted to that task.

All indications are that the faculty is active, cohesive, and attract substantial recognition and research funding. Student enrollment at both undergraduate and graduate (doctorate only) levels is healthy. The research areas are both well focused and diverse. The CS department is one of the larger ones in the School and continues to grow and enjoys a quality faculty and strong leadership. However, the faculty is frustrated by a relatively low ranking among the CS departments in the nation (number 35 among 108 departments in the last NRC rating) and very poor space. We have walked the building and can attest to the space problem. A promised new building, though high in Campus priority, is several years away. In the interim UVA should clean up the existing building, making it more livable. Space is a strong factor in the competition for faculty and graduate students and CS needs immediate relief if it is to remain competitive. This is a critical issue for the Dean.

### **Electrical and Computer Engineering (ECE)**

With 28 tenure-track faculty members, ECE is the largest department in the School in terms of faculty size. However, CS and BME have more PhD students; and BME, MAE and SIE all have more undergraduates. The undergraduate class is 270 and the graduate class 150, of which half are on the PhD track. In terms of research funding, ECE is also in the middle of the pack. The research awards per year are \$11M (\$392K/faculty) and the research expenditure \$7M (\$244K/faculty). The Chair's goal is to increase the research award per faculty to \$500K. All in all, this appears to be an average department both within the School and in comparison with peer departments in the nation. Its USNWR rankings are 35 for the graduate and 21 for the undergraduate EE programs, and 25 for the graduate Computer Engineering program.

However, there are indications that ECE is on the move. It has made six recent faculty hires with at least two senior appointments. One of these is Professor Joe Campbell, who was lured from University of Texas at Austin with a BOV Distinguished Chair. He appears to be quite happy with the move and asserts that ECE is a better department than the one he left (USNWR ranking of UT Austin graduate EE and CE programs: 10 and 6 respectively). The other senior hire is Toby Berger, who retired from Cornell in January 2006. Although Professor Berger is a well known figure in information theory and continues to be a productive researcher, there are some questions as to the wisdom of appointing someone late in his career to this position.

In terms of external funding, there were some large increases in the last two years, and with new faculty hires in active fields, funding does not appear to be an immediate problem.; but ECE should focus on attracting more high quality students, especially at the PhD level.

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### Mechanical and Aerospace Engineering (MAE)

The department has 27 tenured and research track faculty, an undergraduate class of 278 students, and a graduate class of 90 of which 50% are PhD track students. Its external research funding is \$5.1M and its research expenditure \$8.2M in FY 2006<sup>16</sup>. The department is ranked 32 among graduate Aerospace Engineering programs and 33 among graduate Mechanical Engineering programs in USNWR.

MAE has three problems that need management attention. These are: aerospace engineering, research funding, and the Center for Applied Bio-Dynamics.

Aerospace was a group absorbed by MAE, when its home department was dissolved. MAE needs to decide what to do with aerospace engineering. The presentation that we received seems to suggest that MAE leadership is letting aerospace engineering die by natural attrition. This may be the best course available, but aerospace continues to attract more than 20% of the undergraduates, one of whom attended our meeting with undergraduates and spoke enthusiastically of the field. The situation is messy.

The second problem is research funding. The total amount of approximately \$5 million in awards per year is acceptable, but the distribution is very poor. One member of the MAE faculty accounts for 30% of the funding and four members account for more than 72%. Fully half of the faculty receives no funding of their own. While they might be active supporting PI's in their grant activities, nevertheless one would expect that a greater number of the faculty would have grants of their own.

Center for Applied Biomechanics (CAB) is a large project in MAE which has significant industrial support and accounts for a large percentage of its external funding. A large portion of its activity is involved in crash research for the automobile industry using cadavers. CAB may also be a problem. From both the presentation made to us by CAB's director and from discussions with graduate students, it appears that much of the activity in CAB consists of contract testing with only a small portion that is truly research. There was some concern raised in discussions with the students that this "contract testing" activity often greatly slowed the progress of the theses and dissertations. If the students' comments represent a true picture of the general operation of CAB, then there may be issues of the appropriateness of having CAB as an integral part of MAE and of recruiting graduate students to staff its functions. CAB may benefit the department, but is it in the best interest of the students?

With these problems, MAE is a troubled department and needs early management attention.

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<sup>16</sup> Data provided by UVA in an email dated 6/21/07.

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### Biomedical Engineering (BME)

Biomedical Engineering has 19 faculty<sup>17</sup> and ranks number 16 in FY2006 NIH funding and number 2 in citations among such departments. With a planned new building for Biomedical Engineering on the main grounds of the University, which is high status, they will more than double their space. The department has an undergraduate class of 200 undergraduate students, and 86 graduate students, the majority of whom are on a PhD track. They plan to grow to 25 faculty, but consider that plan not bold enough. External research funding is \$8.6M (\$477K/capita) and research expenditures \$4.4M. USNWR rankings are number 16 for the graduate and number 17 for the undergraduate BME programs, which makes it the most highly ranked department in SEAS.

Their research funding illustrates the complexity of attribution, with \$1.5M from SOM faculty, \$4.9M from College of Engineering faculty, including a Coulter Foundation grant and Orthopaedics/ Launcin projects, averaging to \$480K per faculty member/year (similar to Biology, Psychology, and Chemistry, and higher than Internal Medicine).

Founded in 1967, it is one of the oldest programs of its kind. BME enjoys strong student demand and attracts substantial funding support including some major foundation grants. In spirit and in faculty quality of life, it seems to be more closely allied with the School of Medicine than with Engineering. Nonetheless, it is a highly valued member of the School and deserves strong support from the Dean.

This department is especially multidisciplinary and engaged in translational research. They have a world-class cardiovascular bioengineering group and a consortium of biomedical imaging researchers. They have benefited from successful proposals for national investments in biomedical engineering by the Whitaker Foundation and now the Coulter Foundation. They have had three presidents and four board members of their leading professional society; one of their junior investigators won the society's Young Investigator Award in 2004 and was named to the TR100 by MIT's journal of innovation, *Technology Review*. They have licensed products from their research on tissue engineering materials, in vitro diagnostic devices, stem cell therapeutics, microbubble contrast agents, imaging devices and software, and non-peptide drugs. The focus on research is matched by an equal focus on education, especially undergraduate education through classroom and laboratory experience. Undergraduate experience is also augmented through student internships in biomedical companies around the Charlottesville area, some being spin-offs from UVA and the BME activity in particular.

### Material Science and Engineering (MSE)

MSE is a graduate education only and heavily research oriented department. The department also includes the Engineering Physics activity. It has 23 faculty and about 80 graduate students. It is well positioned to take advantage of the current interest in nanotechnology and is aggressively seeking big project funding. It has proposals in

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<sup>17</sup> NOTE: Data provided by UVA in its 6/21/07 email indicate 9 faculty in the department as of Fall 2006, but may not take into account faculty appointed to other departments but working within BME.

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preparation for a half dozen centers in various topical areas and hopes to win at least two. Even without these, it enjoys a good level of external funding for research across a wide spectrum of material science topics. MSE also enjoys very good space as the principal occupant of a new building, Wilsdorf Hall.

One weakness appears to be student demand. For a department with 22 full time faculty members and no undergraduate students, MSE has only about 50 PhD students, but hopes to reach the level of 100 in time. It has responsibility for students in engineering physics and it is unclear whether this represents a significant load. All in all, the student productivity for MSE is low.

### **Systems and Information Engineering (SIE)**

The department consists of 14 tenured and tenure track faculty, an undergraduate class of 260 students, and a graduate class of 76 students. Its external research funding is \$11M and its research expenditure \$5M. No ranking is available, because of the not common title for such a department as already mentioned. We would recommend strongly that the present department title be maintained, because the systems aspect of its teaching and research activities are unique and should be attractive to both students and employers.

This is a well balanced and innovative department with a great deal of vitality. The balance between undergraduate and graduate programs is particularly noteworthy. Its faculty members staff an award winning undergraduate program that enjoys the highest enrollment in the School. Its graduate programs include two popular Masters-degree offerings and enroll 54 PhD students working on a great diversity of timely research topics. All in all, the education balance in SIE is admirable.

SIE is well positioned to serve students who want careers in the fast growing high-end service industries such as financial services and logistics. They receive an education that combines strong analytical techniques with broad exposure to business applications. Students with such an education are in great demand, perhaps even more than those with a business education.

SIE is seeking funding for an Engineering Research Center in the area of large-scale systems. The principal investigator for this proposal is Professor Barry Horowitz, a former senior executive from industry with extensive experience in large scale systems.

SIE is engaged in an extraordinarily wide range of research areas. These include many that are also covered by other departments, e.g., wireless networks, transportation systems, bioinformatics and bio-materials. These offer opportunities of interdepartmental collaboration that are particularly important for a small school of engineering.

### **University of Virginia Research Institute**

In our discussions we became aware of plans to establish the University of Virginia Research Institute (UVRI). The reasons for such an undertaking are many, and include

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the possibility of doing restricted research that could not be done on campus, tapping another source of research funding, providing easier collaboration with local federal centers and private sector companies, and as a revenue source for UVA.

There are a number of universities that operate similar institutes, in particular Georgia Tech and its Georgia Tech Research Institute. The university needs to be clear about what the goals are: quantitatively and qualitatively and assess whether these goals can be achieved. We have seen briefing slides but no detailed plans on which to make such an assessment. In particular: does UVA expect revenues from the Institute, what are the common or different administrative functions between the two entities (accounting is always a difficult issue), will there be deliberate attempts to offer joint appointments and provide for movement of people between the two organizations, and what are the reporting points and relationships?

### IV. ADMINISTRATIVE AND SUPPORT FUNCTIONS

To complement our focus on education and research we required a good insight into the administrative functions of UVA and the state of the capability of these functions to accommodate existing requirements and demands, as well as the changes planned or contemplated. This was especially important since we encountered a number of comments and frustrations as expressed by faculty, staff and researchers about the effectiveness of support operations and resource availability. Important to the success of UVA's research growth strategy are strategic policy insights offered by those with whom we met.

In general we found the administrative groups to be knowledgeable, competent and aware of the issues they and UVA face today, and especially in the future, as it aggressively pursues its growth and enhanced research reputation. Some views, concerns and remedies that were repeatedly brought forth are worthy of being reported before we discuss each major administrative function:

- There seems to be general agreement that to be successful at research, the institution needs to move from a school-and department-centric management philosophy to that of a university-centric one in many of its approaches and policies.
- This university centered approach needs to be reflected in fundraising to achieve a higher percentage of gifts directed to research support and unrestricted gifts and contributions; and more central control and less local autonomy. A similar point can be made about space strategy and space management.
- With this change, more centralization of administrative functions will be inevitable, and with this will come a reduction of the perceived power of department heads and deans and administrators;

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- A prerequisite for these changes will be the need for a rigorous strategy and plan with clear and enforced implementation commitments and schedules.
- The University must recognize that if the number of researchers, research funding and research contracts increases, the administrative functions must increase their supporting capabilities.
- A review and reconsideration of all financial sources and foundation priorities that could contribute to the capital and operating needs of UVA is needed.

### Development

The School-centric focus of UVA is a cornerstone of its Development Program and the present Campaign. The development function is geared to this approach as shown by the fact that development staffing in the schools outweighs the development staffing devoted to central goals in the development organization. There seems to be a “groundswell” from donors and some faculty for UVA to change to a more centric and pan-UVA approach in the fundraising underway. Also, the management of Development seems to be very willing to augment its activities and include university focused activities and solicitations.

A second change that is in order is to include important research goals and maybe research areas and topics as funding activities. Research goals and areas of priority need to be legitimized as important issues and represented in the UVA strategic goals and plans. It would add to the attractiveness for potential sponsors, if the university would have a significant base and recognition in the field being expanded or created.

The designation within the campaign and the Development function, that some areas are the priorities and management prerogative of the University and others that of Schools or departments needs to be understood by the faculty and its leadership.

### Management

The frustration of a number of faculty members in the science and engineering fields was noted before. The Commission on the Future of the University chaired by the Executive Vice President and the new VP and Provost now faces the prospect of engendering similar frustration on the part of the faculty. It stems from the impression that past strategic exercises (whether focused on UVA or addressing UVA research opportunities and capabilities in a statewide context) such as

- Report of the 2020 Commission on S&T (posted 4-2001)
- University of Virginia Ten-year Academic Plan (12-13-2006)
- Collaborative R&D Strategies and Directions for the Commonwealth of Virginia (January 2007 - Virginia Research & Technology Advisory Commission (VRTAC))

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appeared to have university approval but were acted upon only in part with no explanation given about why they were shortcut. Some will even say that nothing of consequence came out of these studies and declarations. This view is reflected in skepticism about ongoing studies.

The situation described is also reflected in attitudes about the Provost and VPRGS positions and their incumbents. While there is high regard for the individuals, neither has much overt power whether in terms of budgetary discretion (VPRGS has \$3million/year seed funding) or in terms of some direct management responsibility of university organizations. With the change in the Provost office, the President should consider giving the Provost

- responsibility for managing and being spokesperson for the strategic plan and its implementation;
- final sign-off on budget distribution
- through the VPRGS, who reports to the Provost, have overall management responsibility for university-wide centers, their commitments and plans. The day-to-day operation should stay between the Center manager and the responsible dean, with cognizance of the VPRGS.

### Budget

The budget processes of UVA are well organized and comprehensive. The decentralized nature of UVA focuses both budget development and decision making at the Dean and department level. Deans, departments and individual faculty have access to funds restricted for their use. There are limited funds available to the Provost and central administration to influence the direction of academic and research programs. This decentralized control of resources is reinforced by the existence of many foundations and fundraising in direct support of Colleges and programs. Only 0.5% of the current campaign is designated for unrestricted use.

Significant institutional funds, as much as \$18 million, are directed to support development activities that benefit college and departmental priorities. Staff suggested consideration be given to recovering at least half of that from the benefiting organizations. On the capital side, there was a tendency for building construction to begin before all donations are received to fully pay the capital costs, leaving the University to fund the difference.

The full impact of the new "compact" with the Commonwealth is still being played out. Ideally this provides additional funds to UVA and financial and operational flexibility. A key assumption is that the Commonwealth keeps its financial commitments to UVA. Cuts in the Commonwealth's support to higher education have tended to come in ten year cycles and it would be wise to prepare for this possibility.

The Commonwealth's support for facilities is less than ideal at a time when public funding for research would greatly aid UVA's efforts to expand. The Commonwealth's

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six year capital planning horizon is not conducive to responding to opportunities that arise quickly for new research avenues. As mentioned earlier, the lack of a comprehensive research facilities strategy further limits UVA's ability to obtain public support for expensive research facilities and follow-on operational expense support.

### **F&A Recovery**

Operationally the CFO and staff are doing an excellent job of negotiating rates that recover UVA's allowed facilities and administrative costs. They are at the high end of rates for public institutions. In the last round of negotiations when the rate increased four points, the resulting additional funds were provided to the Provost's Office/VPRGS as discretionary funds to support research initiatives. This has proven to be an important, but insufficient source of funding to grow UVA's research base.

It should be remembered federal regulations limit the recovery of administrative costs to a rate of 26%. UVA's actual administrative cost component is about 30%. Accordingly this 4% unallowed cost must be absorbed by other unrestricted fund sources. As the research base grows, this under-recovery will increase the pressure to pay for the costs of administration that cannot be reimbursed from grants and contracts.

### **IT Services**

Current management of this activity is relatively new to UVA and both the CIO and his deputy came from the University of Michigan. The difference in activity, even discounting for the relative size of the universities, is quite startling: the University of Michigan requirement for bandwidth and access is much more demanding than UVA. The user pressure and expectations for services and new functions is also markedly less at UVA. User demand is one of the driving forces that will keep IT Services at the leading edge in an institution.

The CIO, has a clear view of what the needs are and also has a good sense for the way to approach requirements and capabilities. He understands that significant investments in compute power, large dataset handling and storage, simulation and visualization capabilities and effective open access to the IT capabilities here and elsewhere are mandatory and needed.

His main action items should be

- reset the IT plan to reflect the reality of what the investment will be over the next 5 to 10 years;
- reduce in-house work that could be performed by outside vendors more or equally efficient to make room for the new workload that strategically could be done internally;

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- focus on a couple of identified big ideas where UVA has the capability of doing groundbreaking research:
  - Digital Humanities
  - Transforming undergraduate experience to resemble that of graduate experience through abundant use and availability of IT services.

### Center Strategy

We have made a number of comments on specific centers throughout the report. This section tries to focus generically on centers in UVA.

Centers are increasingly important, because they facilitate or allow in many cases the performance of multi-disciplinary research. A further important factor is that they facilitate collaborative research and other activities between institutions and between industry and academia.

UVA has approximately 100 centers of all kinds and presumably of varied effectiveness. Most are in Health, Humanities and Social sciences, few in Engineering and Physical Sciences. Despite the large number of Centers, we could not find a UV policy that regulates the establishment, monitoring of activities or dis-establishment of Centers. Also we must conclude that UVA has under-participated in Center competitions at the federal level and therefore has too few well supported NSF and NIH Centers since the establishment of the NSF Science and Technology Center on Biological Timing in 1991. Only this year have three ERC applications been submitted to the NSF – two from relatively newly hired, but experienced faculty. Why the hiatus in this important activity?

UVA needs to take Centers more seriously and bring some oversight and organization to this activity. As far as oversight is concerned,

- The VPRGS should make it his business to know well in advance of new plans and especially solicitations from government, states, foundations and the private sector and together with the deans determine UVA's suitability and strategic interest in the proposed centers. He should assign responsibility and leadership to the appropriate school or department and assure that proposals be developed and submitted.
- Establish a Center policy for UVA that differentiates centers that serve a department only, from centers that are of importance to UVA as a whole.
- There should be clear guidelines for establishing and terminating Centers, the latter to be fixed at the time the center starts operating.

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With regard to Center organization:

Category I: UVA should continue designating University-wide centers that are standing on their own and filling an opportunity to address the mission of the university in new or specialized areas and where the university is the primary responsible funding source.

Category II: National Centers that are fully funded by federal or State Government or industry and established for a finite and known time interval.

Category III: School or Department Centers that are established for the purpose of addressing a specific issue, that lies mostly within the responsibility of one School, College or Department.

Category I and II Centers should report to the VPRGS and Category III to the Dean or Department head as appropriate; but the VPRGS has oversight responsibility over all Centers.

### Space

UVA appears to have a thoughtful and well organized master planning process. Staff reports of benchmarked data indicate UVA has a high degree of efficiency in its use of space. However, this efficiency of space use comes at a cost of having little, to no, "swing space" available for research projects that emerge on short term notice.

There is insufficient central planning and implementation of an overall space utilization for the campus. In the words of the facilities planning staff, "new buildings are "event" driven, versus, "strategy" driven. This is a consequence of most space decisions being made at the Dean's level.

The quality of space currently occupied for research and graduate level labs is of variable quality and some research spaces are not adequate for the level of work being conducted or aspired to. On the other hand, UVA has made excellent progress in the last few years with the Board of Visitors commitment to deal with the maintenance backlog. Significant funds are being set aside each year for bringing building systems up to modern standards. These funds, however, are not available for upgrading the functionality of research space to meet the demands of today's modern research laboratories.

The Fontaine Research Park is becoming a viable location for significant research. We heard in our meetings that the business model for the Park requires a high probability of financial support before construction can begin on new space. This creates a "chicken and egg" dilemma that results in the loss of flexible space at the Park that could be available on short notice to house new research and/or provide swing space for researchers from the main campus who must relocate temporarily for renovations. The Park could be considered as a more active location for research by having some vacant space in reserve for either temporary use by existing researchers or to accommodate new research in immediate need of space.

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### **Human Resources and Recruiting**

This function and its leadership are well positioned to execute the human resources mission. The present plan calls for recruiting 300 new faculty and replaces retirements of 277 faculty, or a 600 new hire load over the next 5 to 7 years. Since vacancies stay with the department and the School the deans have a major control on use of these vacancies.

These to-be-hired numbers do not properly reflect the workload of this function. It is not uncommon to have to interview 5-7 candidates for one hire to maintain the quality standard that is desired and the number of interviewees for the 600 to be hired could be as high as three to four thousand over 5 to 7 years or close to 500 interviewees per year.

The issue that is prominent is spousal employment, although with increasing industry and federal agencies moving into the Charlottesville area, this problem might be easier to solve from here on than it was in the past.

One other problem we have addressed generally elsewhere in the report is diversity at UVA. In the case of faculty, hiring minority candidates and in a number of departments female candidates requires focused attention, not only to attract candidates but to make the position and the environment at UVA desirable to the individual candidates and to their families.

There is some budget support that is available for critical hires, but it needs to be wisely spent.

### **Sponsored Programs: Administrative Support**

Our discussion with the management of this important activity was very positive and left the impression that this group knows its mission well and also the issues it will face. With increasing research activities the Sponsored Programs Office will encounter increasing workload that it must handle. In addition, new rules and regulations by federal and state agencies make the administration of proposals and grants more complex and time consuming. This situation needs to be understood by UVA management and allowances made for it.

One area that needs special focus is the University's proposal approval system. It is paper-based and depends on "by hand" expediting of approvals. As proposal volumes increase and tight time requirements are the norm, the paper route will be more error prone than it already is. The Administration needs not only to look how to computerize this aspect of its sponsored research administrative system, but also at how an automated integrated approach to sponsored research submission can be obtained. The system, by the way, should connect to agencies' input systems and requirements.

The central Administration should work closely with the deans to ensure that adequate administrative support is available and that F&A dollars returned to the departments can be used for those purposes. It is not clear to us if there are enough computer and

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application facilities installed to minimize the workload and make the whole process more timely and error free.

### **Financial Relationship between the Medical School and Hospital**

The financial relationship between SOM and MC was described as a partnership that is guided by senior leadership. This culture of partnership between the leadership of MC and SOM is essential for future success. The national environment of health care and related research is very fluid and constantly changing. The best long term strategy for the continued financial success of both SOM and MC is a collaborative effort with a willingness to share financial, space and other resources. Collaborative skills and intent should be a key attribute of the new Dean of SOM. Strong business leadership will continue to be important for the financial health of the MC.

On an administrative level, there is a well established benchmarked basis for comparing operational results and metrics to peer academic medical centers. At the time of our visit, \$25 million had been agreed to be transferred from MC to SOM.

### **Technology Transfer**

During our first visit to UVA we spent some time with the Patent Foundation. This is a well rounded activity that is not only concerned with disclosures and patents submitted, but proactively through its Scout Program actively pursues and stimulates new disclosures from researchers and their home departments. Last year UVA was number 6 nationwide on disclosures per sponsored research dollars, after Caltech and Georgia Tech. While this is a good showing the revenue stream from licenses is low at \$6 million for 2005.

We also reviewed their operating manual which is well conceived and executed, avoiding unnecessary bureaucratic embellishments.

As research volumes increase, the demand on the Foundation will also increase and systems should be in place to make the processing of patent issues effective.

We would also recommend that intellectual property requirements and problems be looked in total and because of public, especially state legislature interests, that a set of metrics be established that shows activities in the IP area and their effect on the economy of the Commonwealth.

## V. ISSUES AND RECOMMENDATIONS

### A. University-wide

1. **Issue:** UVA enjoys a tradition and culture of providing one of the best undergraduate educations in the country to an elite student body. Should UVA embark on a plan to join the ranks of the 20 or so great American research universities that offer both – a quality undergraduate experience and research attainments with world recognition for excellence?

**Recommendation:** The Board of Visitors, the Administration and the Faculty have expressed support for UVA to improve its research productivity. This is an opportune time for UVA to develop a strategy and make the necessary investments to rise in national stature as a broadly based research university.

2. **Issue:** How should UVA manage growth in faculty size consistent with a new strategy of higher research attainment?

**Recommendation:** Establish with all the departments in CLAS, SEAS and SOM a credible long-range plan and schedule for recruiting *that would contribute to UVA's growth as a respected research university*. With such guidance, the departments can accurately plan according to their needs and their vision of the most important research areas. While on average each department would engage in one or two hires per year, the distribution across departments depends on needs, existing capabilities and strategic importance.

3. **Issue:** Whether justified or not the Washington Advisory Group team finds a degree of frustration in a number of faculty members in the science and engineering fields.

**Recommendation:** Regaining a sense of teamwork and trust among *all* the science and engineering departments should be an important objective for the new dean and provost. A coherent communication strategy is needed that engages faculty and clarifies elements of an initiative and its funding sources. This applies particularly to the new Commission chaired by the new Executive Vice President and Provost. At the end of the planning exercise, UVA needs to make a clear statement as to the results of the exercise, what faculty can expect, and what will happen on what time scale. If resources are not available to implement the recommendations, the administration needs to make this clear.

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4. **Issue:** How important is attracting outstanding graduate students?

Able, innovative graduate students can double the research productivity of faculty. We were stunned to hear the group of impressive science undergraduates, who were headed to very good graduate school programs all around the country, nearly unanimously tell us that they did not apply to stay at the UVA and would not apply were they looking at UVA from the outside. This view is devastating to a research university's reputation. The Ten-Year Plan calls for \$200M in endowment for graduate student support. Competition for top students is high.

**Recommendation:** UVA must find the resources to attract high-quality graduate students. These investments should match those of aspirational peers of UVA.

5. **Issue:** What is the investment needed to enhance the research stature of UVA going to cost?

The Washington Advisory Group estimates that implementing the UVA Ten-Year Academic Plan of December 2006, with 155 new faculty positions across the Sciences, Engineering, and Medicine, plus a similar number of replacements, modern research space, and a graduate student endowment would require about \$1B, depending on the cost of capital projects. Across 40 departments and even five years, this schedule would translate into an average of less than one new faculty member net growth per year per department. Faculty would have to be very productive for UVA to hold its national rankings with such modest growth.

**Recommendation:** UVA should be prepared to make an investment on the order of \$1 billion over the next 5 to 7 years, with as much as possible in the initial five-year period to support expansion of research space and recruitment of faculty and graduate students. This will attract national attention. However, if UVA is to rise significantly in federal research expenditures, a larger investment is required.

6. **Issue:** What are the key metrics for progress on enhancing the research standing of UVA?

These metrics must be matched with the University's goals to overcome major deficiencies and capture grand opportunities. The successful BOV "National Academy-caliber" special faculty recruitments have certainly gained attention for UVA and shown a willingness to make an initial investment of about \$100M.

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Federal funding for R&D is the most generally comparable metric across research universities. Industry and state funding, national awards and prizes, and philanthropy are important secondary metrics.

**Recommendation:** The key metrics are reputational and financial. The former involves distinguished departments, individuals, and research achievements. The latter generally are based on rankings of research universities by total federal R&D funding (National Science Foundation data) and, for the School of Medicine, by NIH research grant funding. UVA needs to be cognizant of these key metrics and where consistent with its own strategy focus on those actions that can improve its standing.

7. **Issue:** Should the present UVA \$3B Campaign aim to raise major sums for the vision of strong science, engineering, and medical research?

Fortunately, the timing may be excellent if the Campaign can generate excitement and investment in these fields of science, engineering, and medicine. Both private sector and public sector leaders have put a high priority on investment in research and education to keep our economy competitive, assure national security, and improve health, environment, and education. UVA as a leading research university must have a big stake in this mission.

The BOV, the President, and prominent donors have a great opportunity to attract and make transformational investments. Greater annual use of the highly appreciated endowments may be warranted to jump-start the effort.

**Recommendation:** Yes. The University leaders, the Development Office, and the 21 Foundations should have major goals for the sciences, engineering, and medicine, tied to achieving the metrics and timelines. The vision of Thomas Jefferson should be energizing for the donor community, combined with specific goals and special funding opportunities.

8. **Issue:** Should the four campus-wide priorities in Science and Technology from the 1999 Commission on Virginia 2020 – Morphogenesis & Regenerative Medicine (MRM); Nanosciences; Computer and Information S&T; and Aging – still be priorities for the University?

**Recommendation:** These priorities were well chosen for 1999 conditions. However, they should be reconsidered in view of much larger campaign currently envisaged and the new opportunities to rebuild the basic fields, to single out new areas such as Radio Astronomy as a distinctive resource at UVA, and to address other priorities, like the Environmental Sciences and Clinical Research that are emerging from the

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Washington Advisory Group assessment and the Commission on the Future.

9. **Issue:** How can the University increase the numbers of UVA faculty elected to the NAS, NAE, IOM (and other prestigious bodies) or receiving major awards?

**Recommendation:** It is essential to recognize that there is a trajectory to such election: basic dramatic research achievements, timely selection to specialty societies, and awards in individual fields. UVA, in addition to selective recruitment of still active current academy members, needs to invest in the most outstanding current faculty who could meet these criteria and in new faculty who are potential academy members. This effort deserves to be an explicitly articulated goal for UVA with a detailed plan for attainment, including ongoing review of how individual faculty members and UVA as a whole are progressing towards this goal.

### B. College of Arts and Sciences (CLAS)

1. **Issue:** Departments such as Physics, Math, and Biology have remained static or have not grown in faculty size since 1990 over a period of time when federal research awards increased. Most leading universities took advantage of funding opportunities at NSF, NIH, DOE, NASA and other agencies over this period. This enabled growth in faculty size in leading competing universities. Laboratories were built with borrowed funds and amortized from federal overhead payments. Now UVA has to play catch-up, when government funding is relatively static.

**Recommendation:** This was a major error in judgment. The Washington Advisory Group supports UVA's decision to make the necessary investments to become a respectable research university. This will involve a major initiative (described elsewhere) of recruiting research competent faculty. An important goal is to increase the size of these departments to the median level of those top 20 or so departments in the country of comparable size to UVA.

2. **Issue:** UVA is embarking on a program to enhance its research productivity in the natural sciences, engineering, and the biomedical fields. UVA science is to a large extent located in the CLAS.

**Recommendation:** It is timely for the next Dean of CLAS be a scientist of stature, with experience in developing research capacity of academic Departments and Centers and accessing federal, and private funding institutions.

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3. **Issue:** Does CLAS have the know-how in its administration and faculty to select forefront fields and identify research proven faculty recruits?

**Recommendation:** The Washington Advisory Group team found a core of faculty in almost every CLAS department that exhibited the enthusiasm, currency, and networking skills to serve in this function. Nevertheless, outside advice can help, considering the importance of this new endeavor.

4. **Issue:** The relatively low rankings of the very basic disciplines of Biology, Physics, Chemistry, and Mathematics in CLAS contribute significantly to the modest current image of UVA as a research university. Almost every distinguished research university in the country ranks well in these basic fields. Whatever the historic reasons, UVA cannot achieve its new goals unless this is corrected.

**Recommendation:** Develop a plan specific for each of these basic departments to improve its comparative ranking.

### C. School of Medicine (SOM)

1. **Issue:** Is the SOM prepared for the redirection of investment at NIH to press academic medical centers to transform their clinical research enterprise and accelerate the application of basic research findings to clinical and public health benefit? Probably not.

The UVA SOM has a well-established General Clinical Research Center, which must be packaged with clinical research training and specific research strengths to compete for a Clinical Translational Science Award during the next 3 years or lose the Center.

**Recommendation:** Support the Dean's commitment to seek philanthropic support to enhance clinical translational research with goals of \$165M for a Center for Translational Research and \$135M to expand the Department of Public Health Sciences into a School of Public Health.

2. **Issue:** What level of investment in the SOM is needed?

**Recommendation:** Prepare for very large numbers—on the order of \$0.5B for the SOM and \$1B for the entire University. If the more ambitious goal of doubling UVA's federally-funded research expenditures is pursued, then investments in the range of \$900M for SOM and \$2B across the entire University will be needed.

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3. **Issue:** Is the Medical Center sharing its surplus and supporting the SOM sufficiently? Is there a firm basis for multi-year planning and alignment of incentives?

The Medical Center and the SOM must jointly recognize the potential for greater synergies and better financial returns from joint investment in enhancing clinical services and the full range of research and research support functions. Healthy clinical finances permit more support of the academics; research discoveries and applications to clinical problems attract patients; high profile faculty and programs attract better residents, fellows, and graduate students; and better trainees make faculty more productive. All of these synergies enhance philanthropic prospects.

**Recommendation:** Establish a high-level working group to examine the Funds Flow Model between the SOM and the Medical Center/Hospital. Give them a mandate to find synergies and propose incentives across clinical care, research and technology development, and education. Charge them to set higher levels of Medical Center payments for roles of the faculty and staff in clinical departments and a higher level of return to the Dean for investments in all units of the SOM under a multi-year agreement suitable for long-term strategic plans. Revisit the desirability of having a Vice-President or Senior Vice-President responsible for both the Health System and the Medical School.

4. **Issue:** Can the clinical departments substantially increase their research funding and research standings? Does Internal Medicine require special attention?

Internal Medicine is by far the largest department of the SOM. Internal Medicine is an engine of broad-based research and research collaborations in all leading medical schools. The UVA department has \$38M in current NIH funding and multiple foci of strength and good funding. Most of its 10 divisions are under pressure to provide more clinical services, generate more reimbursement for those services, and deliver clinical components of salary. Other clinical departments have similar challenges.

**Recommendation:** Resources must be invested to renew the large clinical departments as faculty age or depart and as the SOM aims to significantly increase its research funding and enhance its research reputation. Ensure a stronger leading role for the Department of Internal Medicine.

5. **Issue:** Are there some specific models of recent success among the smaller clinical departments?

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**Recommendation:** Yes. The next Dean of Medicine should examine closely the turnaround performances in Orthopaedics and Psychiatric Medicine as models for what can be done in a short time. In these two departments, outstanding new chairs have generated very impressive research programs with a large multiple of funding in just 2-4 years and simultaneously have made the clinical operations viable and distinctive. These two can be case studies for the rest of the SOM, including divisions of the largest departments, and for departments in other schools, as well.

6. **Issue:** Can the basic science departments in the SOM substantially enhance their research status and research funding?

The UVA basic science departments have very strong histories and key roles in multidisciplinary research centers, including the new Institute for Morphogenesis and Regenerative Medicine (tied to Cell Biology) and the Cancer Center. As with the CLAS science departments, these departments need modern research space; junior, mid-career, and BOV faculty recruitments; research core service labs; and competitive support for graduate students. The University has just made a big investment in Physiology, signaling support for biomedical basic sciences. Other departments are poised for chair appointments and growth, as well. Priority should be given to recruiting faculty with substantial grant support that can be transferred to UVA.

**Recommendation:** Invest in growth of the basic science departments of the SOM. Build on their strong track records. Encourage collaboration with CLAS and clinical departments. Enhance translational research in the Cancer Center and other research centers.

7. **Issue:** Can the UVA Cancer Center continue to grow and greatly strengthen its clinical and translational research?

Since its designation as an NCI Clinical Cancer Center and first Core Grant in 1987, the UVA Cancer Center has grown to 196 faculty in 30 departments, with \$14.4M in NCI funding and \$68M per year in competitive funding from all federal and non-federal sources in 2006, more than double those figures five years earlier. The six basic science programs are very strong, and translational directions are promising. However, major expansion in clinician-investigator faculty and space is required to be competitive in clinical research. Recruitments for clinical leadership and cancer control leadership have been unsuccessful. Like other research centers, the Cancer Center does not have authority to make primary faculty appointments; hopefully the proposed Center for Translational Research will help. Major philanthropy would be desirable for the Cancer Center.

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**Recommendation:** Build upon outstanding basic research strengths to develop early-phase clinical trials capability in the Cancer Center. Complete critical recruitments for Hematology-Oncology in Internal Medicine and related expertise in Radiology, Pathology, and other departments.

### D. School of Engineering and Applied Science (SEAS)

1. **Issue:** Is the importance of ChE being recognized?

**Recommendation:** ChE is a small department whose active members are of high quality. However, it has several members near retirement age and no plan for renewal appears to be in evidence. What ChE needs is an increase in faculty beyond its size of 12 and positions to replace impending retirements. Chemistry is playing a critical role in many areas of engineering research and ChE provides a source of much needed expertise in this area. It has a natural synergy with nearly every department in SEAS and beyond.

2. **Issue:** Is CE viable?

**Recommendation:** The problems of CE are severe. It is too small to be effective. Its largest group, the one on transportation, has only five members. Two of its three research areas have almost no external funding. Left alone, this department will continue to decline and may soon pass the point of no return. We recommend, as mentioned above, that SEAS phase CE out altogether.

3. **Issue:** MAE needs.

**Recommendation:**

- a. Review CAB to make sure that it is doing work appropriate for an academic department and graduate students are not being exploited.
- b. MAE desperately needs more research funding other than contracts like CAB.
- c. MAE needs to deal with the large number of research-inactive members of its faculty.
- d. MAE's problem with Aerospace could be solved by letting natural attrition continue its job or by consciously phase out of Aerospace altogether and becoming a Mechanical Engineering and Applied Systems Department.

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### 4. **Issue:** What should SEAS' strategy be?

SEAS needs to develop a new strategy that dispassionately and realistically takes into account the issues we raise, that deals realistically with available resources for the next 5 years, and takes advantage of its and UVA's strong positives.

**Recommendation:** SEAS has strength in several topical areas that will continue to gain in importance. These include bio-medical topics, systems research, computer and computational research, nanotechnology, information and service oriented technologies, and materials. The danger is that for its size SEAS is focusing on too many of these areas as well as the legacy core disciplines. An intense focus on a few fields may well be a winning strategy. Carnegie-Mellon University (CMU), for example, chose information and computer science as an area for disproportionate focus and support. It succeeded in making CMU world renowned for computer science and lifting the overall ranking of CMU in the process. SEAS might be in a good position to focus similarly on a few well-chosen key areas.

## E. Administrative and Support Functions

### 1. **Issue:** As the Commonwealth's flagship university, UVA should be receiving more funding for research facilities.

**Recommendation:** UVA should continue to develop long range capital plans to present to the Commonwealth detailing the need for research space and the value of public investment. A starting approach could be to get public support for "swing space" that would then allow UVA to proceed with doing most of the funding from its own sources. New building construction should not begin until funds are available to pay for construction without the need to use unrestricted reserves.

### 2. **Issue:** UVA returns a large portion of F&A funds to colleges. The Deans, in turn, have differing strategies for passing these funds to departments. It is the view of the Finance Office that the amount of funds returned to colleges exceeds the costs related to research operations. As a result, central administration must make up the difference from other sources.

**Recommendation:** We recommend there be a study of the costs and recovery of F&A funds and their subsequent distribution. Central administration should alter policies to retain more of these funds.

### 3. **Issue:** UVA has been conservative in its use of debt and its financial strength has earned at AAA rating. To date, borrowed funds have been used sparingly to build research facilities. To the extent that UVA has

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used debt to construct research facilities, the financial staff has been successful in recovering those costs through the F&A negotiation process.

**Recommendation:** UVA consider the use of additional debt to construct facilities where the flow of research grant and contract funding has a reasonable probability of continuation over a multiple year timeframe.

4. **Issue:** Intellectual property income at UVA is not at the level of its other peer institutions. The current policy has been focused on an intellectual property process designed to recognize the work of faculty and not as an income stream to be derived from pursuing the most promising commercial ideas.

**Recommendation:** The University should ensure its policy and procedures toward intellectual property not only incentivize researchers to come forward with ideas that have potential commercial value, but also support the pursuit of revenue streams from IPR efforts, spin-offs, and industry-university agreements.

5. **Issue:** Intellectual property and its effect on state economies are becoming important issues with legislatures.

**Recommendation:** UVA to establish a set of metrics for the IP area, such as disclosure rates, licensing income, spin-offs and their effect on the economy of the Commonwealth (e.g., contracts with local industry, increasing student population, especially graduate students, attracting new companies that locate in the State because of UVA and student supply, etc.).

6. **Issue:** UVA needs to be more active in Center competition and in the management of its various types of Centers.

**Recommendation:** The VPRGS should be knowledgeable of center competitions by government or industry and assure UVA's participation in important events. UVA should also establish guidelines for Centers as outlined in the "Center Strategy" section above. More staff time should be considered for a stronger UVA federal presence in Washington, D.C.

7. **Issue:** Delays and errors in sponsored program applications and during their lifecycle will increase with volume of submissions and the increasing complexity of federal requirements.

**Recommendation:** Automate submission and life cycle administration systems for grants and contracts.

## Enhancing UVA's Recognition as a Research University

8. **Issue:** Space planning and construction of research facilities are key priorities. The decentralized nature of UVA space management works against the preferred strategy of central planning and space allocation.

**Recommendation:** Ideally, planning for research provides for situating compatible research activities in close proximity. Emphasis should be placed on creating a critical mass of faculty and research in allied areas. It is recommended the authority for allocating space be at the Dean's level, to include concurrence of the Provost on matters of overall space strategy. The planning for and construction of new buildings and research space should be driven by University strategy.

We recommend that future main campus construction take full advantage of the maximum available "footprint" by building additional square footage beyond the immediate program requirement. This will provide much needed "swing space" to accommodate either new research opportunities or provide for existing research programs that must be displaced during renovation. This swing space should be centrally controlled.

9. **Issue:** The Fontaine Research Park is becoming a viable location for significant research. We heard in our meetings that the business model for the Park requires a high probability of financial support before construction can begin on new space. This creates a loss of flexible space at the Park that could be available on short notice to house new research and for other purposes.

**Recommendation:** It is recommended the Park be considered as a more active location for research by having some vacant space in reserve for either temporary use by existing researchers or to accommodate new research in need of immediate space.

## VI. CONCLUSION

UVA is unusual among American universities in that it has one of the best undergraduate programs in the country and only modest standing as a research university. UVA's BOV, administration, and faculty are wisely embarking on a campaign to rectify this situation. The stated goal is to join the ranks of the top twenty or so universities that excel in both research and education.

UVA's SOM is in a good position to move forward. However, contrary to the recent history of the best universities, science and engineering in the CLAS and SEAS (with a few exceptions) have fallen behind because of the lower priority consigned to them over

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past decades. All three of these sectors, especially the latter two, must improve substantially in research performance, if UVA is to fulfill its new aspirations.

Fortunately a good foundation exists at UVA on which to build. "Mr. Jefferson's University" has cachet. Its undergraduates are nationally recognized for the quality of their education. Charlottesville is an attractive community for faculty and their families to live in. Faculty salaries are competitive. Campus culture encourages face to face discourse, mutual support, and cooperation. The significance of these attributes in competing for faculty should not be underestimated.

Important first steps have already been taken. Initiatives by the BOV have brought a few distinguished faculty to the campus. The Commission on the Future of the University has been created. However the success of the overall effort rests on the following:

- Adequate resources. The Washington Advisory Group estimates that at least \$1 billion will be required over the next 5-7 years. This will improve one of two important metrics – UVA's research reputation (usually established by surveying deans, department chairs and faculty at other institution). The results of UVA's billion dollar investment will be noticed. However, it may not improve the other metric – federal research expenditures compared to competing institutions. The number of newly recruited faculty plus replacements may be insufficient. Perhaps, \$2 billion will be required over 10 years.
- Wise allocation of resources. The Washington Advisory Group believes that this wisdom exists collectively at UVA in the BOV, Administration and faculty. However it will require effective lines of communication, transparency, and mutual trust. As with most successful universities outside advice should be solicited, using well selected visiting committees and consultants.

The Washington Advisory Group understands that the current \$3 billion campaign can still be redirected to some extent. In this and earlier drives, donor support for graduate research programs have never been seriously attempted. This may be a most important source for funding the research university initiative of UVA.

APPENDIX A

The Washington Advisory Group Team

**Erich Bloch** is a Director of The Washington Advisory Group and advises on corporate R&D management and strategic planning for academically based research enterprises and other not-for-profit organizations. He is also serving as a member of the President's Council of Advisors on Science and Technology, and is the Distinguished Fellow at the Council on Competitiveness.

As Director of the National Science Foundation from 1984–1990, Mr. Bloch oversaw the Foundation's \$3 billion annual budget and the award of 12,000–14,000 research grants in natural and social sciences and engineering.

Previously, Mr. Bloch was IBM Corporate Vice President for Technical Personnel Development. His earlier work at IBM included Engineering Manager of the Stretch supercomputer system, head of the Solid Logic Technology Program, Vice President of the Data Systems Division, and General Manager of the East Fishkill development and manufacturing facility.

Mr. Bloch was awarded the National Medal of Technology for “developments that revolutionized the computer industry” and is a recipient of the IEEE Founders Medal and the Vannevar Bush Award. He is a member of the U.S. National Academy of Engineering, the Swedish Academy of Engineering Sciences, a Fellow of IEEE, and a foreign member of the Engineering Academy of Japan. He serves on several boards and a variety of non-profit advisory boards.

Mr. Bloch received his education in electrical engineering at the Federal Polytechnic Institute of Zurich and earned a Bachelor of Science degree in electrical engineering from the University of Buffalo.

**Frank Press** is a Director of The Washington Advisory Group and advises on R&D strategic planning; management and research scenarios for new undertakings in industry and academia; and international research opportunities.

Dr. Press was President of the U.S. National Academy of Sciences and Chairman of the National Research Council from 1981 to 1993 and Science Advisor to the President of the United States and Director, Office of Science and Technology Policy from 1977 to 1980. Prior to that, he was Professor of Geophysics at the Massachusetts Institute of Technology and Chairman of the Department of Earth and Planetary Sciences. Dr. Press was also Professor of Geophysics at the California Institute of Technology and Director, Seismological Laboratory. He is a Life Member of the Corporation of MIT and Board Member of the Woods Hole Oceanographic Institution, the Marine Biological Laboratory, and the Monterey Bay Aquarium Research Institute. He is a Director of a medical diagnostic device company. He was the Cecil and Ida Green Senior Fellow at the

## Enhancing UVA's Recognition as a Research University

Carnegie Institution of Washington from 1993-1997. Since 1993, he has been a visiting Professor at Cornell, Caltech, Stanford, and Indiana universities.

Dr. Press has been elected to fellowship in the American Academy of Arts and Sciences, the Royal Astronomical Society, the Royal Society (London), the Russian Academy of Sciences, and the Academie des Sciences (France). He is the recipient of 30 honorary degrees. Among his awards are the U.S. National Medal of Sciences, the Vannevar Bush Award, and the Pupin Medal from Columbia University. Dr. Press received the Japan Prize from the Emperor in 1993. He was awarded the "great gold" Lomonosov medal, the highest award of the Russian Academy of Sciences.

Dr. Press earned a B.S. from the City College of New York, and a M.A. and Ph.D. from Columbia University.

**James E. Morley, Jr.** is a Director of The Washington Advisory Group and advises on financial, administrative and organizational management to colleges, universities and nonprofits. He is the past president and CEO of the National Association of College and University Business Officers (NACUBO), a Washington, DC based organization serving over 2,100 colleges and universities with advocacy and services dedicated to higher education administrative and financial issues. During his eleven year tenure he lead the organizations transformation to include its national engagement on such issues as the cost of college, taxes and a U.S. Government (FIPSE) supported project on Building Organizational Capacity.

His distinguished career in university management included serving as Senior Vice President, and previously, Vice President and Treasurer at Cornell University (1985-1995); Vice President for Finance and Administration at Rensselaer Polytechnic Institute (1978-85) and Rider College (1976-78), and Comptroller, Syracuse University (1972-76). Prior to joining academia, he was on the audit staff and a Management Consultant with Ernst & Ernst from 1969-1972. Mr. Morley is a retired Colonel, USMC Reserve.

Mr. Morley has published, consulted and spoken widely on the topics of academic leadership and organizational effectiveness. His publications include *The Extraordinary Higher Education Leader*, (with Doug Eadie) 2001; "Working More Effectively by Building Organizational Capacity," *Business Officer Magazine*, December 2005; and "The Business of Higher Education: New Leadership Needs for a New Era" in Brent D. Ruben's *Pursuing Excellence in Higher Education: Eight Fundamental Challenges*, 2003. He recently served on the Task Force of the University of California Compensation, Accountability, and Transparency. He is a director of the NGM Insurance Company where he also serves as chair of the Audit Committee. He has been a director of the American Council on Education and chair of the Board of Trustees of Emma Willard School. He is a member of the board of directors of the Forum for the Future of Higher Education.

Mr. Morley received an M.S. in Accounting from Syracuse University (1970), and a B.M.E. from Rensselaer Polytechnic Institute (1962).

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**Gilbert S. Omenn, M.D., Ph.D.** is an Affiliate of The Washington Advisory Group and advises on biomedical research and academic health center projects in the public and private sectors.

Dr. Omenn is Professor of Internal Medicine, Human Genetics, and Public Health at the University of Michigan. He served as Executive Vice President for Medical Affairs and as Chief Executive Officer of the University of Michigan Health System from 1997 to 2002. He was formerly Dean of the School of Public Health, and Professor of Medicine and Environmental Health, University of Washington, Seattle. His research interests include cancer proteomics, chemoprevention of cancers, public health genetics, science-based risk analysis, and health policy. He was principal investigator of the beta-Carotene and Retinol Efficacy Trial (CARET) of preventive agents against lung cancer and heart disease; director of the Center for Health Promotion in Older Adults; and creator of a university-wide initiative on Public Health Genetics in Ethical, Legal, and Policy Context while at the University of Washington and Fred Hutchinson Cancer Research Center. He served as Associate Director, Office of Science and Technology Policy, and Associate Director, Office of Management and Budget, in the Executive Office of the President in the Carter Administration. He is a longtime director of Amgen Inc. and of Rohm & Haas Company. He is a member of the Council and leader of the Plasma Proteome Project for the international Human Proteome Organization, and in 2004 became President-elect of the American Association for the Advancement of Science.

Omenn is the author of over 390 research papers and scientific reviews and author/editor of 17 books. He is a member of the Institute of Medicine of the National Academy of Sciences, the American Academy of Arts and Sciences, the Association of American Physicians, and the American College of Physicians. He chaired the presidential/congressional Commission on Risk Assessment and Risk Management ("Omenn Commission"), served on the National Commission on the Environment, and chaired the NAS/NRC/IOM Committee on Science, Engineering and Public Policy. He received the John W. Gardner Legacy of Leadership Award from the White House Fellows Association in 2004.

He is active in cultural and educational organizations, and is a musician and tennis player. Omenn received his B.A. from Princeton, the M.D., magna cum laude, from Harvard Medical School, and a Ph.D. in genetics from the University of Washington.

**Martina Newell-McGloughlin**, an internationally recognized authority on biotechnology and its social implications, directs the UC Systemwide Biotechnology Research and Education Program (UCBREP). She is co-director of a National Institutes of Health (NIH) Training Grant in Biomolecular Technology, one of only three in California.

Prior to taking up this position she had been director of the UC Systemwide Life Sciences Informatics Program and the UC Davis Biotechnology Program. Among her qualifications are an encyclopedic knowledge of biotechnology research in academia and industry; experience in developing novel biotechnology research, training and education programs; and experience in managing grants programs. She has published numerous

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papers, articles, book chapters, two books on biotechnology, edited two and has a third in progress.

Her personal research experience has been in the areas of disease resistance in plants, scale-up stability for industrial and pharmaceutical production in microbes and microbiological mining. She travels worldwide for the State Department and United States Department of Agriculture on biotechnology science and policy issues and served on the board of Science Foundation Ireland. The UC Davis Academic Federation selected her to receive its 2001 James H. Meyer Distinguished Achievement Award.

She has a Doctor of Science (DSc) degree from the National University of Ireland.

**Roy F. Schwitters** is S.W. Richardson Foundation Regental Professor of Physics at the University of Texas at Austin, where he teaches and conducts research in experimental high energy physics. From its founding in 1989 until canceled by Congress in 1993, he was director of the Superconducting Super Collider (SSC) laboratory in Dallas, TX. Before moving to Texas, he was professor of physics at Harvard University.

Dr. Schwitters has been involved with research in high energy physics and related developments in particle detectors and accelerators for over twenty years. From 1980 until his appointment as SSC laboratory director, Dr. Schwitters was co-spokesman and head of construction for the Collider Detector at Fermilab (CDF) in Batavia, IL. From 1978 to 1989, he was Associate Editor of Annual Review of Nuclear and Particle Science: from 1980 to 1983, he was Divisional Associate Editor for Particles and Fields of Physical Review Letters.

Before joining the Harvard faculty in 1979, Dr. Schwitters was assistant and then associate professor at Stanford Linear Accelerator Center in Palo Alto, CA. He joined Stanford in 1971 as a research associate after receiving his Ph.D. degree in physics from MIT where he also earned his bachelor of science degree in physics in 1966.

Dr. Schwitters is a fellow of the American Academy of Arts and Sciences, a recipient of the Alan T. Waterman Award of the National Science Foundation, and a fellow of the American Physical Society and the American Association for the Advancement of Science.

**Eugene Wong** is known for the extraordinary breadth of his accomplishments in scientific research, academia, the business world and government service. As a researcher, Dr. Wong set new directions in the theory of stochastic processes and database technology. Working with Bruce Hajek, he developed the theory that provides the statistical foundation for processing images and other multi-dimensional data. He also invented 'dynamic re-materialization,' a method that focuses on the distribution of data during query processing.

As chairman of the electrical engineering and computer sciences department at the University of California in Berkeley, he led it to become not only Berkeley's largest

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academic department, but also one of the most globally respected. He also served for two years as vice president of research at Hong Kong University of Science and Technology, where he developed successful and innovative programs in technology transfer and commercialization.

Also a businessman, Dr. Wong was a co-founder of INGRES Corporation, a major database software company and technology leader. He subsequently was chief executive officer of SuperNet, Ltd., a pioneering Hong Kong Internet service provider, and of Versata, Inc., an Oakland, California based publicly traded software company.

In 1990, he was recruited by the U.S. White House to be associate director of the Office of Science and Technology Policy, Executive Office of the President, where he coordinated the effort leading to the Presidential Initiative on High Performance Computing and Communications (HPCC) and the High Performance Computing Act of 1991. In addition, from 1998 to 2000 he served as assistant director of the National Science Foundation and Head of the Engineering Directorate, where he reshaped NSF programs in engineering.

Appendix B  
Meeting Schedules and Participants

	Engineering		Science		Science		Biotech
	<b>Wong/Bloch</b>		<b>Press</b>		<b>Schwitters</b>		<b>Omenn/Newell McLaughlin</b>
<b>Tuesday, April 3</b>	<b>Boar's Head Inn, Patio Room -Reservation under A. Gomez</b>	<b>Tuesday, April 3</b>	<b>Boar's Head Inn, Patio Room -Reservation under A. Gomez</b>	<b>Tuesday, April 3</b>	<b>Boar's Head Inn, Patio Room-Reservation under A. Gomez</b>	<b>Tuesday, April 3</b>	<b>Boar's Head Inn, Patio Room-Reservation under A. Gomez</b>
6PM dinner Wong will not attend dinner	R. Ariel Gomez, Vice President for Research and Graduate Studies Roseanne Ford, Associate Vice President Graduate Studies David J. Hudson, Associate Vice President for Research and Graduate Studies Jeffrey Plank, Associate Vice President for Research and Graduate Studies	6PM dinner	R. Ariel Gomez, Vice President for Research and Graduate Studies Roseanne Ford, Associate Vice President for Graduate Studies David J. Hudson, Associate Vice President for Research and Graduate Studies Jeffrey Plank, Associate Vice President for Research and Graduate Studies		R. Ariel Gomez, Vice President for Research and Graduate Studies Roseanne Ford, Associate Vice President for Graduate Studies David J. Hudson, Associate Vice President for Research and Graduate Studies Jeffrey Plank, Associate Vice President for Research and Graduate Studies		R. Ariel Gomez, Vice President for Research and Graduate Studies Roseanne Ford, Associate Vice President for Graduate Studies David J. Hudson, Associate Vice President for Research and Graduate Studies Jeffrey Plank, Associate Vice President for Research and Graduate Studies
<b>Wednesday, April 4</b>	<b>Rodman Room, Thornton Hall</b>	<b>Wednesday, April 4</b>	<b>Physics, Room 120</b>	<b>Wednesday, April 4</b>	<b>Physics, Room 120</b>	<b>Wednesday, April 4</b>	<b>Physics, Room 120</b>
8-8:45 AM	Barry Johnson, Senior Associate Dean	8-8:45 AM	Peter Brunjes, Assoc Dean for the Sciences	8-8:45 AM	Peter Brunjes, Assoc Dean for the Sciences	8-8:45 AM	Peter Brunjes, Assoc Dean for the Sciences
9-10 AM	Computer Science, Mary Lou Soffa	9-10 AM	Math, Ira Herbst	9-10 AM	Math, Ira Herbst	9-10 AM	Math, Ira Herbst
10-11 AM	Electrical and Computer Engineering, Lloyd Harriott	10-11 AM	Physics, Dinko Pocanic	10-11 AM	Physics, Dinko Pocanic	10-11 AM	Physics, Dinko Pocanic
11-12 Noon	Systems and Information Engineering, Reed Bailey	11-12 Noon	Astronomy, John Hawley	11-12 Noon	Astronomy, John Hawley	11-12 Noon	Astronomy, John Hawley
<b>Noon-2PM Lunch-Rodman Room, Thornton Hall</b>	<b>Rodman Room, Thornton Hall</b>	<b>Noon-2PM Lunch-</b>	<b>Rodman Room, Thornton Hall</b>	<b>Noon-2PM Lunch-Rodman Room, Thornton Hall</b>	<b>Rodman Room, Thornton Hall</b>	<b>Noon-2PM Lunch-Rodman Room, Thornton Hall</b>	<b>Rodman Room, Thornton Hall</b>
	James L. Hilton, The Vice President and Chief Information Officer Colette Sheehy, Vice President for Management and Budget Yoke San L. Reynolds, Vice President and Chief Financial Officer Donald E. Sundgren, Chief Facilities Officer		James L. Hilton, The Vice President and Chief Information Officer Colette Sheehy, Vice President for Management and Budget Yoke San L. Reynolds, Vice President and Chief Financial Officer Donald E. Sundgren, Chief Facilities Officer		James L. Hilton, The Vice President and Chief Information Officer Colette Sheehy, Vice President for Management and Budget Yoke San L. Reynolds, Vice President and Chief Financial Officer Donald E. Sundgren, Chief Facilities Officer		James L. Hilton, The Vice President and Chief Information Officer Colette Sheehy, Vice President for Management and Budget Yoke San L. Reynolds, Vice President and Chief Financial Officer Donald E. Sundgren, Chief Facilities Officer
2-3PM	<b>Rodman Room, Thornton Hall</b>	2-3PM	<b>Physics, Room 313</b>	2-3PM	<b>Physics, Room 313</b>	2-3PM	<b>Physics, Room 313</b>
3-4PM	Richard Gangloff, Material Science	3-4PM	Environmental Sciences, Jay Ziemann	3-4PM	Environmental Sciences, Jay Ziemann	3-4PM	Environmental Sciences, Jay Ziemann
4-5PM	Michael Demetsky, Civil Engineering	4-5PM	Psychology, David Hill	4-5PM	Psychology, David Hill	4-5PM	Psychology, David Hill
	Robert Davis, Chemical Engineering		Chemistry, Ian Harrison		Chemistry, Ian Harrison		Chemistry, Ian Harrison
5-6PM	Pepe Humphrey, Mechanical Engineering	5:15-6:15PM	Arthur "Tim" Garson, Dean School of Medicine	5:15-6:15PM	Arthur "Tim" Garson, Dean School of Medicine	5:15-6:15PM	Arthur "Tim" Garson, Dean School of Medicine
	<b>Rotunda, Lower West Oval</b>		<b>Rotunda, Lower West Oval</b>		<b>Rotunda, Lower West Oval</b>		<b>Rotunda, Lower West Oval</b>
<b>7PM DinnerLower West Oval Room-Rotunda</b>	10-15 Mix faculty-reservation under Phil Parrish	<b>7PM DinnerLower West Oval Room-Rotunda</b>	10-15 Mix faculty-reservation under Phil Parrish	<b>7PM DinnerLower West Oval Room-Rotunda</b>	10-15 Mix faculty-reservation under Phil Parrish	<b>7PM DinnerLower West Oval Room-Rotunda</b>	10-15 Mix faculty-reservation under Phil Parrish
<b>Thursday, April 5</b>	<b>McKim Hall- 3rd Floor Conf Room</b>	<b>Thursday, April 5</b>	<b>McKim Hall- 3rd Floor Conf Room</b>	<b>Thursday, April 5</b>	<b>McKim Hall- 3rd Floor Conf Room</b>	<b>Thursday, April 5</b>	<b>McKim Hall- 3rd Floor Conf Room (Rm 3001)</b>
8-9AM	Pharmacology, Jim Garrison	8-9AM	Pharmacology, Jim Garrison	8-9AM	Pharmacology, Jim Garrison	8-9AM	Pharmacology, Jim Garrison
9-10AM	BME, Tom Skalak	9-10AM	BME, Tom Skalak	9-10AM	BME, Tom Skalak	9-10AM	BME, Tom Skalak
10-11AM	Biology, Doug Taylor	10-11AM	Biology, Doug Taylor	10-11AM	Biology, Doug Taylor	10-11AM	Biology, Doug Taylor
11-12 Noon	Biochemistry, Joyce Hamlin	11-12 Noon	Biochemistry, Joyce Hamlin	11-12 Noon	Biochemistry, Joyce Hamlin	11-12 Noon	Biochemistry, Joyce Hamlin
<b>Noon-2PM-Jordan 2ABC</b>	<b>Jordan Hall, Room 2ABC</b>	<b>Noon-2PM-Jordan 2ABC</b>	<b>Jordan Hall, Room 2ABC</b>	<b>Noon-2PM-Jordan 2ABC</b>	<b>Jordan Hall, Room 2ABC</b>	<b>Noon-2PM-Jordan 2ABC</b>	<b>Jordan Hall, Room 2ABC</b>
	lunch w/ undergraduate students		lunch w/ undergraduate students		lunch w/ undergraduate students		lunch w/ undergraduate students
2-3PM	<b>Jordan Hall, Room 2ABC</b>	2-3PM	<b>Jordan Hall, Room 2ABC</b>		<b>Jordan Hall, Room 2ABC</b>	2-3PM	<b>Jordan Hall, Room 2ABC</b>
3-4PM	Cell Biology, Barry Gumbiner	3-4PM	Cell Biology, Barry Gumbiner		Cell Biology, Barry Gumbiner	3-4PM	Cell Biology, Barry Gumbiner
4-5PM	Microbiology, Tom Parsons	4-5PM	Microbiology, Tom Parsons		Microbiology, Tom Parsons	4-5PM	Microbiology, Tom Parsons
	Neuroscience, Kevin Lee		Neuroscience, Kevin Lee		Neuroscience, Kevin Lee		Neuroscience, Kevin Lee
5:30-6:30PM	<b>Boar's Head Inn (Bistro)</b>	5:30-6:30PM	<b>Boar's Head Inn (Bistro)</b>		<b>Boar's Head Inn (Bistro)</b>	5:30-6:30PM	<b>Boar's Head Inn (Bistro)</b>
	Robert Sweeney, Vice President for Development		Robert Sweeney, Vice President for Development		Robert Sweeney, Vice President for Development - BHI Bistro		Robert Sweeney, Vice President for Development - BHI Bistro
	<b>Boar's Head Inn (Albemarle Room)</b>		<b>Boar's Head Inn (Albemarle Room)</b>		<b>Boar's Head Inn (Albemarle Room)</b>		<b>Boar's Head Inn (Albemarle Room)</b>
<b>7PM Dinner-Boars Head Inn-Reservation under J. Aylor</b>	Robert Bruner, Dean Darden Graduate School of Business Carl Zeithaml, Dean McIntire School of Commerce James H. Aylor, Dean of Engineering Ed Ayers, Dean of Arts & Sciences	<b>7PM Dinner-Boars Head Inn-Reservation under J. Aylor</b>	Robert Bruner, Dean Darden Graduate School of Business Carl Zeithaml, Dean McIntire School of Commerce James H. Aylor, Dean of Engineering Ed Ayers, Dean of Arts & Sciences			<b>7PM Dinner-Boars Head Inn-Reservation under E. Hewlett</b>	Howard K. Kutchai, Professor & Acting Chair Of Molecular Physiology & Biol Phy Lukas K. Tamm, Department of Molecular Phys and Biological Physics  Erik L. Hewlett, Senior Associate Dean for Research Douglas R. Taylor, Professor and Chair, Dept of Biology Mark Yeager, Incoming Chair Of Molecular Physiology & Biol Phy

	Engineering		Science		Science		Biotech
	Wong/Bloch		Press		Schwitters		Omenn/Newell McGloughlin
Friday, April 6		Friday, April 6		Friday, April 6		Friday, April 6	McKim Hall- 3rd Floor Conf Room (Rm 3001)
	Town Center One		Town Center One				
7:30-9:00 AM UVA Research Park (Town Center One Conf Room)	Breakfast and tour at UVA Research Park Tim Rose, CEO UVA Foundation <i>and</i> Robert S. MacWright, Executive Director and CEO UVA Patent Foundation	7:30-9:00 AM UVA Research Park (Town Center One Conf Room)	Breakfast and tour at UVA Research Park Tim Rose, CEO UVA Foundation <i>and</i> Robert S. MacWright, Executive Director and CEO UVA Patent Foundation			8-9 AM	Pediatrics, Robert Chevalier
9-9:45AM	Robert S. MacWright <b>Madison Hall, President's Conference Room</b>	9-9:45AM	Robert S. MacWright <b>Madison Hall, President's Conference Room</b>			9-10 AM	Orthopaedic Surgery, Cato Laurencin
10-11 AM	George Hornberger, Faculty Env. Sciences (on Sabbatical)- VIA Conference Call (510.525.8530)	10-11 AM	George Hornberger, Faculty Env. Sciences (on Sabbatical)- VIA Conference Call			10-11 AM	Physiology, Mark Yeager and Howard Kutchai
11-12 Noon	J. Milton Adams, Vice Provost for Academic Programs	11-12 Noon	J. Milton Adams, Vice Provost for Academic Programs			11-12 Noon	Psychiatric Medicine, Bankole Johnson
Noon-2PM	Lunch w/Graduate Students	Noon-2PM	Lunch w/Graduate Students			Noon-2PM	Internal Medicine, Robert Strieter
2-3PM	Gene D. Block, Vice President and Provost Leonard W. Sandridge, Executive Vice President and Chief Operating Officer. Arthur "Tim" Garson, Dean School of Medicine R. Ariel Gomez, Vice President for Research and Graduate Studies	2-3PM	Gene D. Block, Vice President and Provost Leonard W. Sandridge, Executive Vice President and Chief Operating Officer. Arthur "Tim" Garson, Dean School of Medicine R. Ariel Gomez, Vice President for Research and Graduate Studies			2-3 PM	Neurology, Jaideep Kapur
							<i>Newell McGloughlin to leave Cville at 1:30pm</i>

Updated

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	Topic	Primary	Others
<b>Tuesday, May 8</b>		<b>Teleconference</b>	
	Organization and Control of Centers	Gene D. Block, Vice President and Provost	
<b>Tuesday, May 15</b>		<b>Boar's Head Inn- Lobby</b>	
5:45 PM	Schedule Review	Pace Lochte	
<b>6PM dinner</b>	<b>Dinner</b>	<b>Boar's Head Inn-Tack Room(located on the lobby level) Reservation under Dr. Gomez</b>	
		R. Ariel Gomez, Vice President for Research and Graduate Studies	
		Leonard W. Sandridge, Executive Vice President and Chief Operating Officer	
<b>Wednesday, May 16</b>		<b>Newcomb Hall-Room 481 (434) 924-7215-Dial in for Conference Call</b>	
7:30 AM		Pick up from Boar's Head-Lianne Landers (434) 981-5250	
8-9:30 AM	Development	Robert Sweeney	Charly Fitzgerald, Alison Traub, Karen Rendleman, Davies Bisset, Warren Buford, Tom Jennings
9:30-10:30 AM	F&A Recovery	Yoke San Reynolds	Dave Hudson, Dave Boling
10:30-11:30 AM	Administrative Support for Sponsored Research	Dave Hudson and Michael Glasgow(by conference call)	Gerry Kane
11:30-1 PM		Lunch-UVA catering	
1-2:30 PM	Space Planning	Dick Minturn	Luis Carrazana,Judy Maretta, Richard Allen, Jay Klingel
2:30-3 PM	Break		
3-4 PM	Financial relationship between Medical School and Hospital	Larry Fitzgerald, Jay Scott, Ed Howell, Leonard Sandrige	Brad Haws
4-5 PM	UVA Strategy	Leonard Sandridge and Tim Garson (by conference call)	
5PM	Back to Boar's Head Inn	Lianne Landers (434) 981-5250	
6PM	Dinner	on your own	
<b>Thursday, May 17</b>		<b>Newcomb Hall- Room 481 (434) 924-7215-Dial in for Conference Call</b>	
7:30 AM		Pick up from Boar's Head-Lianne Landers (434) 981-5250	
8-9:30 AM	Budget	Colette Sheehy	Melody Bianchetto, Anda Webb
9:30-10 AM		Break	
10-12 AM	IT Services	James Hilton(by conference call)	Jim Jokl and Mike McPherson(in Person)
<b>12-1 PM</b>	Dean, School of Engineering	James Aylor Lunch will be provided by Take It Away	
1- 2:30 PM	Academic Human Resources,Recruiting Plan and Strategy	Gertrude Fraser	Anda Webb, Milton Adams
2:30-3 PM		travel to Madison Hall-Lianne Landers (434) 981-5250	
<b>3-4PM</b>		<b>Madison Hall-President's Conference Room</b>	
	Close-out Meeting	John T. Casteen, President	
		Leonard W. Sandridge, Executive Vice President and Chief Operating Officer	
		R. Ariel Gomez, Vice President for Research and Graduate Studies	
		Tim Garson, Provost designate	
4PM		Pick up from Madison Hall-Lianne Landers (434) 981-5250	