Report

of

The Washington Advisory Group, LLC

on

Research Capability Expansion

for

The University of Texas System

The University of Texas at Arlington
The University of Texas at Dallas
The University of Texas at El Paso
The University of Texas at San Antonio

Revised May 7, 2004
The Washington Advisory Group, LLC

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# Research Capability Expansion at UTA, UTD, UTEP, and UTSA

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Appendix 1: Scope of Work
Appendix 2: The Washington Advisory Group Team
INTRODUCTION

The Washington Advisory Group (WAG) was engaged by the administration of the University of Texas System (UT System) to examine the research capacities and the potential for expansion at a number of UT System institutions, including The University of Texas at Arlington (UTA), The University of Texas at Dallas (UTD), The University of Texas at El Paso (UTEP) and The University of Texas at San Antonio (UTSA).

In particular, we were asked to review background information provided by the universities as well as information gathered independently, and to visit each of the four for a series of face to face meetings with senior administrators, research active faculty members and others. Based on our review of background information and our interviews, we were then to recommend strategies and tactics for using current resources more effectively, and for significantly expanding their research capabilities. In doing so, we were instructed to be mindful of the current state revenue shortfall and the fact that, even when the economy improves, it is not realistic to expect substantial increases in state appropriations. The Scope of Work is attached as Appendix 1.

This project was undertaken by a team of individuals whose biographical sketches are attached in Appendix 2. While, it was not feasible to assemble a team with specific expertise in each of the research areas covered by the UT institutions, the team members' backgrounds, experience and expertise are sufficiently broad to conduct the reviews and assessments contemplated by the UT System.

The Four Universities

Each of the four UT universities that are the subject of this report aspires to be in the uppermost tier of American research universities. To provide some context for this aspiration, we note that there are roughly 250 research universities in the United States, defined by a joint mission of undergraduate and graduate education linked to fundamental research and scholarly activity in scientific, engineering and other fields.1 Despite numerous stresses, the American research university system by and large fulfills the dual role of training the next generation of scientists and engineers and maintaining the United States in a world leadership position. The success of this system derives, in part, from the following attributes:

- **Science, technology and education are generally recognized as public goods.** There is general recognition on the part of federal agencies2, and, more recently, on the part of state governors and legislatures, industrial leaders, philanthropic foundations, the media, and the public, that fundamental university conducted research and the

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1 In 2001, there were 264 research institutions in the country with at least $5 million in total research expenditures. Source: *TheCenter* at the University of Florida data on American research universities available at http://www.thecenter.ufl.edu.

2 This is evidenced, for example, by congressional initiatives to double the research budget of NIH, NSF, and by support for Defense Department scientific research.
training of scientists, engineers, and managers are important for economic growth\textsuperscript{3}, national security, public health and national prestige.

- **Merit based funding.** By and large, federal research funding, the largest source of research funding, is allocated competitively, based on merit review, rather than directed towards specific institutions.\textsuperscript{4}

- **Departments and focal areas.** Typically programs of education and research in departments that cover all of the basic science and engineering fields as well as interdisciplinary and other new frontier fields located in departments, centers, institutes or other academic structures.

- **Multiple sources of support.** Research is supported by a multiplicity of federal agencies, state governments, businesses, and private non-profit and charitable organizations. This variety of sources reduces vulnerability from an over-dependency on one sponsor. It is noteworthy that federal support for university research has increased each year for the past 25 years. However, the federal share of total research funding in universities has declined from 67\% in 1979 to 58\% in 1999.\textsuperscript{5} During the same period, universities own funds dedicated to research increased from 14\% to 20\% of the total research expenditures.\textsuperscript{6}

- **Mobility of faculty within the system.** It is not uncommon for a faculty member to move from one institution to another one or more times as he or she progresses up the academic ladder. This mobility mitigates inwardness, and brings fresh views to a campus. These advantages outweigh considerations of inefficiency and waste.

- **Competition for outstanding faculty.** Universities often engage in fierce competition for creative and productive faculty members. On occasion, this can lead to high salary offers and support packages and create bad feeling between research institutions. However, it can also promote the careers of the most talented and arguably makes them more productive because of the additional resources that become available to them.

- **Contribution to economic development.** In addition to the traditional mission of education, research and service, modern universities, especially public ones, are expected to contribute to the economic development of the a region and the nation. Among the ways in which they do this are the development of intellectual property and related patenting and licensing activities, incubator operations, and spin-offs of high technology companies.

One of the most important measures of a research university is its level of sponsored research expenditures, and particularly, its level of federal research awards. This is true because


\textsuperscript{4} Politically motivated allocations (“pork barrel” or “earmarked” allocations) represent a small percentage of the total of federal research funding, but are nevertheless troublesome. Information about such allocations is compiled by *The Chronicle of Higher Education* (on-line: http://Chronicle.com/stats/pork).

\textsuperscript{5} National Science Board, *Science and Engineering Indicators 2002*, op. cit., Appendix Table 5-3.

\textsuperscript{6} Id.
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Federal research funding generally is allocated competitively, based on merit review, and therefore awarded to the most meritorious projects. Table 1 below shows levels of total and federal research expenditures for the institutions that occupied the 95th through 105th positions in total and federal research expenditures in FY2001, and comparable data for the four UT universities.

Table 1
Research Expenditures (in thousands) and Rankings of Selected Universities
Fiscal Year 2001

<table>
<thead>
<tr>
<th>Institution</th>
<th>Tot. Research (in 1000s)</th>
<th>Rank</th>
<th>Fed. Research (in 1000s)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of South Florida*</td>
<td>171,550</td>
<td>65</td>
<td>58,826</td>
<td>95</td>
</tr>
<tr>
<td>Rockefeller University*</td>
<td>145,571</td>
<td>80</td>
<td>55,362</td>
<td>101</td>
</tr>
<tr>
<td>Arizona State University – Tempe</td>
<td>118,763</td>
<td>86</td>
<td>56,616</td>
<td>99</td>
</tr>
<tr>
<td>Florida State University*</td>
<td>113,817</td>
<td>90</td>
<td>57,075</td>
<td>98</td>
</tr>
<tr>
<td>University of Alaska – Fairbanks</td>
<td>110,195</td>
<td>93</td>
<td>55,287</td>
<td>102</td>
</tr>
<tr>
<td>University of South Carolina - Columbia*</td>
<td>109,973</td>
<td>94</td>
<td>51,983</td>
<td>103</td>
</tr>
<tr>
<td>Dartmouth College*</td>
<td>109,096</td>
<td>95</td>
<td>69,844</td>
<td>83</td>
</tr>
<tr>
<td>Auburn University</td>
<td>106,347</td>
<td>96</td>
<td>40,097</td>
<td>119</td>
</tr>
<tr>
<td>Tufts University*</td>
<td>105,806</td>
<td>97</td>
<td>71,669</td>
<td>80</td>
</tr>
<tr>
<td>Indiana University – Bloomington</td>
<td>103,960</td>
<td>98</td>
<td>46,712</td>
<td>109</td>
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<tr>
<td>UT Medical Branch - Galveston*</td>
<td>102,722</td>
<td>99</td>
<td>64,682</td>
<td>90</td>
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<tr>
<td>Tulane University*</td>
<td>99,761</td>
<td>100</td>
<td>55,669</td>
<td>100</td>
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<tr>
<td>Washington State University - Pullman</td>
<td>99,302</td>
<td>101</td>
<td>43,989</td>
<td>112</td>
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<tr>
<td>Georgetown University*</td>
<td>99,228</td>
<td>102</td>
<td>93,626</td>
<td>66</td>
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<tr>
<td>Virginia Commonwealth University*</td>
<td>99,180</td>
<td>103</td>
<td>57,315</td>
<td>97</td>
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<tr>
<td>Wake Forest University*</td>
<td>98,343</td>
<td>104</td>
<td>78,021</td>
<td>75</td>
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<tr>
<td>University of Massachusetts - Amherst</td>
<td>97,976</td>
<td>105</td>
<td>49,576</td>
<td>105</td>
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<tr>
<td>Brown University*</td>
<td>91,636</td>
<td>110</td>
<td>58,367</td>
<td>96</td>
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<tr>
<td>George Washington University*</td>
<td>73,805</td>
<td>122</td>
<td>51,757</td>
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<tr>
<td>University of Texas – Arlington</td>
<td>17,486</td>
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<td>9,413</td>
<td>221</td>
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<tr>
<td>University of Texas – Dallas</td>
<td>15,684</td>
<td>227</td>
<td>7,049</td>
<td>244</td>
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<tr>
<td>University of Texas - El Paso</td>
<td>21,889</td>
<td>204</td>
<td>16,167</td>
<td>182</td>
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<tr>
<td>University of Texas - San Antonio</td>
<td>11,331</td>
<td>247</td>
<td>8,012</td>
<td>235</td>
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* Institution includes medical school/specialized biomedical research curricula

Source: TheCenter at the University of Florida data on American research universities available at http://www.thecenter.ufl.edu.

As shown in the table, roughly 100 institutions had total annual research expenditures in excess of $100 million in 2001, and annual federal research expenditures in excess of $56 million. Thus, to be in the top 100 institutions, UTA will have to increase its total research expenditures by $82 million and federal by $46 million over 2001 levels; UTD will have to

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7 TheCenter at the University of Florida data on American research universities, op. cit.
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increase total expenditures $84 million and federal by $49 million over 2001 levels\(^8\); UTEP will have to increase total expenditures by $78 million and federal by $40 million over 2001 levels; and UTSA will have to increase total expenditures by $89 million and federal by $48 million over 2001 levels.

It is important to note that research expenditures at each of the four UT universities have grown since FY2001, the latest year for which comparative data is available. In FY2003, UTA had $23 million in total research expenditures, UTD had $28 million, UTEP had $33 million, and UTSA had $15 million.\(^9\) Of course, it is likely that research expenditures have increased at the top 100 institutions as well. UTA, UTD, UTEP and UTSA all aspire to achieve “Tier 1” research university status. The term “Tier 1” is not defined in any published documents, but it is clear that the UT universities regard $100 million in annual research expenditures as conferring Tier 1 status – a logical conclusion in light of the data shown in Table 1. For purposes of this report, when we use the term, we also define it as $100 million in total annual research expenditures.

The Path to Tier 1 Status

As discussed above, the four UT universities must increase the level of research on their campuses by from $67 to $85 million to achieve Tier 1 status. This will require a tripling, at least, of current research expenditures. It is possible (although unlikely) for a university to reach $100 million in annual sponsored research expenditures by concentrating effort and resources on only a few, narrowly defined, focus areas that are popular with federal funding agencies. But if the basic science and engineering fields are neglected, a university could find itself technically fitting within the Tier 1 definition, but it would not have the stature of national research university and would not serve its community's educational aspirations very well. High ranking research universities also have intellectual breadth not only in the technical fields but also in scholarly fields with few funders, and it is important that the UT institutions not lose sight of this fact.

The four UT institutions that are the subject of this report have different characteristics and are starting at different places as they attempt to achieve their common goal of Tier 1 status. But all share certain challenges. The first is to recruit a large cohort of research active faculty members that are able to generate annual research expenditures of between $67 and $85 million.

One rather crude method for determining how many researchers will be needed to reach these levels assumes that each new recruit will bring in $230,000 in annual research expenditures ($230,000 is the average annual research expenditure for university researchers with at least some federal funding\(^10\)). This $230,000 figure is likely somewhat higher than the current comparable averages at the four UT institutions, but not so much so as to be unrealistic.\(^11\) Calculations using

\(^8\) For reasons that are not explained, TheCenter’s data for 2001 lists UTD’s numbers as estimates (they are unchanged from the year before).

\(^9\) Information provided to WAG by the universities.

\(^10\) Information provided by NSF’s Division of Science Resources Statistics in email communication to Erich Bloch, January 13, 2004 based on 2001 data (the latest year for which NSF has researcher data). The $230,000 average was calculated with research expenditure data that excluded expenditures for clinical research.

\(^11\) While we do not have directly comparable figures for the UT universities, according to data provided to us by those universities, the average annual research expenditures for UTSA faculty members in the Colleges of Sciences and Engineering is approximately $80,000 and for UTD faculty members it is approximately $70,000, while the average for research active faculty members at UTA is $160,000 and at UTEP is $210,000.
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this figure show that the four universities each will need to hire between 300 and 400 additional faculty members to achieve the desired level of research funding. Given the effort and resources that must be devoted to faculty searches in order to identify and successfully recruit quality, research active faculty members, we believe that no more than 30 new research active faculty members can be recruited each year (and maybe fewer), assuming that the space and research infrastructure is available to house them. Purely on the basis of this analysis, then, it would take between 10 and 12 years to recruit the necessary researchers to each campus. And this estimate is likely low – it assumes that the facilities will be available to house the new hires; that each will achieve the $230,000 average immediately upon his or her arrival on campus; and that all the additional FTEs will be fully supported by formula funding of enrollment growth and/or tuition increases. All of these assumptions have uncertainty associated with them.

The calculations described above could be repeated using other reasonable assumptions on dollar volume and timing, but the general conclusions are likely to be the same for all: several hundred high quality researchers will have to be recruited, and the construction and renovation of facilities be staged to accommodate this faculty growth. If there are any delays in hiring and facilities staging, or if funding assumptions are too optimistic, the process is likely to take well over a decade.

Significant new funding will be required to expand the faculties of UT’s institutions. Not only will the universities have to fund FTE slots, they also will have to provide start up packages for new faculty members to equip laboratories, fund post docs in some instances, and provide initial seed funding for research. These packages likely will range from $200,000 to $750,000 or more, depending on the field and seniority of the researcher. Universities also will have to fund new buildings, facilities and equipment.

In addition to the challenges posed by the massive recruiting that must be undertaken, the progress and success of the four universities will depend on how they address the following issues:

- **Strategic Planning.** The development of a realistic strategic plan, with a specific agenda for prioritization of research and education programs, identification of funding sources, and a timetable for achieving the various goals, is of critical importance if an institution is to achieve its goals. The universities’ plans should be developed with extensive input from administrators and faculty, partly because of their knowledge and experience and even more to ensure their buy-in.

- **Identifying Resources to Fund the Growth in Research Capacity.** As mentioned above, the state is not likely to increase significantly its appropriations to the universities, so universities must look elsewhere for the resources to finance faculty growth and the space, equipment and facilities that these researchers will require. In our view, tuition increases represent the only reasonable source of funding for FTE salaries, given the state’s financial constraints. Industry and gifts from alumni and foundations can provide funding for other aspects of growth, including set up costs and facilities, as can tuition revenue bonds (although this would effectively reduce the tuition revenue available for salaries). Some UT institutions are pursuing earmarked funds in an attempt to grow their research capacity. In our view, the use of earmarked funds to support research is not an acceptable or useful long term strategy. It deadens the competitive spirit and undermines the merit review system that is responsible for raising U.S. research universities and their research
accomplishments to a world leadership position. Overplayed, earmarking reduces the performance of researchers and reduces the ability to evaluate their work. Earmarking triggers an angered response from colleagues, and can result in negative reviews of research proposals. Clearly, UT System universities must put their major emphasis on obtaining federal funds by the traditional competitive granting mechanisms as they attempt to expand their research capacity.

- **Competing for Faculty.** The recruitment process for research capable individuals is a highly competitive one and will require significant new resources. Nevertheless, recruiting outstanding faculty is the principal mechanism by which the UT institutions can assure research quality, and the universities must arrange its priorities so that it succeeds in this competition. If an institution is to be able to attract premier faculty, it is especially important that the university’s senior leadership include individuals with knowledge and experience in science and/or engineering research.

- **Research Culture.** Each of the institutions that desires to elevate its research stature must foster a research culture on its campus. It must create an environment in which excellence in research is recognized and rewarded with appropriate incentives and where teaching loads are not excessive to the detriment of research productivity.

- **High Student Enrollment.** For the most part, the institutions we visited had large and growing enrollments, resulting in high student-faculty ratios and heavy teaching loads. The former is frowned on by ranking organizations and students alike, and the latter poses a significant barrier to research productivity. There seems to be growing recognition on the campuses that there should be limits on the size of the undergraduate student body, and that excessive enrollment, especially with low admission standards, can become a losing financial proposition, wasteful of resources and expensive to students and parents.

- **Unproductive Competition Among the Institutions.** During the course of our site visits, we sensed a certain degree of competition, turf fighting and zero-sum gaming among the various public institutions of higher education in Texas, and within the UT System as well. It is important for these institutions to find a way to lessen these unproductive activities.

- **Graduate Students and Programs.** Each of the institutions must find ways to attract the high quality graduate students so important to a university’s research programs. These graduate students are also working scientists and can as much as double their professors’ output. In this regard, we note that the various universities have been thwarted at one time or another in their attempts to develop new Ph.D. programs. We believe universities must be permitted to develop doctoral programs in all fields in which they can be accredited by the appropriate accrediting boards. Departments that lack such programs, in effect, are denied the ability to compete well for new research active faculty members and for research funds and national research standing. To the extent the UT System and the Texas Higher Education Coordinating Board can promote the development of these programs, we encourage them to do so.

- **Research Infrastructure.** Faculty members at all four institutions expressed frustration with the lack of support for proposal preparation, grant administration and accounting, and the like. The vice presidents for research on each campus should
evaluate their research infrastructures and take actions to provide more support to faculty members who are trying to attract external research funding. Such actions should also include the development of incentives to encourage faculty members to apply for grants.

- **National Recognition.** Recognition from peers reflects well on the accomplishments of individual researchers as well as on the quality of an institution. Leading universities have outreach programs that focus explicitly on this issue, and so should the research universities in the UT System.

- **Technology Transfer.** Technology transfer is a forward-looking idea for many research universities. As these institutions increase the level and quality of their research, intellectual property is developed and that intellectual property can result in significant income for the university and its researchers, and it can contribute to the national economy. Although commercialization activities have been modest at the four universities that are the subject of this report, as they ramp up their research activities, they should establish explicit policies to address relevant matters including the granting of licenses, allowable rules for faculty and even students, and allowable commercialization activities. They also should establish effective organizations to deal with these issues.

In an important sense, there will be no winners and losers as these universities progress at differing rates to realize their ambitions. *All will steadily improve as they move forward.*

**Strategic Planning**

During the course of our campus visits, we found that the four UT institutions have not developed realistic or detailed strategic plans, identifying specific priorities for research, education and economic development or metrics and timelines for monitoring progress towards their goals. A lack of such plans will hamper these institutions as they attempt to achieve their overarching objectives.

Each university must articulate its vision and mission before it can undertake the strategic planning process. This is generally done by the institution’s upper administration, through a consultative process that solicits input from the institution’s schools and departments. Once the vision and mission have been articulated, the university can develop a detailed plan defining its goals and prioritizing its strategic objectives: describing the ways in which those objectives will be achieved; identifying the resources that will be used to achieve those objectives, and establishing a realistic timeline for various actions. Finally, the plan should include metrics by which the institution and the System can measure progress.

As these strategic plans are developed, it is of critical importance that the university involve all of its constituents in the planning process, including school and departmental leaders and faculty. This broad participation is important for a number of reasons – it provides the expertise needed to inform the planning process, and facilitates acceptance by the stakeholders of the strategic plan. Without this, universities will not be able to achieve their objectives.
The Significance of Collaboration

Each of the four universities we visited recognizes the importance of forming linkages and partnerships with other research institutions – medical centers, universities, government and private sector research entities, and with each other. These interactions can be mutually beneficial in several ways: many frontier fields are multidisciplinary and require contributions of human and facility resources not found in a single institution; many government projects are of a magnitude and complexity that call for teaming. And for universities in an expansion mode that are developing new strengths, they can find mentors in other institutions. The biomedical fields present special opportunities because there are renowned medical centers in Texas that recognize the advantages of joining forces with the basic science and engineering departments of universities. (It should not escape anyone's notice that the National Institutes of Health has become the most important financial supporter of research at American universities.)

We were particularly impressed with the extraordinary possibilities of research collaboration in the Dallas Metroplex region. The trio of UT institutions there – UTD, UTA and the University of Texas Southwestern Medical Center at Dallas (UTSWMC) – are in close proximity, and already are working together at the intersection of science, engineering and the biomedical fields. Together they can become a powerful force for organizing and mounting major research projects that are very competitive nationally. The three institutions, together with the UT System administration, should put in place a 5-year joint strategy focus in engineering and science, including the biomedical sciences. The joint strategy should include a mechanism for frequent status meetings attended by the deans of the schools involved, as well as a mechanism for frequent face to face dialogue between faculty members at the three institutions.

Role of the UT System Administration and Texas Higher Education Coordinating Board

The state authorities that administer higher education in Texas (including both the UT System and the Coordinating Board) have an opportunity to make a real difference for the UT institutions as they pursue Tier 1 status. The following actions all would help enhance research performance at those universities:

- The Coordinating Board should permit universities to undertake doctoral programs in all fields for which they can receive official recognition from a respected accrediting board. We cannot stress enough how important this is. Without such qualification, a department is, in effect, denied the ability to compete well for new, high quality researchers and research funds, and the ability to achieve higher research standing.

- The UT System and its constituent universities should participate in discussions and develop policies addressing the issues of undergraduate enrollment growth and admissions standards.

- The UT System should foster communication between universities and develop incentives for collaborations (research and programmatic) among the institutions. Communication and appropriate incentives can facilitate cooperative ventures which can accelerate a university’s rise in stature.

- The UT System does not appear to have a uniform sabbatical leave program, and faculty members on campuses we visited would like to see one instituted that is similar to the one at UT Austin. Sabbatical or paid leaves should be supported on all campuses, as they are at most high ranking research universities.
The universities’ upper administrations should include individuals who collectively, have the background and expertise in science or technology to address and develop the universities’ research and education missions and initiatives. This is important not only to the functioning of a university and the allocation of its resources, but also when competitively recruiting large numbers of new faculty in the scientific and technological fields. The UT System plays an important role in assuring appropriate balance through its involvement in presidential searches. Although leadership searches on the campuses (at the provost or dean level) should be the primary responsibility of the individual presidents, consultation with the UT System administration on these searches is recommended. This would allow the System to help ensure that appropriate individuals for these important positions are identified at an earlier stage.

In light of the massive recruiting effort that will be undertaken over the decade at each of the four institutions that are the subject of this report, the UT System should consider actions that it can take to help these institutions recruit the highest quality faculty members. These might include:

- Mounting workshops for search committees to expose committee members to best practices in faculty recruiting;
- Following up with campuses to see how well recent recruits are performing; and
- Encouraging the establishment of blue ribbon search committees with external members that can provide advice on searches for deans, endowed chairs and other high profile positions.

The UT System can also provide some central support to help faculty members with their grant proposals. For example, the System might sponsor workshops on proposal writing; provide support in identifying funding opportunities; and, on occasion, hire a consultant to review proposals, especially large ones, before they are submitted to a federal agency.

Throughout this report, we recommend that the four UT institutions develop sound, realistic, and achievable strategic plans. For these plans to yield results, however, goals must be stated explicitly and metrics must established to permit measurement of progress and accomplishment. The UT System should ensure that appropriate metrics are articulated and it should judge institutional performance against those metrics, especially as the institutions recruit large numbers of new research faculty in their pursuit of research eminence. As the UT System develops research metrics, we believe it should adopt a relatively broad definition of research awards – one that encompasses peer reviewed awards for projects, equipment and student support designed to contribute to the creation of new knowledge. For example, in addition to the traditional individual and center research projects, we believe the following activities should be included in such a definition:

- awards to support undergraduate and graduate students as research assistants;
- infrastructure and facility awards supported by government agencies to maintain U.S. leadership in science and technology;
- evaluative research dedicated to testing research results to validate or nullify research hypotheses; and
• data collection and field sampling that are critical elements of social and environmental science.

This type of definition would recognize the different styles and modes of research and scholarly activities undertaken across the science, engineering, humanities and social science fields. All of these contribute to the generation of new knowledge and understanding.

Evaluation of the Individual Institutions

We were asked specifically not to compare the four UT universities that are the subjects of this report, and as a result, we have not done so. The following sections of this report examine each institution's strengths and weaknesses as centers of research; review any special opportunities presented; assess the resources required for improvement and the potential for securing them; and evaluate the feasibility of the universities’ own plans. Our general conclusions and recommendations for the universities are presented at the end of the applicable sections, while recommendations specific to individual schools and departments are in the subsections dealing with those schools and departments.
THE UNIVERSITY OF TEXAS AT ARLINGTON (UTA)\textsuperscript{12}

The University of Texas at Arlington (UTA) has had a succession of names, affiliations, ownerships and assignments over its 109 year history, and it has evolved into a large, broadly based, university offering educational opportunities in all the key fields of the liberal arts, humanities, sciences, and engineering. Over the past 30 or so years, the University has applied for and received approval to create 30 doctoral programs in many of these fields. Today, it is the only university in the UT System other than UT Austin that has achieved Carnegie Doctoral Research Extensive status. UTA now aspires to Tier 1 research status as well – that is to say, $100 million in annual research expenditures.

The next decade will be critical in determining whether UTA can achieve this goal. Despite the breadth of its coverage of research fields, only 114 out of 531 tenure and tenure track faculty (21\%) and 28 non-tenure track faculty are research active.\textsuperscript{13} As a consequence, UTA’s annual research expenditures ($23 million in 2003)\textsuperscript{14} are among the lowest of the country’s Doctoral Research Extensive public universities.

University Leadership

UTA – in the midst of a leadership change – is at a crucial cross roads. The new President, James Spaniolo, arrived on campus on February 1\textsuperscript{st}. He was preceded by an Interim President who served for roughly a year, and before that by President Robert Witt. President Witt was primarily focused on reversing enrollment declines the University had experienced in the mid-90s, and dealing with the resulting financial crisis that those declines created. He gradually restored enrollment levels and left the University in 2002, along with many in his upper administration. The Interim President, Charles Sorber, has done an admirable job in raising morale and aiming the University in the right direction to raise its research stature, but much remains to be done if UTA is to become a Tier 1 research university.

The recent instability in the University’s leadership and the financial crisis UTA experienced has adversely affected morale among the faculty. One of the first things UTA’s new President will have to do is to fill permanently the positions of the Provost and Vice President for Research. The individuals currently in these positions are serving on an interim basis. The interim Provost is widely respected by the faculty and we were impressed by both of these officers. If they, or other well respected senior administrators, were to leave the University at this point, their departures would prove quite unsettling for the faculty, and would set back the institution’s efforts to enhance its research stature. In this regard, we note that the Dean of the College of Science, also very well respected on campus, will be leaving UTA for a new position. There is a very real danger that the resulting uncertainty may lead to an exodus of good, young faculty (a process that has already begun in the Department of Biology). The fact that President Spaniolo, in one of his first actions, extended the appointment of his interim Provost for 18 months is a positive development.

\textsuperscript{12} This section of the report includes information that was provided to us during the course of our campus meetings. Where facts are given without citing to a particular document, that information was given to us orally during the course of those meetings.


\textsuperscript{14} Id.
Research at UTA

Because of the many leadership changes at UTA in recent years, the University does not now have a coherent research strategic plan. If it is to move up in the rankings, the new President must develop such a plan as quickly as possible, and the process should involve faculty in addition to the University’s senior leaders. The plan must address issues such as how to increase and improve research capacity, how to identify and prioritize growth initiatives, and how to fund the growth in faculty and related facility needs. In addition, the plan must address issues related to student enrollment – the quality of the students admitted and the extent to which enrollment growth should be limited. The development of this plan will take some time, and getting the process started should be one of the new President’s first priorities.

Despite the understandable lack of a true strategic plan, the University’s interim leadership has developed a coherent approach to growth and improvement in research capacity, capability and impact. This appears to have been done with faculty participation, and their “buy in” was evident during the course of our meetings. In essence, the University intends to build on certain major research thrusts that already exist on campus:¹⁵

- Nanotechnology and materials research
- Automation Research and Robotics Institute (ARRI)
- Research relevant to the Texas Manufacturing Assistance Center
- Research related to transportation, planning, design, construction, maintenance and operation of transportation facilities through the Texas Department of Transportation (TxDOT) Cooperative Research Program
- High energy physics

UTA is a broadly based university with some strength (albeit uneven strength) in all of the basic science and engineering fields. UTA’s status as a Carnegie Research Extensive university puts it in good position from which to pursue higher national status. Its proximity to UTD also provides it with an advantage. Both UTA and UTD are building quality research programs in materials science including nanotechnology and other areas of chemistry and physics, and in electrical engineering and computer science and engineering. The proximity of these two institutions creates obvious opportunities for partnership. In addition, the Dallas-Fort Worth Metroplex is home to one of the best health science institutions in the country, the University of Texas Southwestern Medical Center at Dallas (UTSWMC). The combined strengths of these institutions are formidable and joint activities should be encouraged. The trio of institutions has the potential to secure funding for sizeable projects of the type frequently initiated by federal mission agencies. There is little evidence at this point of significant collaborations between UTA and UTSWMC or UTA and UTD. Significant collaborations may require a change in mind set and, as discussed in earlier sections of this report, we recommend that the three institutions develop a 5 year joint strategy focusing on engineering and science, and the biomedical sciences.

UTA, like its sister institutions in the UT System, aspires to reach the level of $100 million in annual research expenditures. This will require that it more than quadruple its current research expenditures (which were $22.9 million in 2003).¹⁶ We generally were favorably

¹⁶ Id., p. 17
impressed by the quality of the faculty with whom we met and by the breadth of their research and teaching. This raised an obvious question: if the faculty members are so good, why aren't their departments better regarded and better funded for their research?

The answer, which we do not claim to understand in detail, surely is rooted in the complex history of the institution. We have little doubt that the transition in attitude and expectations from a broadly based teaching institution to a modern, competitive research university largely has taken place. However, other factors such as turnover in University leadership, instabilities in overall enrollment, and financial pressures have stunted the emergence of UTA as a potential Tier 1 research university. Perhaps even more significantly, while enrollment levels were 4% higher in 1990 than they were in 2002, faculty levels were 12% higher. Thus, at a time when UTA is trying to become more research active and generate larger amounts of sponsored research funds, the size of its faculty is smaller than it had been. This, presumably, is resulting in higher teaching loads – a situation that is inconsistent with increasing research productivity, and is also resulting in a high student/faculty ratio.

UTA’s Interim Vice President for Research presented to us an interesting study on faculty size and research support based on experience at 73 doctoral research extensive public universities without affiliated medical schools. His results show a correlation between research support per faculty member and the overall student/faculty ratio, with more than a three-fold increase in support for a reduction in student/faculty ratio by one-half. The present size of the UTA faculty is 531, of which 142 are considered research active. Scaling in various ways, the Interim Vice President’s analysis suggests that if UTA doubles the present faculty size, while fixing enrollment of 25,000, and eventually moving to a fully research qualified faculty, UTA will be able to reach $100 million a year in research expenditures. This analysis assumes that the current level of research awards per research active faculty member of $175,000 would be achieved by the faculty. We note that the national average total research expenditures for researchers who have federal grants is $230,000 per year. Using this figure, the number of faculty members that would be required to generate $75 million in research expenditures (the approximate difference between UTA’s current research expenditures and $100 million), is 325. Whether the number of additional faculty members UTA will need is 530, as suggested by the Interim Vice President’s analysis, 325, or some other number, UTA’s major challenge will be to recruit, support and house the necessary individuals.

As described earlier in this report, the level of an institution’s sponsored research programs is one major criterion by which it is rated. Another is the quality of its undergraduate students. Continuing pressure to increase undergraduate enrollments can eventually impact the quality of both education and research programs on a campus. When students delay graduation because they are under-prepared or must work, the expense to them and their families rises. During the course of our conversations with UTA’s administrators, we found them ready to address the policy issues of raising admissions standards and limiting enrollment growth.

It is clear that UTA must increase substantially the size of its faculty to keep pace with its teaching responsibilities, to say nothing of expanding its research. This will require significant

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17 In 1990, the total student headcount was 24,783 and the total tenure and tenure track faculty size was 594. In 2002, those numbers were 23,821 and 529, respectively. Source: Information provided to WAG by UTA.
18 The Interim Vice President for Research told us that, while the current student/faculty ratio is 40:1, the minimum requirement for a research university is 25:1, and most top-tier universities have ratios on the order of 10-12:1.
new sources of funding. The UT System has stated that “it is not realistic to expect substantial increases in state appropriations” and “…additional distributions from the PUF [are] unlikely in the short term.”\textsuperscript{19} This leaves enrollment growth, tuition increases, industrial and philanthropic contributions, and sponsored research grants as the major resources of funding available to UTA.

1. \textit{Student Generated Income.} UTA’s student body has grown substantially over the past several years, and there is pressure for enrollment to grow even further. So long as the state continues to fund universities based on their student contact hours, enrollment can lead to funding increases, although perhaps not to the extent necessary to cover the costs associated with the enrollment growth. We are concerned that, in the present fiscal climate, the level of this funding stream cannot be counted on, and, in any case, too large an enrollment may cause the quality of teaching and research to suffer. In a climate of fiscal stringency in the state, tuition increases are a one of the few potentially large sources of new funds available to UTA and, for that matter, to most of the other public universities in the country.

2. \textit{Industrial Support.} UTA’s current levels of industrial support are modest at best and must be raised. During our campus visit, we met with industry representatives who appeared to be midlevel corporate officers. These individuals are at an appropriate level for project-oriented cooperation. We hope UTA also has relationships with individuals at the highest levels of industry to deal with mutually important strategic issues.

3. \textit{Philanthropy.} UTA has been deficient in philanthropic fund raising. In its 109-year history, the institution has never mounted a capital campaign, and its annual fund drive yield is small. Little has been done to solicit gifts from UTA’s 110,000 alumni. UTA’s Development Office has assembled an outside development committee consisting of well-positioned UTA alumni who are interested in helping UTA. However, raising substantial funds from alumni and non-alumni philanthropists is a slow process and it is likely to be five years or longer before substantial funds can be raised. This will slow the University’s progress to Tier 1 status. Nevertheless, a start must be made and UTA has begun.

4. \textit{Federal and Other Sponsored Research.} UTA’s current level of sponsored research is not high, and the average annual research award of UTA’s research active faculty members is only about $175,000 per year. UTA will have to look towards its new hires as the basis of success or failure in securing federal and other research grants. Federal agencies in general, and NIH in particular, are the largest source of research funding of successful research universities. Until this year, only one substantial NIH research grant had been received by a UTA faculty member. According to the Interim Vice President of Research, some 10-15\% of UTA’s research support comes via the earmarking process which can be useful, especially for construction and instrumentation purposes. However, obtaining earmarked funds to support research is not an acceptable or useful long-term strategy. Clearly UTA must put more emphasis on obtaining federal funds by the traditional granting mechanisms and from the traditional granting agencies in order to achieve significant growth.

UTA has a distinctive head start at significantly improving its research standing in some fields, since it begins its campaign as a Carnegie Doctoral Research Extensive institution. This

\textsuperscript{19} Request for Proposal: Consulting Services Related to Research Capability Expansion for The University of Texas System (RFP NO. AA062003), The University System of Texas, June 6, 2003, p. 15.
achievement should translate into know-how in identifying and recruiting research active faculty, particularly in the areas of UTA’s existing coverage – almost all the basic disciplines of the physical sciences and engineering (but not necessarily in the biological sciences). Given UTA’s history as a broadly based teaching university, its standing in the community that derives from carrying out that teaching role well over many years, and its more recent strides toward becoming a research-centered university, the prospects for substantial improvement in UTA’s standing are positive. However, effective leadership and sustained continuity of purpose will be essential.

UTA’s Academic Units

COLLEGE OF SCIENCE

UTA’s most direct and practical way to enhance its research standing is through strengthening and growing the existing departments in its College of Science. At present, this College contributes 22% of the University’s total research awards, and 40% of its tenure and tenure track faculty are research active. This ratio is relatively low compared to top tier research universities.

The University’s history as a broad based teaching university has endowed these departments with the depth to serve as foundations for growth and excellence in research. The reductions in faculty size over the past decade (we were told that 24 positions were lost) and increases in undergraduate enrollment, and the fact that these departments are already largely research qualified, justifies sensible growth in faculty positions in this College. Indeed, some of its departments – Chemistry, for example – are close to becoming sub-critical in size and risk losing the excellent people that are already onboard.

New vitality in biological science and initiatives that could bring broad segments of the College into collaboration with UTSMWC appear to be particularly good targets for investment. One could imagine, for example, expertise in chemistry, mathematics and physics being brought to bear on instrumentation, detection, analysis and imaging technologies that could be of great common interest and benefit.

Research in nanomaterials is one of UTA’s priorities, as it is at many universities and research centers across the country. This is probably a necessary investment, but the competition in this area is very strong. Recruiting a Welch Chair in the Chemistry Department to help lead this effort will be important to the development of the Nanotechnology Research and Teach Facility. The recent recruitment to the Physics Department of a young experimenter working in magnetic nanomaterials appears to be an excellent move.

Other popular and competitive research areas where there is good potential for growth include grid computing and numerical simulations of physical systems. These areas involve collaborations between the Physics, Mathematics and Engineering Departments, as well as with outside institutions and national programs (e.g. LambdaRail). Finally, geology and environmental science with an emphasis on the north-Texas region is of potential interest to students, both undergraduate and graduate, and has important research potential.

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21 The Total Number of Tenure and Tenure Track Faculty by Department for Fall 2002, UTA Office of Research.
The Department of Biology has 23 tenure and tenure track faculty members although 4 of these hold administrative positions, effectively leaving 19. These individuals must deal with 1,500 undergraduate majors (out of a total of 2,200 in the College of Science) and 85 graduate students, 23 of whom are Ph.D. students. Although there are 5 non-tenure track instructors to help with teaching, the teaching load is heavy; many faculty teach 3 courses each semester (3+3) and sometimes 4.

This Department needs to be greatly strengthened. In recent years, the number of research faculty members has declined, and morale has suffered. Four good young faculty members with research support left in recent years for the University of Iowa, Texas A&M, Oregon State, and Indiana. Fortunately, a new chairman has been appointed who has the respect of the Dean and the faculty, and he has moved to rebuild the Department. Four promising young faculty members have been hired in the past two years, and two more hires are slated for next year.

Despite heavy teaching loads in the Department generally, the Department has been able to provide new research faculty members with a 1+1 load for their first two years. However, over the next five years, a number of faculty members are due to retire, and others may fail to achieve tenure. The individuals most likely to depart are carrying heavy teaching loads. The new chairman estimates that the Department must increase the total number of research active faculty to 30. In our view, in light of the Department’s heavy teaching obligations, that number should be closer to 50, which still would leave a student faculty ratio of 30:1.

On the positive side, the Department’s recent hires are well trained, enthusiastic and optimistic, and believe they can flourish at UTA with new leadership. They have grant support, mostly from NSF. However, faculty members’ current research strengths are in traditional fields such as systematics, ecology, evolutionary biology – areas outside of “modern biology” that attract very little NIH support. There has been recent interest in building research capability in genomics and some of the Department’s new hires are in this field, but while this is a very good move that should continue, these individuals tend focus on comparative and evolutionary genomics. It will be important that future hires in genomics focus on molecular, cell and developmental, or neurobiological related areas, which are not only cutting edge fields, but also where NIH support is available.

The Department’s current faculty appears satisfied with the research infrastructure, particularly in electron microscopy and confocal microscopy. But these individuals do not have as much need for other modern instrumentation as will new recruits who do more cellular and molecular research. The creation of the Emerging Biotechnology Center which will have equipment and services to support cutting edge and interdisciplinary research, including genomics, proteomics, computational biology, and bioinformatics, etc. is a very significant step towards satisfying these needs. However, the funding of this center is in part dependent on a pending federal earmark proposal, the outcome of which is not yet certain.

As with all other departments, Biology must increase the quality of its graduate students which this will require increasing the number of research and teaching assistantships, increasing stipends, and developing better recruiting.

In summary, the Department of Biology at UTA has enormous needs in terms of faculty members and facilities. According to the Dean, only 3 of its 23 faculty members have grants.
The Department must expand its research horizons significantly as discussed above. In addition to the inherent importance of modern biological research, the predominant source of biomedical research funding is the NIH and little of the current research in the Department falls into the major NIH funding areas.

**Department of Chemistry and Biochemistry**

The Department of Chemistry and Biochemistry has 14 tenure and tenure track faculty, down from its "normal" size of 18 to 20, which it had in the early 1990's. The decrease is attributed to a university-wide hiring freeze that was in place during the previous administration. The Department is now recruiting for two assistant professor positions and one senior position which will be assigned to a Welch Chair, the only such endowed position in the College. The holder of the Welch Chair is expected to take a major leadership role in the College’s Center for Nanostructured Materials. The Department's long-held goal is to have 25 tenure and tenure track faculty members, a reasonable number for such an important field that contributes so much to materials science and modern biology.

All faculty members except the Department Chair (who has been funded in the past) have research funding. The FY2003 average total of research awards per faculty member was $101,000. The Department expects all of its faculty members to secure research grants. Their major sources for research funding are NSF, NIH, DOE, and the Welch Foundation. Typical teaching loads are 1+2.

Our impressions of the quality of this Department’s faculty, and of their energy, breadth of research interests and commitment to research, are positive. Their focus areas are in materials chemistry, molecular recognition, and nanostructured systems; synthetic chemistry; solar energy research; and cancer research. All of these present particular opportunities for expansion and external sponsorship in view of the current national interest in them, and the faculty resources devoted to them. The most critical issue the Department faces relates to its size – faculty members worried that the Department could soon diminish to sub-critical size, and without a continuing and credible recruiting/growth plan many of its excellent young faculty will be lured elsewhere. Furthermore, the faculty already has difficulty in covering its necessary course offerings. The Department Chair told us that the very high student/faculty ratio is one of his biggest problems.

**Department of Geology**

This Department of 7 faculty members (all tenured) is of sub-critical size. It is the only department in the College of Science that lacks a doctoral program, and in 2002, it had research awards of just $130,000. The faculty includes one of the world's leading experts in creating maps and computer animations of the positions of continents and oceans over the past 500 million years related to plate tectonic processes. It also includes an outstanding, well funded, recently hired faculty member in the important field of chemical hydrogeology. We suggest the Department be given the opportunity to submit a staged plan outlining future growth in student enrollment, high opportunity research areas such as environmental earth sciences, initial resources needed to pursue this path, and sources of external research support that might become available. Failing this it is difficult to divine a possible future for the Department.

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22 Advancing Research at the University of Texas at Arlington, op cit., p. 10.
23 Awards and Source of Funding by Department, UTA Office of Research, August 29, 2003.


Department of Mathematics

The Department of Mathematics has 24 tenure and tenure track faculty members, 10 lecturers, 26 graduate teaching assistants and 25 to 30 part-time teachers to cover its large teaching responsibilities. The faculty teaching load is 2+2. Essentially all tenure and tenure track faculty members are research qualified, in that 80% of them have grants (including all of the assistant professors). One of the Department’s key strengths is the diversity of research interests of its faculty. There is a core group involved in "pure" mathematics research – geometry and algebra – and a substantial number in applied mathematics involving statistics and mathematics applied to simulation and modeling.

The Department is critically constrained because of its small faculty size, and the 100 undergraduate majors, 25 Ph.D. students, and 6,000 students in math classes that it must teach. We were told that a lack of a critical mass of researchers was responsible for the recent departure of a well-regarded faculty member.

Department of Physics

The Department of Physics has 16 tenure and tenure track faculty. It is presently searching for a new departmental chair (the tradition at UTA is to hire senior researchers from outside the institution to be the permanent departmental chairs). Fifteen faculty members have research funding (12 from federal sources, 3 from the Welch Foundation); the single faculty member not currently funded has been a strong researcher who now is focused on teaching. With $2 million per year in annual research expenditures, the average FY2003 research award per faculty member was $104,000. All members of the Department publish regularly. The Department’s philosophy for continuous improvement is to demand that any person they promote would be capable of being promoted at a Tier 1 university.

The teaching load for faculty members in Physics is 1+1. UTA resources support a mechanical shop with two permanent machinists and two part-time technicians. This shop is used extensively by departmental researchers and is a conspicuous "in-kind" contribution by the University that benefits UTA faculty in grant competitions, as well as in their research efforts.

The Department’s major research group is engaged in experimental high energy physics. The group has wisely concentrated on large international collaborative efforts at frontier accelerator facilities in the U.S. and Europe. It is involved in an operating experiment at Fermilab in an experiment under construction at the CERN laboratory in Geneva, Switzerland which begins in 2007, and it plans for a future international linear collider that may be built sometime after 2010. The UTA group has made effective use of its past experience in constructing particle detectors and the research infrastructure of the Physics Department to find productive, albeit relatively small roles in major international collaborations.

A second focus of the high energy physics group is grid computing. The large analysis efforts required for the Fermilab and CERN experiments rely on grid computing, and UTA’s physics group is collaborating with faculty in the Department of Computer Science and Engineering and has received a NSF MRI (Major Research Instrumentation) award to support this work.

Another important area pursued by physics faculty members is condensed matter science, both experimental and theoretical. The Department’s most recent faculty hire is taking a national leadership role in the emerging area of magnetic nanomaterials.
The Physics Department impressed us as being well positioned for substantial growth in research capacity and stature because of the quality of its faculty and the fields it has chosen to emphasize. The Department presented us with a thoughtful and realistic strategic plan for a five year program of growth and improvement. In this plan, it seeks 50% growth in the number of faculty members, based on present research strengths with continuing developments in nanophysics and grid computing, and increased collaboration in UTA biotechnology and engineering programs.

Department of Psychology

This Department seems to be thriving and on the upswing. It has an effective chairman who has built a good department that continues to improve in both size and quality. It has 17 tenure and tenure track faculty members who, for the most part, are research active. It also has 400-500 undergraduate majors and approximately 60 graduate students; 25 M.A. and 35 Ph.D. students. Faculty teaching loads are generally 2+2, but new hires teach 1+1. The Department recently made 3 new appointments, 2 of whom are senior, productive researchers who are well funded. A third recruitment of a senior faculty member (from UTSWMC) is being processed.

Six of the Department’s current faculty members have significant research support, a total of $2.5 million in awards at present, including NIH and NSF grants, and when all of anticipated new recruits arrive, this total will grow to around $10 million. In addition, in collaboration with colleagues at Cornell University and Claremont College, faculty members in this Department have applied to the NSF for a Center of Science of Learning grant. If this application is successful, it will bring about $10 million to the Department over 5 years. While this success is by no means assured, the application, together a number of individual grant applications that are in the works, demonstrate that the faculty members are actively pursuing sponsored research funding.

The Department’s research strengths are in several areas of cognitive, social, and behavioral psychology, personality studies, learning and memory (including false memory), and pain, including neuroscience aspects of pain. The Department has been quite traditional. For example, there is little or no brain imaging going on right now (an important area in cutting edge neuroscience) although several faculty members are interested in this approach.

The neurosciences presents a real opportunity for growth, and the Department is attempting to capitalize on this opportunity. It currently has 2 neuroscientists and its new senior appointment from UTSWMC has an interest in neuroscience of pain. Additional hires are anticipated in this area. The fact that this Department is in the College of Science (which is not always the case in research universities) facilitates interactions with the Biology Department and others in the College as well as with the College of Engineering. For example, we were told that there is interest in neuroscience in the Departments of Mathematics, Physics, and Computer Science. Thus, this field could become an important area of interdisciplinary research at UTA, and one in which collaborations with UTSWMC could be developed.

We believe this Department has a good chance of becoming a nationally recognized Department of Psychology if it continues its development and adds several additional research active faculty over the next 2 to 3 years.
Recommendations for the College of Science

1. No university today can aspire to first tier research status without a first class biology department. The University must increase the number of research oriented faculty members in its Biology Department, and it must cover a broader array of cutting edge fields in modern biology. We recommend recruiting in fields that are well supported by NIH such as molecular, cell and developmental biology, and/or neurobiology and related fields which also are the cutting edge of science.

2. Without a University strategic plan, it is difficult to comment on resource planning, but our impression is that every department in College of Science needs to grow. The Dean believes a 50% growth in the faculty (50 individuals) is needed if the College is to contribute $50 million in annual research expenditures. As discussed earlier, we believe this number is on the low side.

3. The Department of Psychology should consider submitting an application to the NIH for a training grant. The Department is sufficiently strong and its research program sufficiently coherent to develop a very competitive proposal. Psychology, like every other department, has difficulty in attracting and supporting good graduate students. An NIH training grant could be of great help and provide a model that other departments could strive to emulate.

COLLEGE OF ENGINEERING

This College is active and up-to-date in its research and is central to the comprehensive nature of UTA in terms of the variety of degree programs it supports and the range of research efforts it sustains. Its enrollment in the fall of 2003 was 4,159 students, including 2,088 undergraduate and 2,071 graduate students, 18% of whom are enrolled in the Ph.D. program. It has 10 different Ph.D. programs, and in 2003 awarded 20 Ph.D.s. The College has 5 academic departments (the Departments of Civil and Environment (CE), Computer Science and Engineering (CSE), Electrical Engineering (EE), Industrial and Manufacturing Systems (IMS), and Mechanical and Aerospace (MA)) and two academic programs in Biomedical Engineering, and Materials Science and Engineering. It also has over 35 research centers and groups, including the Automation and Robotics Research Institute (ARRI), and the Nanotechnology Research and Teaching Facility (NanoFab).

The College has 108 tenure and tenure track faculty members and 20 full-time non-tenure track faculty members. Of those, we were told that 44 are research active, producing annual research expenditures of $8.8 million as of fall 2003. This results in an average of $81,480 per faculty member. These levels are well below the average research expenditures per faculty member for highly ranked engineering programs, public or private, and this disparity is indicative of the development effort that will be required to bring UTA engineering up to parity with Tier 1 research institutions.

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24 Overview of the College of Engineering, presentation by Dean to WAG, December 16, 2003, pp. 8 and 9.
25 Id., p. 4 and 10.
26 http://www.uta.edu/engineering/research.php.
27 Overview of the College of Engineering, op. cit., p. 5.
Department of Computer Science and Engineering

CSE has 24 tenure and tenure track faculty members, and 1,166 enrolled students, including 520 graduate students (439 MS students and 81 Ph.D. students). It offers undergraduate programs in Computer Science and Engineering, Computer Science, and Software Engineering. It also offers MS and Ph.D degrees in Computer Science and Computer Science and Engineering.

This Department has shown significant initiative in developing programs, and its active research grants amount to $8.32 million. The Department has developed a research plan that aims to improve research performance so that it becomes one of the top 25 Computer Science and Engineering programs in terms of research, academic excellence, and recognition. Since the fall of 2000, this plan has helped draw in $2 million support, and has resulted in a 40% increase in the size of its tenure track faculty.

The Department has demonstrated strength in database and information technology, embedded systems, high performance computing, intelligent systems, software engineering and telecommunications and networking. Also, it has shown recent strength in multimedia and video processing and pervasive computing. These areas are funded at modest levels by both federal, state and industry sources. Considering the Department’s existing strengths, and local and national needs, possible areas for future focus are in bioinformatics and security. CSE faculty members are enthusiastically working towards meeting the Department’s “Top 25 Initiative” goal and we believe it has the momentum and collective energy to accomplish this goal.

Department of Electrical Engineering

This Department has 32 tenure and tenure track faculty members, and its fall 2003 enrollment was 1,237. Of these, 749 are graduate students, including 123 doctoral level students. CSE and EE together accounted for 58% of the Fall 2003 enrollment of 4,159 in the College of Engineering and 48% of the tenure and tenure track faculty. The Department’s total research activity is $4.4 million, little more than half of that CSE for almost the same number of tenure and tenure track faculty.

The faculty’s research subject matter indicates an imaginative approach. For example, Department researchers are doing work on “smart skin” – micro infrared sensors, laser machined installed on flexible substrates that have demonstrated imaging capability mimicking human skin – that is sponsored by NSF and the Army Research Office. Other activities include DSP (Digital Signal Processing) and image processing, remote sensing, and power electronics. VLSI (Very Large Scale Integration) and semiconductor devices is another field of activity. When augmented

29 Overview of the College of Engineering, op. cit., pp. 5, 8, and 9.
30 Id., p. 12.
31 According to information at http://www.cse.uta.edu/About/Top25.asp, “The National Research Council, in its most recent rankings (March 2000 issue of Computing Research News), ranked CSE@UTA in the "36 and below" category.” The rankings are based on information collected in the 1995 NRC assessment of research and doctorate programs in the U.S.
33 Overview of the College of Engineering, op. cit., p. 8.
34 Id., p. 9.
35 Id., pp. 5 and 8.
36 Id., p. 12.
by MEMS (micro-electromechanical systems) technology, miniaturized structures can be synthesized, incorporated into functioning processors, and utilized in medical, communication, and control applications. These research areas and others display a desirable flexibility which can lead to student involvement in research and additional research funding.

The Department’s performance in terms of research and academic competitiveness is below the average for top electrical engineering departments. Recently, it was able to recruit very good researchers with expertise in microelectronics and MEMS and who have the potential to generate competitive federal funding. The Department’s clean room facilities are supported by a congressional grant and other federal and industrial grants and provide an environment for the researchers to perform very high quality work. The Department has the potential to improve its standing by continuous recruiting in the areas it has identified as areas of growth. The addition of new faculty members will bring new ideas, add strength to its intellectual capacity, and help grow its graduate programs.

Department of Civil and Environmental Engineering

This Department has 12 tenure and tenure-track faculty, 365 undergraduate students, and 163 graduate students (135 MS students and 28 Ph.D. students). Its research funding comes primarily in the form of state grants in amounts of less than $50,000 per faculty member per year. There seems to be some disquiet among the faculty, with complaints grounded in ABET (Accreditation Board for Engineering and Technology) requirements which call for substantial involvement of the faculty in teaching related activities (such as the development of design courses, lab courses, etc.); and for addressing the lack of integrated goals and programs, the lack of cost sharing, heavy teaching loads (6 courses a year is usual), and inadequate support from the Office of Research for research proposal activities.

The Department does not seem to be pursuing an overall theme for research or curriculum, and has not developed a plan to allow for the development of areas which can leverage future funding by the federal government or the state. The current areas of research focus are environmental, geotechnical, hydrology, structures, and transportation.

Overall the Department is in need of a strategic plan that will identify appropriate research education areas that will address local and national needs and guild on existing strengths. Some suggested themes are programs and research areas related to geophysical disciplines and water resources (ground water remediation). To improve the Department’s performance both in research and education will require a substantial funding increase and additional faculty of stature.

Department of Industrial and Manufacturing Systems Engineering

With only 9 tenure and tenure track faculty members and overall enrollment of 260 students (46 BS, 164 MS and 50 Ph.D.), the academic and research activity in this Department has been fairly limited. The total level of active contracts and grants in the Department is low ($268,000 in 2003) although the Department ostensibly covers research areas for which funding is available. The Department has declared the research areas of manufacturing, transportation, health care, and environmental analysis as both programmatic and research focus areas.

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37 Id., pp. 5, 8 and 9.
38 Id., pp. 5, 8 and 9.
39 Id., p. 12.
However, the biggest research activity for this Department is from faculty members who are actively participating in ARRI.

The Department wants to increase the number of undergraduate students to 300 from 246 in the next two to three years, and increase the number of degree programs and courses offered. It wants to improve the quality of the educational programs; develop a research agenda that generates adequate funds and publications; and establish a Center for the Aerospace and Defense Enterprise that will cover the research areas of pervasive computing in manufacturing, autonomous systems for defense applications, manufacturing systems, simulations and analysis, enterprise engineering, reconfigurable manufacturing systems and systems engineering in aerospace. This latter program targets $500,000 per year from federal and corporate sources to support 10 Ph.D. students. While the concept of such a center is excellent, the expected level of research is very modest and its scope in terms of future directions is very limited. The Department needs a more comprehensive and aggressive plan.

The ambitious program agenda laid out in the UTA/IMSE presentation, dated December 17, 2003, is inclusive but not convincing since space, funding, student demand, and industrial interests are not yet adequate to improve research performance. A development effort of at least several years will be required encompassing new faculty hires and the development of research directions relevant to areas funded by federal agencies and private industry.

**Department of Mechanical and Aerospace Engineering**

This Department has 25 tenure and tenure track faculty members and a 25 year history of research and teaching. It has almost doubled its enrollment since 2000 to over 800 in the fall of 2003, and increased its graduate student headcount from 136 in 2000 to 225 in 2003 (187 MS students and 38 Ph.D. students).

Currently Active research grants and contracts will bring in a total of $1.7 million over their lives – not enough to finance the Department’s ambitious research agenda. Between September, 2002 and August, 2003, faculty members published only 36 papers in journals and conference proceedings. This research output is very low and should be improved substantially. One reason for this poor showing is that faculty research interests tend to be dated or very applied. Several projects are conducted jointly with the Automation and Robotics Research Institution (ARRI) with an emphasis on micromaching and embossing and have resulted in interesting and potentially important applications for manufacturers of micro and nano components of systems.

Faculty members are doing research in flight mechanics and control, aerodynamics and propulsion, heat transfer, boiling and condensation heat transfer, MEMS and mechatronics, and telecommunications packaging. Some of these topics such as heat transfer and boiling and condensation heat transfer are outdated. We recommend that MAE focus its research on areas most likely to lead to tech transfer and economic development and most likely to be funded by federal agencies and industry, especially in cooperation with ARRI. Together, they could form an active research consortium including industrial members.

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40 Id., p. 5.
41 Id., p. 8.
42 Id., p. 9.
The Department has identified a number of challenges including its low percentage of junior faculty, low percentage of Ph.D. students, low federal funding support, imbalanced faculty salary levels, limited funds for scholarships, and limited lab space. Progress in these areas will be critical in order to improve the quality of education and research. A detailed strategic plan should be developed to address these issues.

**Materials Science and Engineering (MSE) Program**

The MSE Program is administered by the Colleges of Engineering and Science and has 7 full time (core) faculty members, over 15 associated faculty members, and 70 graduate students. It is a graduate program only and is of small size; last year it produced 7 Masters and 1 PhD graduates.

The Program supports a very broad spectrum of research topics indicating an inability to focus on a few key initiatives. Also, it supports five different centers, a surprisingly high number considering that the Program has only 7 core faculty members. MSE has an active research activity centered on electronic materials, but more focus would improve it. This can be achieved in two ways: (1) reducing the number of research centers, and/or (2) increasing the number of faculty and students. The process to achieve better focus and better performance should be determined through extensive strategic planning. The Program’s instrumentation is modern, but requires continual upgrading since the relevant technology is developing rapidly. MSE has extensive industrial relations and has contracts and grants from federal, state, and industrial sources. Its research activity is about $1 million for the total duration of the contracts, and annual research funding is less than $500,000, leading to the conclusion that many of its centers are relatively inactive.

**Biomedical Engineering Program**

The Biomedical Engineering program collaborates with the UT SWMC. This cooperation appears to be productive but the Program is small and not well funded. At UTA, there are 7 Biomedical Engineering faculty members, and 8 degrees (all MS) were granted in 2002-03. The Program’s active research grants amount to $686,000 and its research themes are imaging, tissue engineering, bioinstrumentation and human performance, biomechanics and orthopedics, and molecular and computational biomedical engineering. These subjects allow for an active research program in biomedical engineering that should have funding from NIH and other appropriate federal agencies.

**Automation and Robotics Research Institute**

The Automation and Robotics Institute’s (ARRI) mission is to improve the competitiveness of manufacturing and related enterprises through excellence in research and the sharing and deployment of knowledge. ARRI is located in a 48,000 sq.ft. building in east Fort Worth about 10 miles from the University campus. It employs 21 professional staff and is

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43 Id., p. 9.
44 Id., pp. 5 and 10.
45 These themes require better definition. Imaging for human patients’ diagnoses is one objective, for example three-dimensional representations of organs, but imaging widely has many applications beyond those in biomedicine. How widely is this theme going to be applied and in which applications? The same questions are relevant to tissue engineering. So far, the answers to these questions are not being used to animate the programs and themes.
supported by 6 tenure track faculty members. Its grants and contracts last year were close to $4 million. About 25% of this funding was from the state.\textsuperscript{46} This Institute has been in existence since 1983 and has focused on a variety of research areas including process automation, autonomous systems, enterprise engineering, free form fabrication, controls and sensors, MEMS, and pervasive computing. While the primary value of the Institute is in technology transfer and engagement with the business community in Fort Worth, it also provides funding for basic research.

\textit{Recommendations for the College of Engineering}

Overall UTA Engineering has strengths in a number of departments and centers that can be further developed, including Computing Science and Engineering, Electrical Engineering, Mechanical and Aerospace and ARRI. Others showing potential, but with more significant hurdles to overcome, are Biomedical Engineering, Industrial and Manufacturing Engineering, and Civil and Environmental Engineering. The key to realizing the potential of this College is the development of a comprehensive plan that will allow UTA to build on the existing strengths and reach the level of quality required to place UTA in the Tier 1 group of institutions.

Our specific recommendations for the College are as follows:

1. UTA and UTD seem engaged in unproductive competition with each other. We suggest that UTA Engineering and UTD Engineering collaborate rather than compete. These two universities have unique strengths that can lead to a great coordination of activities and very exciting research. Areas for potential collaboration include microelectronics and biomedical engineering.

2. Most departments, other than Computer Science and Engineering and Electrical Engineering, are understaffed in terms of both faculty and technical personnel. The faculty feels unsupported and sees many roadblocks in its efforts to improve the quality of research programs and increase research output. UTA needs to make adequate investments in new faculty hires, graduate student fellowships, facilities, and technical support.

3. UTA has extensive facilities for work in microelectronics, MEMS, and materials, but no staff to provide support for this equipment. We recommend that UTA consider hiring staff so that faculty members can spend their time writing proposals rather than servicing equipment.

4. It is very important for the College to develop a strategic plan that identifies areas of future focus. The College’s faculty now seems to go after opportunities in an uncoordinated way.

5. Important subjects of materials engineering and science need to be reworked to improve their presentation in the curriculum and their place in research. The size of the faculty is inadequate in these areas (7 full time core faculty members) and the research program appears diffuse and underfunded. The subject matter is too central to engineering and industrial requirements to allow it to remain in its current state.

\textsuperscript{46} Automation & Robotics Research Institute, The University of Texas at Arlington, undated presentation to WAG.
School of Nursing

The School of Nursing is large, with over 1,000 students, 400 of whom are juniors and seniors (the junior and senior years are considered the professional nursing years after 2 years of general education and biological background). The School receives applications from many more individuals that it can admit (600 applications for 200 spots). Perhaps as a consequence, students in this School have a relatively high average GPA of 3.4. We were told that the School’s graduate program is the largest in Texas with over 300 students, most of whom are MA candidates with a Nurse Practitioner focus, and some in an MA program for Nursing Administration. This fall, the School instituted a new Ph.D. program with two areas of study, academic role development and clinical research.

The School has approximately 90 faculty members (76 FTE’s) with average teaching loads of 3+3 for undergraduate level courses and 2+2 for graduate level courses. The faculty to student ratio for clinical years is 1:10; however, it should be noted that faculty teaching in this program have many contact hours – 50% of faculty time is spent in direct contact with students and about 20% in preparation. The Dean believes that the addition of 6 tenure track and 3.6 non-tenure track positions would bring the student/faculty ratio to the desired level. She cites the relatively low level of faculty salaries as an impediment to recruiting.47

The School appears to have competent and enthusiastic leadership and a thriving undergraduate and graduate education program. There is a definite and increasing interest in research with the new Ph.D. program. The School had approximately $1.02 million in awards last year with the vast majority ($0.9 million) in education grants, and $43,431 in research grants. About 6 of the School’s faculty members are research active and interacting with various medical institutions in the area. Although the faculty is heavily engaged in teaching, it did manage to produce 47 publications last year, 21 in refereed journals.

The School of Nursing appears to be thriving and, although it is unlikely to be a major player in research, an investment in additional faculty with research interests would be worthwhile and might significantly increase the external funding for the School.

College of Liberal Arts

The College of Liberal Arts has 160 tenure and tenure track faculty, of whom about 140, the Interim Dean estimates, are active publishers in peer reviewed journals of varying quality. Teaching loads are generally 3+3 or 3+2, salaries are not competitive, and infrastructure to support research is lacking. This may be part of the reason that the College has lost some 30 tenure and tenure track faculty members in the past 6 years (through non-promotion and retirement as well as departure). Fifteen authorized searches are underway at this time.

By far the strongest departments are Political Science, with its associated Center for Mexican-American Studies, and History and the affiliated Center for Greater Southwestern Studies. The graduate-only Linguistics Department has an excellent reputation and was the recipient of a substantial grant several years ago, and the Department of Criminology and

47 The Dean informed us that the School’s full time faculty salaries are moderately below the regional and national means for academic nursing faculty and substantially below the salaries provided at the hospitals in the surrounding Metroplex area.
Criminal Justice also is well-regarded. One of its faculty is a co-PI on a grant ($148,000 in 2002, $15,000 in 2003) that appears in the total for School of Urban and Public Affairs (SUPA).

The most successful research active faculty members in Political Science are involved in the Center for Mexican-American Studies (which also includes faculty members from other departments, such as Sociology, and has a close collaboration with the College of Education). The Center’s participants enjoy much lighter (1+1) teaching loads than are standard for the College. The Center receives some State support through special-item funding of $50,000 per year and also receives NSF funding through a subcontract with Southern Methodist University (SMU). One faculty member who works on a variety of Mexican immigration issues has brought in a total of $400,000 in grants over the past three years, a little less than half of which has come to UTA – some of this money has come from the Mexican government equivalent of the NSF. For FY2002, the Political Science Department received approximately $64,000 in federal research funding, which accounted for 77% of the external research funds received awarded in the College of Liberal Arts.\[48\]

Participants in the Center for Greater Southwestern Studies, which is staffed primarily but not entirely by faculty from the History Department, also enjoy relatively low 1+2 teaching loads and receive some travel money and RA support to assist research in the Center’s own special collections, which are also the focus of most of the Center’s research projects. External funds for this Center come primarily from private foundations in Texas (e.g., $68,000 from the Houston Endowment and $30,000 from the Summerlea Foundation of Dallas, both to improve the teaching of Texas history).

**Recommendations for the College of Liberal Arts**

1. Individual faculty members, departments, and the College as a whole all need to focus on developing collaborative proposals for larger grants. The College is in the early stages of developing an interdisciplinary effort to attract federal funding for research on the social implications of homeland security. Collaboration with faculty in other universities, particularly those in the Dallas area, should also be pursued.

2. Much of the work to change the incentive structure to facilitate and reward research must be done at the University-wide level, but the College leadership should also continue, and if possible intensify, its efforts to establish such a structure.

3. Every effort should be made to raise endowment money for the College’s two Centers, which are clearly the focal points for research grants, to enable them to operate on a less catch-as-catch-can basis.

**COLLEGE OF EDUCATION**

This College has 28 tenure and tenure track faculty members\[49\], and more than 100 adjuncts, lecturers, etc. (mostly part-time). The Dean estimates that some 15 to 20 of the tenure and tenure track faculty are doing high quality research. Though highly ambitious for her school, she estimates that it will take 10 to 12 more years “to build the College we want,” as well as additional funds to hire new faculty, give them teaching loads consistent with active research, and

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\[48\] *Awards and Source of Funding by Department*, op. cit.

\[49\] *The Total Number of Tenure and Tenure Track Faculty by Department for Fall 2002*, UTA Office of Research.
to fund TAs and RAs, particularly in the new PhD program in K-16 Educational Leadership that the College is proposing. Currently, resources for reduced teaching loads are available only to new faculty for the first year. The College is authorized to hire 5 new faculty members this year.

Areas of particular strength include the Department of Kinesiology, which has a number of research oriented young faculty members who are in the process of developing partnerships with various medical centers and the Department of Curriculum and Instruction. The latter has a 5 year $1 million-plus grant from the U.S. Department of Education for bi-lingual education, but this is primarily a training grant. We were told that a couple of the smaller grants (one funded by the Sid Richardson Foundation), again focused on bi-lingual students, and are more research oriented. Research funding awarded to the College in FY 2002 totaled $1.5 million but, despite the “research” designation, this included the 5-year training grant described previously.

The Dean puts heavy emphasis on collaboration with other parts of UTA, including the Center for Mexican-American Studies, the College of Science, and the College of Engineering, as well as with other institutions of higher education, from UTSMWC to nearby community colleges, and with many of the independent school districts within a 60-mile radius of UTA as well. One aspect of this last collaboration is an ambitious proposal to fund a Center for Collaborative PreK-16 Teacher Education Research (CCPTER) based at UTA. Funding is being solicited from the U.S. Department of Education under the No Child Left Behind Act; the direct grantees would be the School districts rather than UTA itself, but the Center would recruit, coordinate, oversee, report on and disseminate results of the research conducted by 64 students, educators and other professionals.

Recommendations for the College of Education

1. The Dean stated at one point in our discussion that “we are creating a new [research oriented] culture here.” She should continue to send this message as clearly as possible in all directions: downward to the faculty, in the form of support and reward structure; upward to the central administration in the form of steady pressure to create the necessary infrastructure; and horizontally to the various groups that are potential collaborators, either as funders or as co-investigators in research.

2. The outreach for partnerships and collaborators, both inside and outside UTA, should continue to receive high priority, and both the Dean and the faculty actively involved in creating such relationships.

3. The proposed Ph.D. program in Educational Leadership should be pursued. It is a natural complement to the proposal for a Collaborative Research Center described above, and would provide a graduate research niche for the College that would build on existing strengths and interests.

COLLEGE OF BUSINESS ADMINISTRATION

The College of Business Administration has some 70 tenure and tenure track faculty. According to the Dean, about 65 are publishing in peer reviewed journals, with perhaps 50 hitting the major (either “elite” or “high quality” in the ranking system they use) journals in their respective fields. Teaching loads vary from 2+2 for the most research active faculty to 4+4 for those who are not producing research at all. The Dean considers salaries competitive at the junior

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50 Awards and Sources of Funding by Department, op. cit.
but not at the senior levels, creating a compression or even inversion problem. He also believes the support provided for the College’s Ph.D. students (there are 88 currently) is not competitive for high quality students.

There is at present no externally sponsored research in the College of Business. The Dean mentioned that he hopes to raise $5-6 million of outside funds with the aid of his newly-created Advisory Board and an outside fundraising consultant. He adds that grant-writing “is not part of the Business School culture,” a view that is quite general among business schools.

Recommendation for the College of Business Administration

In light of the situation just described, it is not realistic to expect the College of Business to become a significant generator of externally sponsored research, although many of the tenure and tenure track faculty are active in research and publication on an individual basis.

SCHOOL OF URBAN AND PUBLIC AFFAIRS (SUPA)

This is a small but high quality School with 12 tenure and tenure track faculty, most or all of whom are publishing, primarily in peer reviewed journals. Teaching loads seem to range from 2+2 to 3+3, but can be reduced by grants. Salaries are competitive for the state but not nationwide, according to the Dean. The School has been designated by the U.S. Department of Commerce as one of the nation’s Centers for Economic Development Research Excellence, through which it receives an annual appropriation designed to assist local communities with their economic development plans. It also has been designated by the State of Texas as the state’s only Institute of Urban Studies and, as such, has received special item funding since 1967 to carry out its mandate.

In FY 2002, SUPA received research funding of just over $400,000, slightly less than half from a federal agency and the other three from State, local, and private sources. In FY 2003, the School’s research awards totaled $785,000. SUPA offers two Ph.D. programs, one in Public Administration and Urban Affairs and one in Urban Planning and Public Policy (a version of the latter is offered jointly with Universidad Autónoma de Nuevo León (UANL) in Monterrey, Mexico). It also offers four MA’s, 6 MA’s jointly with other UTA schools, three undergraduate minors, and six certificate programs.

SUPA also has three research centers: The Institute of Urban Studies (IUS), established in 1967 by an act of the Texas Legislature; the Center for Economic Development Research and Service (CEDRAS), established in 1994 under the auspices of the U.S. Economic Development Administration, and the Center for International Research, Education and Development (CIRED), established in 2001 under contract with the U.S. Department of State University Partnership Development Program, focused primarily on universities in Eastern Europe. The majority of the grant funding received by SUPA comes through one of these centers and, as is generally the case in such fields, it isn’t possible to separate the research from the training-outreach components of these various activities. CEDRAS is currently in the process of establishing a socioeconomic data center and an input-output model adapted to local and regional needs.

The concerns of the Dean and faculty are similar to those voiced by many of the other groups we interviewed: lack of funds to support full-time Ph.D. students (currently most are part-

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51 Awards and Source of Funding by Department, op. cit.
52 R.L. Elsenbaumer, Interim V.P. Research, op. cit.
time working professionals), absence of infrastructure to assist to faculty in writing grant proposals and managing grants, the non-availability of matching funds that would make UTA grant proposals more competitive with proposals from institutions in states that do provide such funds. The Dean and faculty also argue that with a larger faculty the School could generate substantially more externally funded grants and contracts. Given the national standing of the School and its uniqueness in the State of Texas, they could very well be correct, although at present, only about 4 or 5 of the faculty have such grants.

Recommendations for the School of Urban and Public Affairs

1. SUPA already partners with a number of other UTA Colleges and Schools in offering degree programs, and with universities in Mexico (offering a joint Ph.D. in international comparative policy and administration) and in Eastern Europe (under the State Department program described above). It may want to explore more specifically research oriented collaborations, both with its current internal partners and UANL and with other schools of public policy, both in Texas and elsewhere.

2. Currently, no new hiring is authorized for SUPA. Some strategic hiring of high quality research oriented junior faculty would very likely increase opportunities for additional external funding for research, particularly if it were combined with some increase in research infrastructure available to these new hires.

School of Social Work (SSW)

The SSW has 32 faculty members who, according to the Dean, have a strong record of publication in peer reviewed journals. Teaching loads in the School are 2+2 and, according to the Dean, salaries are not competitive, particularly at the full professor level. The School offers a Ph.D. in Social Work as well as a dual Ph.D. in Comparative Social Welfare with UANL in Monterrey, the first Ph.D. Program in Social Work in Mexico.

The Dean estimates that 22 of the School’s faculty members are actively engaged in some aspect of externally funded projects, and that they generated some $3.2 million this year (largely from federal granting agencies), or $100,000 per full-time faculty member. These grants, again, represent a mixture of research, training, and service components. With a good base to build on, one of the Dean’s goals is to make these activities more research oriented (e.g., through greater use of clinical trials). The School’s partnerships with faculty at UTSWMC and the North Texas Health Sciences Center are critical to this thrust.

The SSW’s Center for Research and Technology serves as the nucleus of a research infrastructure for the School to attract external funding. The SSW faculty have both research interests and recognized strength in such areas as cognitive behaviorism, child abuse, domestic violence and anger management, substance abuse, mental health, biofeedback therapy, and IT applications in human services. The Dean would like to see the School establish a partnership with Nursing to develop expertise in gerontology, which he sees as an area of rising research interest.

The Dean has established a research initiative, in the form of some funds for RA support and grant development travel, in order to encourage the research activities of new faculty. The Dean adds that obtaining externally funded research grants, as opposed to simply publication, is a relatively new priority for his School, originating within the last 5 years, and that the necessary change in faculty culture is still in its infancy.
**Recommendation for the School of Social Work**

The SSW’s strongest partnerships at present are with various service providers, and these have been the source of a number of mixed research-training-outreach grants (with the research often taking the form of program evaluation). However, in order to bring in funding from federal research granting agencies like NIH, partners who have a track record with these agencies are essential. Given this fact, and the strong health related character of many of the faculty’s research strength and interests, initiation and expansion of partnerships with the medical and health sciences institutions in the area should be given high priority.

**General Observations, Conclusions and Recommendations For UTA**

As stated earlier, it is of overarching importance that UTA’s new President expeditiously install his senior leadership team and announce a vision for the future of the University. UTA’s history as a broadly based teaching university, its standing in the community that derives from carrying out that teaching role well over many years, and its more recent strides toward becoming a research centered university, enhance its prospects for substantial improvement in standing. However, effective leadership and sustained continuity of purpose will be essential.

UTA’s current major strengths are:

- The fact that it is a broadly based, Carnegie Research Extensive University;
- The broad base of research potential in important areas of science and engineering that can provide a foundation on which to build research capacity and compete for federal research grants;
- UTA’s location in a technologically advanced industrial region;
- The possibility of partnership and joint research proposals with the trio of UT System institutions in the Greater Dallas Region; and
- Outstanding engineering graduates that are in high demand by local industry.

The areas which pose the most significant challenges to achieving Tier 1 research university status are:

- The faculty’s heavy teaching loads (often 3 courses a semester) that leave little time for research;
- UTA’s lack of a strategic plan with timetable for recruiting research qualified faculty, staging construction of facilities, and realistic estimate of funding needs and sources;
- Weakness in biology and in other NIH fundable research fields;
- UTA’s late start in organizing development campaign;
- Instability of leadership in recent years; and
- The low level of sponsored research funding despite comprehensive coverage of basic fields in science and engineering.

Although the levels of sponsored research at UTA are relatively low, those funding levels are not always indicative of the quality of research. UTA has strong research groups in the following areas:
Research Capability Expansion at UTA, UTD, UTEP, and UTSA

- Chemistry;
- High energy physics;
- Psychology; and
- Computer science and engineering.

The fields that provide the next high opportunity areas for UTA are:

- Genomics; and
- Nanotechnology related to semiconductor fabrication (which would support the needs of local industry).

In order to maintain its current research strengths, pursue new ones, and reach Tier 1 status, UTA estimates that it will need to:

- Hire between 400 and 450 new research qualified faculty members, assuming each generates research expenditures equal to the average for UTA’s current research active faculty of $161,000 per year. If such faculty members were able to generate $230,000 in research expenditure a year (which is the national average for federally funded faculty members) the total number of new faculty members needed would drop to approximately 320.

- Provide start up packages for new research faculty members, which are likely to range from $300-$500,000.

- Complete the new science building that already is funded; add an annex to the engineering building that will double the amount of space there; and, after that, build two additional 120,000 square foot science buildings, each at a cost of approximately $80 million.

UTA’s estimates appear reasonable to us. Its major challenge will be to identify and secure the sources of funding to support this growth.

As UTA pursues its goal of Tier 1 status it must establish certain priorities – it cannot undertake simultaneously all of the actions that must be taken to achieve success. We believe the following should be among the first that UTA undertakes:

- UTA’s first priority should be the development of a strategic plan that, among other things, identifies and prioritizes research focus areas, lays out a specific timetable for achieving goals, and identifies sources of funding.

- Once the strategic plan is developed, UTA will be in a position to mount its capital campaign and begin recruiting the faculty necessary to achieve its vision.

Assuming UTA is able to address the issues we raised in this report, we agree with its conclusion that it will take some 15 years to recruit the 400-450 additional research active faculty who are the key to UTA’s aspirations. This assumes a hiring rate of 30 per year. If the national average for research efficiency of $230,000 is assumed about 325 additional faculty would be needed and this would take more like 10 years to complete. With all the uncertainties in assumptions it is reasonable to use 10 to 15 years as a target. The difficulty in achieving this goal
will be in obtaining state support for the additional FTEs, financing their set up costs, and financing the required teaching and laboratory facilities. UTA needs to organize a campaign to find these resources.

Our specific recommendations for UTA are as follows:

1. **Strategic Plan**: The development of a strategic plan, with a specific agenda for prioritization of research and education programs, is of critical importance. It should be done with extensive input from administrators and faculty, partly because of their knowledge and experience and even more to insure their buy-in, and also with input from community leaders and other interested parties. The plan also must bear a strong stamp of the new President’s own vision for the Institution.

2. **Communication and Development**: The administrators in charge of the Offices of Government Relations and Development both feel strongly that the University has not told its story effectively to alumni, foundations, corporations, or the community in general. In order to do so, UTA needs not only a long term vision for itself and a strategic plan to go with it, but also a specific development (fundraising) plan, and investment in a development infrastructure.

3. **Partnerships**: Forming research partnerships, not only with other North Texas academic institutions (particularly UTD and UTSWMC), but also with major corporations (e.g., Lockheed, Texas Instruments, Vought Aircraft), and government research labs like Sandia and Fermi would greatly increase opportunities for obtaining research grants from federal agencies, and would also increase the likelihood of getting corporate money for research from companies that hire UTA’s graduates in large numbers.

4. **Faculty Recruitment**: UTA should study and then employ the best faculty recruiting practices of successful research universities, including the establishment of a network to identify outstanding prospects, and seminars to tutor faculty that serve on search committees.

5. **Uneven Distribution of Strength**: UTA’s broad portfolio of departments in basic science and engineering fields offers it an advantage, but the departments are of uneven strength, and eventually this must be corrected. Not all departments need to be equally strong, but for UTA to exploit fully its broad portfolio, it should raise its weaker departments to a level capable of doing fundable research.

6. **Graduate Students**: UTA should allocate resources to improve the uneven quality of its graduate students. Factors that have contributed to this uneven quality include non-competitive stipends, problems with tuition remission, and a lack of a good central recruiting policy.

7. **Matching Funds**: Finding money to allow the University to match external grant funding would greatly enhance the probability of getting such funding.

8. **Government Relations**: Although not discussed in the body of the report, we note that the Office of Governmental and Community Relations has a one person staff. The current Director appears competent and effective at local and state levels but has
no experience at the Washington level and federal relationships have been left to the UT System. UTA might want to consider more of a federal presence.

9. *Support for Common Equipment.* A number of researchers mentioned the fact that the University has certain specialized research equipment available to them, but it has no staff to support the equipment, and researchers must maintain the equipment themselves. UTA might consider whether it would be possible for UTA, UTD and UT SWMC to develop a common pool of technicians for this type of equipment.
THE UNIVERSITY OF TEXAS AT DALLAS (UTD)\textsuperscript{53}

In the late 1950s, the three founders of Texas Instruments, Eugene McDermott, Cecil Green and J. Erik Jonsson, were importing engineering talent from outside the state of Texas, while the region's young people were pursuing education elsewhere.\textsuperscript{54} These executives were convinced that the region "must grow academically; it must provide the intellectual atmosphere which will allow it to compete in the new industries dependent on highly trained and creative minds."\textsuperscript{55}

Acting on these convictions, Texas Instruments’ founders formed The Graduate Research Center of the Southwest (later renamed the Southwest Center for Advanced Studies (SCAS)), a research oriented institution granting Ph.D. degrees in physics, earth and space sciences, and molecular biology. In 1969, the University of Texas at Dallas was established and SCAS, which was donated to the University of Texas System, formed the initial core of this institution. It is likely that the founders, all of whom were familiar with the Massachusetts Institute of Technology as alumnæ, donors, or recruiters of MIT graduates, had that institution in mind as model for their new creation.\textsuperscript{56}

Forty years is a short time within which to develop a major research university, and only a few schools have accomplished this feat.\textsuperscript{57} UTD is not yet among them, and its inability to achieve significant progress towards this goal in the past is due to a combination of factors that are discussed in more detail below. Nevertheless, we believe that with continued progress, support from the state, the UT System and private sources, and with strong leadership, UTD could become a top tier research university and fulfill the dreams of its founders. The substantial funds made available by Project Emmitt, which are described below, and the research capacity building know-how evidenced by UTD’s leadership and faculty lead us to this conclusion. However, the time that will be required for UTD to achieve this goal is much less certain. In general, we agree with experts in university rankings who say that an institution has to spend a fortune and exert a Herculean effort to rise even one spot in the rankings.\textsuperscript{58}

University Leadership

President Jennifer is now in his ninth and last year as President of UTD. Under his leadership, the University articulated the goal of becoming a Tier 1 research university with $100 million in external research funding annually, and a graduate student population of roughly 6,000 individuals (up from the current level of 5,600). These goals by and large are supported by the faculty members with whom we met. To his credit, President Jennifer also succeeded in securing Project Emmitt for UTD and the significant funding that goes along with it. President Jennifer expressed to us his strong view that, in order to achieve the UTD’s goals, the next president must

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\textsuperscript{53} This section of the report includes information that was provided to us during the course of our campus meetings. Where facts are given without citing to a particular document, that information was given to us orally during the course of those meetings.

\textsuperscript{54} http://www.utdallas.edu/utdgeneral/utdhistory.html

\textsuperscript{55} The Charter of Progress, Graduate Research Center of the Southwest, 1961, p.10 (as cited in An Executive Briefing Provided by The University of Texas at Dallas to The Washington Advisory Group, LLC, prepared by the Office of Strategic Planning and Analysis, The University of Texas at Dallas, August 19, 2003).

\textsuperscript{56} We make this statement based on our impressions from conversations WAG principals had with these individuals during their lifetimes.

\textsuperscript{57} For example, UC San Diego and the University of Texas Southwestern Medical Center at Dallas.

have substantial experience and eminence in teaching and research at a top tier research university. We concur in this judgment. UTD’s new president must understand what will be required to greatly enhance the research and graduate programs of the University, secure greater amounts of grants funds and, at the same time, successfully reach out to the philanthropic community in the Dallas area. The new president will be joining a provost, deans, and department chairs who are qualified to embark on a path to research eminence. The selection of a new president for a university is always a major task. When that university is seeking to move to a significantly higher level, the responsibility is particularly great.

Research At UTD

UTD has so far failed to achieve national research prominence for a number of structural reasons, some of which have been corrected (e.g., the delay in allowing the University to admit freshman and sophomores and to grant graduate degrees in certain key scientific and engineering fields), and others which remain to be addressed (e.g., poor hiring practices in UTD’s earlier days that resulted in feelings of insularity, complacency and lack of interest in research among some faculty members). And while UTD recently secured major funding in connection with Project Emmitt, generally it has been unable to access large philanthropic and industrial sponsors in Dallas and elsewhere.

Project Emmitt represents a relatively well defined and highly visible opportunity for UTD from which it can embark on its quest to achieve higher standing among the nation's research universities. Done well, this effort should make it possible for UTD to tap into considerably larger sources of private donations than have been available in the past. If successful, the University should emerge with a larger and stronger research qualified faculty, student body and educational infrastructure. Project Emmitt provides UTD with a 5 year fundraising head start as it pursues its goal of achieving Tier 1 status. According to the Provost, it will have to raise an additional $200 million for the following 5 year period to pursue successfully this goal.

Over the past decade, the University has made progress, having developed truly excellent undergraduate programs, and recruited actively and well in specific research areas. UTD now has a total of 35 endowed chairs, distinguished chairs and named professorships. This represents a 70% increase since 2000 – a positive trend that the University wishes to continue through Project Emmitt and increased private fundraising efforts.

Despite this progress, UTD, starting with a low ranking, must expand significantly both the quantity and the quality of its research activities in order to achieve its goals. It must jump perhaps 50 or more positions in national rankings over a decade – a feat that few if any institutions have achieved. TheCenter, an organization that collects data on American research universities, reported that UTD was ranked 165th among public research universities in total research expenditures in 2001, and 174th in federal research expenditures. UTD was ranked

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59 Project Emmitt provides state and local incentives for Texas Instruments to build a $3 billion wafer fabrication facility in the Metroplex. Texas Instruments agreed to keep its facility in the area provided it received certain tax abatements, and UT Dallas receive an enhancement package from the state. An Executive Briefing Provided by The University of Texas at Dallas to The Washington Advisory Group, LLC, op. cit., page 47.

60 TheCenter at the University of Florida data on American research universities, available at http://www.thecent.ufl.edu. FY2001 numbers are the most recent ones available from TheCenter. We note that the UTD data on total and federal research expenditures for FY2001 reported by TheCenter are
In contrast to its rankings in research expenditures, UTD does quite well in the rankings based on undergraduate quality. In 2001, it ranked 49th among public universities in SAT scores, and in 2002 it ranked 49th in National Merit and Achievement Scholars. This is particularly impressive in light of the fact that UTD only recently began to admit freshman and sophomores. The high quality of UTD’s undergraduate population is due, in part, to the strictures imposed by the Texas legislature with respect to selective admissions, but it is clear the University has worked hard and imaginatively to reach its current level of excellence. It should be recognized and commended for this, and the fact that UTD has been able to build such excellence in undergraduate education bodes well for it as it turns its attention to research and graduate education. However, UTD seeks recognition as a Tier 1 research university, a more difficult undertaking than its achievements in undergraduate education. UTD recognizes the uneven quality of its graduate students and the need to be competitive in providing fellowships and assistantships to improve this situation. It is beginning to raise the necessary funds. In leading research universities, graduate students are known to increase the productivity of the research faculty, in some cases by as much as 100%. If UTD expends the kind of effort on recruiting graduate students as it has on undergraduate students, good results will ensue.

The main obstacle that UTD faces in achieving its goals relates to scale – UTD is simply too small in terms of the total number of faculty in each disciplinary or sub-disciplinary area. This problem of scale handicaps it in two ways: it reduces the national visibility of UTD as an institution (as opposed to the visibility of many individual faculty members) and it often prevents its faculty from participating in the large programmatic grants that are the mechanism through which a significant part of the funds available from federal granting agencies are distributed.

UTD’s leaders understand the challenges they face and are approaching them in sensible ways, pursuing a strategy of focused excellence so that UTD becomes the third public research extensive university in Texas "with flagship type" Tier 1 status (along with the University of Texas at Austin and Texas A&M University). UTD is concentrating its efforts and resources in the areas of information transmission and processing, advanced materials and instrumentation, and disease-centric science and technology. Where practical, it plans to pick specialties that have synergy within UTD and the Dallas-Fort Worth Metroplex generally. The somewhat narrow focus that UTD is pursuing may be appropriate at this time, given the origins of the University, its core competencies, and the realities presented by the state’s declining financial position and the currently poor prospects for state funding of higher education. However, if it is pursued relentlessly and without a larger vision, the University might achieve $100 million in annual

unchanged from FY2000 and that the source for TheCenter’s data, NSF/SRS Survey of R&D Expenditures at Universities and Colleges, FY 2001, indicates the data are estimates.

Id.

UTD’s financial statements for FY2003.

TheCenter at the University of Florida data on American research universities, available at http://www.thecent.ufl.edu.

Information provided to us during our meeting with the Provost.

An Executive Briefing Provided by The University of Texas at Dallas to The Washington Advisory Group, LLC., op. cit, page 9.
sponsored research expenditures, but not raise its stature and reputation to a position among the top research universities in the country, most of which are broadly based.

The model of allocating limited resources to a small number of focus or niche areas is a strategy that UTD has in common with at least two of its sister institutions (San Antonio and El Paso), and with many lower tier universities that seek to rise in stature but are unable to "to spend a fortune and exert a Herculean effort." Irwin Feller, an economist at Pennsylvania State University who studies rankings expresses concern with this model, saying "for all its efforts to improve its rankings, a university may not improve conditions for itself or its community. Pumping money into marquee programs could drain money from other departments leaving steeples of excellence surrounded by tenements of mediocrity."66

UTD’s leaders recognize this danger and understand that they must build critical size cohorts of faculty members in the basic physical, biological, and engineering fields. For example, the Dean of Engineering, who is playing a key role in the allocation of Project Emmitt funds, recognizes the need to build strength in the basic physical and biological sciences, concomitant with the growth in electrical engineering, computer science and engineering, and management science. Recruiting faculty members with excellent research credentials will require the ability to offer competitive salaries, and adequate set up funds, space and infrastructure. UTD’s leaders know that they must make every hire count, and that they must attract senior leaders who in turn can attract the best junior faculty members and graduate students. UTD’s leaders also understand the value and necessity of combining excellence in research with excellence in teaching. UTD has already found success in these directions in its recent recruitments of faculty and administrators.

As part of its strategy, the University also plans to establish and strengthen linkages and partnerships with other research entities and with the high-tech industry in the Metroplex. UTD’s efforts to develop more interactions with the University of Texas Southwestern Medical Center at Dallas (UTSWMC) will be vital. The latter is a superb medical school with very extensive, excellent programs in both basic and clinical research. UTD brings to the collaboration expertise in fields where medical schools are not traditionally strong, such as chemistry, physics, computer science, psychology, and engineering. These fields are becoming increasingly important in cutting edge biomedical research. The two institutions already have established important links and synergies but there is potential for a great deal more. We met a number of officials at UTSWMC, including the President, Dean of the Medical School, several department chairs, and other faculty members, all of whom expressed enthusiasm and support for further partnerships.

The nearby University of Texas at Arlington (UTA) offers another possibility for symbiotic partnerships. Both institutions are strong in the physical and engineering sciences, and this makes it possible for them to collaborate on large and competitive research proposals in fields such as nanotechnology, designated for high priority by federal agencies. An example of a successful collaboration of this type is the SPRING (Strategic Partnership for Research In Nanotechnology) consortium which involves UTD, UTA, the University of Texas at Austin, Rice University, and the Air Force Materials Research Laboratory. SPRING received congressional approval for $6 million of equipment in FY03 and $10 million for equipment and research support in FY04. The collective rich intellectual resources of the trio of UT institutions in the greater Dallas area have greater potential for research growth in the combined engineering.

66 M. Arnone, op. cit. Also see I. Feller, I., Strategic Options to Enhance the Research Competitiveness of EPSCoR Universities, http://www.aaas.org/spp/tcp/epscor/Feller.html.
Research Capability Expansion at UTA, UTD, UTEP, and UTSA

science and biomedical fields than any could aspire to individually. Joint research initiatives could be highly attractive in the national competition for federal grants.

Money, particularly support from state governments, is the biggest constraint that public universities face in moving into the national spotlight.\(^{67}\) Because of the state of Texas’s declining financial position and the currently poor prospects for state funding of higher education, UTD must be able to tap into new sources of funds to fully implement its plans and achieve its goals. UTD’s location in the high-tech North Dallas area of the Metroplex is a major asset in this regard, and Project Emmitt, which includes a substantial private sector contribution, has jumpstarted UTD’s financial campaign.

With its abundance of research university "users", including well prepared prospective students, strong science and technology based industries and sophisticated and generous potential donors, the area provides UTD with certain natural advantages. In fact, this location was directly responsible for Project Emmitt’s major infusion of funds to support UTD’s science and engineering research and education programs. Project Emmitt, in addition to providing state and local incentives for Texas Instruments to build a $3 billion wafer fabrication facility in the Metroplex as noted above, also provides UTD with $300 million in support to accelerate research in engineering, natural sciences and related fields.\(^{68}\) UTD’s location and resurgence also provides it with access to wealthy donors in the Dallas community, and allows significant interactions with UTSWMC, one of the top medical schools in the nation.

In addition to the funds generated by Project Emmitt, UTD is looking towards the following sources of revenue to fund its expansion of research:

1. **Funds generated through enrollment growth.** As is true with its sister universities, UTD is counting on student derived income to partially fund its rise to Tier 1 status. So long as the state continues to fund this growth in student contact hours, this is a positive development. But we are concerned that, in the present fiscal climate, the level of this funding stream is uncertain. The record nationally and in Texas shows a steady decline in state support of public universities.

2. **Increased tuition and fees.** Increased tuition and fees are a potentially important source of revenue and the only ones that UTD has identified as a source for funding for the additional FTEs it will need to achieve its goals. However, it is not clear how much leeway UTD will have to pursue tuition increases.

3. **PUF and other state funds.** The availability of Permanent University Funds (PUF) or other state funds could prove to be important sources of funds for UTD, however such funding is subject to significant uncertainty and, at present, cannot be counted on.

\(^{67}\) Nils Hasselmo, President of the Association of American Research Universities. Quote from M. Arnone, op. cit.

\(^{68}\) Of the $300 million, (i) the Governor’s Enterprise Fund will provide $50 million for research projects in science and technology that demonstrate promise for economic development; (ii) the Texas Land Office will provide $85 million for new science and engineering research facilities; (iii) UT System PUF bonds will provide $50 million for research space and equipment; (iv) the state will provide $15 million for new faculty positions in science and technology; (v) $75 million must be obtained from philanthropies to fund endowments to support faculty and students; and (vi) $25 million in state and private investments must be raised to fund new faculty initiatives. An Executive Briefing Provided by UTD to the Washington Advisory Group, op. cit., page 47.
4. **Industrial Support.** Research support from industry in the form of grants, cooperative programs, analytical services and consulting can be a source of income for the University, especially since it is situated in a region with a wide variety of commercial enterprises in broad and diverse sectors.

5. **Philanthropy.** UTD plans to do significantly better than it has done in raising large philanthropic contributions from wealthy donors in the Dallas community. If it is successful, UTD will be able to put its future on a more substantial and realizable basis.

6. **Federal and other sponsored research.** UTD’s leadership believes that UTD must double the number of faculty members engaged in research, and double the average research expenditures of each such faculty member in order to reach Tier 1 status.\(^{69}\) One strategy that UTD intends to pursue is to apply for the larger ($10 million plus) center type grants that are available in areas such as nanotechnology or space sciences. It is not clear, however, that these goals can be achieved within the decade.

Identifying the necessary resources is just one of several critical steps in achieving research prominence. The ability to identify and recruit outstanding researchers is another, as is the ability to provide researchers with adequate space, equipment, start up packages and the like. UTD’s faculty and administration are “research sophisticated”, in the sense that they have a good grasp of opportunities for research support and understand the needs of local high-tech industry. Their general approach of focusing on the themes of digital communications, materials science and disease-centric research makes sense, particularly since we do not believe this will be done in a way that diminishes basic disciplines.

**UTD’s Academic Units**

**SCHOOL OF NATURAL SCIENCES AND MATHEMATICS**\(^{70}\)

The School of Natural Sciences and Mathematics (NSM) has six departments (Molecular and Cellular Biology, Chemistry, Geosciences, Mathematical Sciences, Physics and Science and Mathematics Education) and a number of centers and institutes (e.g., Space Sciences, NanoTech Institute, Lithospheric Studies, Sickle Cell Disease Center, Applied Biology, and Quantum Electronics).\(^{71}\) During the 2002-03 academic year, the School had 72 tenure and tenure track faculty members, research awards of $13,022,149,\(^{72}\) and total research expenditures of $12,457,378.\(^{73}\)

NSM’s departments have roughly 10-15 tenure and tenure track faculty each. These numbers are small compared to corresponding departments at many of the better research

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\(^{69}\) The refrain heard during a number of our meetings on campus was “we need twice as many faculty members doing twice as well.”

\(^{70}\) In this section, we discuss all of the academic departments in the School with the exception of the Departments of Mathematical Sciences and Science and Mathematics Education. Those Departments were not included because we did not meet with any of its faculty, and a review of their web page indicates very little research.

\(^{71}\) Its Department of Science Education is not research oriented.

\(^{72}\) *An Executive Briefing Provided by UTD to the Washington Advisory Group*, op. cit., page 51.

universities, and balanced growth could help achieve more favorable critical masses of researchers throughout the School. A doubling of tenure and tenure track faculty in the sciences is probably needed over the next decade. We were told that the School plans to add 45 new faculty positions over the next decade, and increase its level of externally funded research to $50 million per year. Its current (2003) level of annual research expenditures is $12.5 million.\(^\text{74}\) Even if the current faculty were able to double the amount of its externally funded research, new hires each would have to average $550,000 in annual research expenditures for the School to reach $50 million. We do not believe it likely that this result can be achieved. The School also expects that all of its current space to be upgraded and renovated over the next decade and that 100,000 sq.ft. of additional space will be available for its expanded efforts. It was not clear to us how much of this growth and expansion has been authorized by the University.

We were told that teaching loads in some of NSM’s departments are higher than those at top tier research universities against which UTD must compete for faculty members – up to three courses per semester. Plans for faculty growth will need to provide some relief, in addition to accommodating the expected increases in the number of undergraduate and graduate students. From the figures presented to us, it appears that School would like to grow its faculty by roughly 50% over the next five to ten years although UTD’s administration has not specifically authorized this growth. It is not clear how teaching loads for research faculty would be impacted by that level of growth.

At this time, NSM has an interim Dean. In view of the ambitious and difficult goals of the School, a permanent Dean should be named as soon as possible following the appointment of a new university president.

**Department of Molecular and Cellular Biology**

The Department of Molecular and Cellular Biology has 16 tenure track and 4 senior lecturers. At present it has no chairman, and is being run by a “troika” of tenured faculty. Faculty members with whom we met viewed this situation as unfortunate and we certainly concur. Good leadership for the Department is essential at this point, and we believe an external search for a chair should be concluded expeditiously.

The Department has approximately 600 undergraduate majors and 74 graduate students, including 24 Master’s and 21 Doctoral students. Teaching loads appear reasonable (1+2 for research active faculty). Most of those with whom we spoke taught one course per semester. As in other departments, the faculty members here feel the undergraduates are very good, while the overall quality of graduate students is mediocre. This mediocrity was attributed to factors such as non-competitive stipends, problems with tuition remission, and a lack of a good central recruiting policy.

This Department has a number of well trained, research productive faculty members, but fewer than half have external grant support. Faculty members carry out research in a variety of areas within “modern biology,” i.e., genomics, proteomics, bioinformatics, structural biology, and animal models of disease, without an overall focus on any particular area. Thus, at present, there is no critical mass of excellence in a sub-discipline, and the Department is too small and spread too thin. The Department must hire 8 to 10 new research active faculty members in order to develop the necessary critical mass.

\(^{74}\) Information provide to WAG by UTD.
The individuals with whom we spoke described laboratory space and research infrastructure as inadequate. For example, the Department’s electron microscope is outdated and it does not have up-to-date advanced light microscopy and sequencing and microarray facilities. Better core facilities and sufficient research space will be needed to attract new recruits and increase research support.

A healthy Department of Molecular and Cellular Biology is vital, even if the University’s main focus is on engineering, computer sciences, and physical sciences. This is true not only because of the increasing intersections of these disciplines at the cutting edge of molecular biology, neuroscience, computational biology, bioengineering, etc., but also because of the availability of funding in those fields and the increasing emphasis on interdisciplinary research. Over the last several decades, MIT has built its biology department into one of the largest departments in the university and one of the best in the world, to the great benefit of the institution as a whole, and to the national scientific enterprise. While UTD cannot build a biology department like MIT’s in the coming decade, a large, more focused effort in the biological sciences with a substantial number of new research active faculty will be very important if UTD is to move to the next level. UTD’s department has a productive core of researchers that can provide a foundation on which to build, but it is too small to be viable. Unless this situation improves, UTD will not be able to fully exploit possible linkages and partnerships with UTSWMC.

Center for Sickle Cell Research

The new Center for Sickle Cell Research provides a good example of, and possible model for, a UTD collaboration with UTSWMC. The director of the Center is based at UTSWMC, and the Center is jointly supported by a large NIH grant. UTD’s share of that grant is $150,000-200,000 per year. UTD’s participant in the Center, an M.D. well trained in pediatric hematology and oncology, is an impressive new hire who works on hemoglobin gene regulation and is supported by an NIH grant in addition to the Center grant.

Department of Chemistry

The Department of Chemistry has 13 tenure and tenure track faculty and 3 adjunct faculty (senior lecturers), with 56 Ph.D. students and external funding of approximately $3 million per year. Much of the research conducted by Chemistry faculty is centered in the NanoTech Institute whose director, a recent recruit from Honeywell, is very impressive. That recruitment was facilitated by the earlier recruitment of the 2000 Nobel Laureate in Chemistry, Alan MacDiarmid. Often, appointments of very senior people who did important work elsewhere and who maintain other positions do not contribute substantially to small departments beyond a certain public relations value. In this case, Professor MacDiarmid was able to identify outstanding researchers working in industry who could be attracted to UTD and contribute significantly to its vitality and growth.

We understand that the Dean intends to strengthen this Department by adding 6 new faculty positions, thereby achieving a critical mass of researchers. The Department’s faculty appropriately focus on important and high opportunity fields such as nanotechnology and other material sciences, fuel cells, and membranes. The Department seems uneven in terms of research accomplishments and potential. Recent hires in nanomaterials already are making an impact on research and enhancing UTD’s standing. Beyond this work, the Department’s principal strengths seem to be in polymers.
Rogers MRI Center at UTSWMC

The Rogers MRI Center has very good, and currently expanding, facilities at UTSWMC. Dr. Dean Sherry, who is a Professor of Chemistry at UTD, also is a Professor of Radiology at UTSWMC and there is a long standing history of joint activities between the two institutions led by Dr. Sherry and Dr. Craig Malloy at UTSWMC. It is of interest that UTD had NMR facilities in the Chemistry Department before UTSWMC and that stimulated the collaboration. The Rogers Center now is expanding into new facilities and will become one of the largest MRI Centers in the country. It is expecting a new 3T magnet for metabolic studies that will be designated the UTD-UTSWMC magnet – an important symbol of the partnership.

The Rogers Center now has two large NIH Center grants, each about $2 million a year, and UTD is a subcontractor on those grants. The Center is a vital asset for UTD as well as UTSWMC because it represents a currently forefront, high opportunity area that will become even more important in the future to chemistry, biology, brain and behavioral sciences, psychology, and possibly other programs such as bioengineering. The extensive and impressive joint activities in this area provide convincing evidence that collaborations between UTD and UTSWMC can and do occur.

Department of Geosciences

The Department of Geosciences has 12 tenure and tenure track professors and two senior lecturers who cover a broad range of topical research areas, and 30 Ph.D. students.75 Research in geosciences is concentrated in the Center for Lithospheric Studies. In our briefings, we were told that about 7 of the 11 faculty members are research qualified. Their teaching loads of two organized courses per semester are high compared to other geosciences departments at top rated universities. The Department has good contacts with the exploration industry but it is of a sub-critical size. Nevertheless, a review of its publications in major journals shows breadth and competence across geological and geophysical sub disciplines of the type that should be fundable federal agencies and industry. The Department should be able to increase its level of sponsored research. With the approval of a doctoral program in the spring and the addition of about 4 research capable faculty members, the situation should improve.

Department of Physics

The Department of Physics has 15 tenure and tenure track and 33 Ph.D. students.76 Its largest research center and one of the longest-standing centers at UTD is the Center for Space Sciences. The technical staff of the Space Sciences Center is comprised of 4 members, 4 research scientists and an engineering team of 6. The average research budget for the Center is about $3 million per year, depending on particular space missions. The Center for Space Sciences has a relatively long-standing record of plasma and related experimental studies of the space environment, in addition to a continuing program of hardware fabrication for space probes. This program has been the main source of research funding in the Department and constitutes its only critical mass research effort.

Recent strategic hires in nanomaterials have brought the Department into the NanoTech Institute and the proposed display initiative. The focus of these efforts are on the respective interdisciplinary research centers and do not represent critical mass research groups within the

75 Id.
76 Id.
Department. Other members of the Department maintain small research programs in atomic physics, condensed matter physics, high energy physics, cosmology, and quantum optics. However, the Department is too small to support effectively the goals of the University. Other than space sciences and, possibly, materials science, we did not see the kind of critical mass research groups that can sustain programs of Ph.D. level research that will be sufficiently competitive to contribute to UTD’s efforts to become a Tier 1 research university.

The Department desires to grow to a steady-state level of 17 tenure and tenure track faculty, but the timetable and a detailed path for this to occur was not described to us. The Department does have the approval of the administration to hire in space sciences and materials science, and it anticipates 5 or 6 faculty members to retire over the next few years. However, there appears to be a disconnect between the strategic hiring goals being promoted by the Vice President for Research (who wants to hire established scientists in targeted research areas) and the rather vague plans described by the Department to hire excellent young researchers who will grow in stature over time. A shared vision must be developed as soon as possible.

One fact of note is that total R&D expenditures in Physics at UTD fell by 85% between 1992 and 2001. While this might be related to particular cycles in multi-year grants, it is an indicator of the fragility of research funding in physics.

Recommendations for the School of Natural Sciences and Mathematics

As described above, we found NSM’s departments and programs to be, for the most part, too small for the University’s aspirations, but with pockets of strength on which it can build. Our specific recommendations for the School are as follows:

1. Physics, chemistry, biology and related departments and centers are cores of strength in almost every successful research university. UTD has a small foundation of productive researchers in these fields. However, the School must double the size of its tenure and tenure track faculty over the next decade to achieve critical mass, satisfy teaching responsibilities, and create a real possibility of increasing its externally funded research to the $50 million level to which the School aspires. Adequate space will have to be made available to provide for the new hires and for growth in the current faculty’s research programs.

2. Research active faculty members should have teaching loads of no more than 2+1, and in some cases less, depending on the magnitude of their research programs.

3. The Department of Molecular and Cellular Biology, a forefront and well funded field, is particularly small relative to what is required for critical mass and for its potential contribution to the sponsored research at UTD. A permanent chair must be recruited as soon as possible, and the Department should add at least 8 to 10 new research active faculty members at a rate of approximately two per year.

SCHOOL OF BEHAVIORAL AND BRAIN SCIENCES

Although the School of Behavioral and Brain Sciences (BBS) is the smallest school in terms of faculty, it ranks first in publications per tenure and tenure track faculty member, second in research support per faculty, and third in total external support. The faculty impressed us as

having good morale and enthusiasm and being strongly supportive of their Dean. The Dean feels that an additional 8 to 10 members of the faculty will be needed in the next three years to keep pace with the growth of their educational and research programs. This estimate appears reasonable to us.

There are 707 majors in the School – 492 are in psychology, 91 in neuroscience, and 124 in speech and audiology. There are approximately 240 Master’s and 100 Ph.D. students. The School offers Ph.D. degrees in Audiology and in Human Development and Communicative Disorders. Currently, it is not allowed by the Coordinating Board to grant Ph.D.’s in Psychology. Given the strength of this School, this seems unreasonable. The Psychiatry Department at UTSMWC has expressed interest in a joint Psychology program with UTD. This should be actively pursued.

Most of the research in neuroscience and related areas – cognitive science and psychology – is done by faculty members in this School, and much of it is on audition and the auditory system. A major strength of the School, and indeed of UTD, is the Callier Center, which specializes in hearing, speech, language and communicative disorders. The Callier Center has two sites – one on the UTD campus and the other adjacent to UTSMWC. Its clinical programs serve approximately 70,000 patients per year and the Center also provides educational programs for both hearing impaired and normal children. Much of the research both at Callier and in the School in general is concerned with cochlear implantation treatment for deafness, which is one of the major advancements in modern medicine. For example, researchers are studying critical periods in the auditory system to determine the optimal times to do implants, as well as the reorganization of the cortex that occurs following the cochlear implant procedure. This emphasis on the auditory system and related research areas makes much sense and the School of Behavioral and Brain Sciences is recognized as one of the top institutions in the country in this field. Indeed, the BBS graduate program in Audiology is recognized by U.S. News and World Report as in the top 25 programs in the nation (the only UTD program so far recognized as in the top 25). Furthermore, editors of the five major journals in hearing are in the BBS.

One of the School’s new initiatives is the development of a Center for Brain Health. Six faculty members are involved, in which there is considerable community interest. The faculty members involved study such things as recovery from traumatic brain injury, aging of the brain and Alzheimer’s disease, gender and aggression, child care and language, and hearing impaired humans.

Generally, the School of Behavioral and Brain Sciences is impressive, but some of its members are quite senior, it has lost some faculty, and like many other departments at UTD, only about 50% of its faculty members presently have research grants. Some key new appointments could energize the School and bring it close to top tier.

Recommendations for the School of Behavioral and Brain Sciences

1. At least 8 to 10 new appointments of research active faculty should be made in the next three years, including filling four existing vacancies. Psychology should receive several of these appointments as the group is currently too small. Other appointments could augment the fields listed above in the areas under the umbrella of

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78 Information provided to WAG by UTD.
the Center for Brain Health. They could also continue to build on their major strength which is audiology, where they have potential to be a national leader.

2. The School’s facilities on the UTD campus are marginal, but a new Callier Center building is being completed now. If this is not adequate to house the needed new faculty appointments, consideration should be given to seeking additional space.

3. The School should continue to build on its already strong collaborations with UTSWMC which is an enthusiastic partner.

4. The School should be permitted to develop a Ph.D. program in Psychology, perhaps jointly with UTSWMC.

ERIK JONSSON SCHOOL OF ENGINEERING & COMPUTER SCIENCE

In 1986, the Texas Higher Education Coordinating Board permitted the establishment of a School of Engineering and Computer Science at UTD, and the School accepted its first graduate students in 1987 and its first freshman class in 1995. Its new Dean was hired in August 2003, after having served for many years with Texas Instruments. In 2002, the School had an enrollment of 3,408 students, including 2,033 undergraduate and 1,375 graduate students. The School has only two departments – Computer Science and Engineering (CSE) and Electrical Engineering (EE) – and it grants approximately 754 degrees per year in these two disciplines, of which roughly 14 are Ph.D.s.

The concentrated strength of the College of Engineering in two disciplines makes the academic performance in each one of these departments competitive with top ten engineering schools. Specifically, UTD is fifth in the country in BS degrees awarded in ECE/CSE and third in the number of MSEE degrees awarded. Among Texas’ graduate engineering schools, UTD is third in the number of total awarded Ph.D. degrees after TAMU and UT Austin. The School is fifth in the state in research expenditures per faculty member (after TAMU, UT Austin, Rice, and U of Houston) and last in terms of the mix of engineering disciplines, with only two areas of specialization. Thus, while the School’s two departments are strong and competitive as compared to those of the top ten institutions, the small number of departments makes the School weak in comparison to schools at other universities because its focus is so much narrower.

UTD currently has a high quality faculty cohort in the School of Engineering and it has been able to attract active research groups in materials, nanotechnology, and electronic communications. Their research is narrowly focused on electronic-related applications and on some specialized but significant biomedical-related projects performed in collaboration with the UTSWMC. The School’s research base is respectable and its faculty members are involved in high quality research and are publishing in top scientific journals. But the School must broaden its scope to achieve its objectives and serve the region’s economic development needs. Because

80 An Executive Briefing Provided by UTD to the Washington Advisory Group, op. cit., page 27.
82 Id.
83 Id.
84 Id.
of the requirements of surrounding industries’ and UTD’s designated research foci, the following examples should be considered: Industrial Engineering and Manufacturing Systems, Mechanical and Materials Engineering, Chemical and Bioengineering. This expansion of the engineering mission would give the School a modern and comprehensive look and a more realistic base from which to achieve its stated goals.

Like the University generally, the School of Engineering aspires to Tier 1 status, and its new Dean has set a goal of being one of the top 50 engineering schools in the country, with $50 million in external research funding annually. He plans to recruit 40 new faculty members over the next five years (he has been given authorization from the University to do so) and 400 new graduate students, and to establish two new academic departments. Currently, the School has 78 tenure and tenure track faculty members, including 25 assistant professors (creating an undesirably low ratio of assistant professors to total faculty). The undergraduate student-to-faculty ratio is 29:1 as compared to 18-25:1 at top 50 institutions. With the new faculty positions contemplated by the Dean, the School’s student to faculty ratio may be reduced to levels comparable to those of top ten institutions.

Faculty salaries are a key parameter in attracting top faculty. The administration is prepared to pay competitive salaries to recruit entry level assistant professors with demonstrated research capability. However, existing faculty salaries are not competitive (other than salaries of individuals hired in the past 2 to 3 years). For example, in the year 1999 professorial rank, salaries at UTD were $80,000/year, while at Georgia Tech, where salaries are in the competitive range, they were $95,000/year. The salary issue needs to be addressed, and given the priority it deserves.

Department of Computer Science and Engineering

The Department of Computer Science and Engineering has about 40 tenure and tenure track faculty members and almost half of the School’s student population. Its faculty members participate in a number of multidisciplinary programs, including the Institute of Interactive Arts and Engineering in collaboration with the School of Arts & Humanities, the materials science research group and the Biomedical Engineering Program with UTSWMC. The faculty members are all enthusiastic and supportive of the University’s plans for growth, and are working on a variety of programs including Networking, Software Engineering, Computer Systems, Intelligent Systems and Human Language Technology and Computation Theory and Applications which are funded by federal and state programs. This Department expects to increase its research funding to almost $25 million a year from the current $4 million level, a daunting, if not impossible, task for any top CSE department, and we saw no evidence of any detailed plans that could justify such academic and research growth, despite the fact that the Department has a very large number of established centers such as the Centers in Digital Forensics and Emergency Preparedness; Integrated Circuits and Systems; Systems, Communications, and Signal Processing; Embedded Software; Photonic Technology and Engineering; and Advances in Telecommunications Systems and Services.

86 Id.
87 Id.
88 Information provided to WAG by UTD.
89 The Erik Johnsson School of Engineering & Computer Science Status & Plans, op. cit.
90 Data comes from a report circulated to the Deans of school of engineering at Big 10+ universities.
91 Information provided to WAG by UTD.
92 The $4 million figure is the one that was used by the Dean during his presentations to WAG.
Department of Electrical Engineering

The Department of Electrical Engineering has 38 tenure and tenure track faculty members and half of the School’s students. It has been authorized to recruit 5 to 7 new faculty members for the next academic year. The Department has a variety of high quality programs funded by the federal and state government, including: Signal Processing, Microelectronic Circuits and Systems, Nanotech Materials and Processes, Optical Circuits and Systems and Speech Processing and Biotech Aids to Hearing. The Department has not gone through any strategic planning exercise and faculty members are not clear on the University’s overarching research goals and objectives.

Recommendations for the Erik Jonsson School of Engineering & Computer Science

Our specific recommendations for the School are as follows:

1. The School of Engineering should expand the number of departments over the next 10 years. Because of the requirements of the surrounding industry, and the UTD designated foci, the following areas should be considered: Industrial Engineering and Manufacturing Systems, Mechanical and Materials Engineering, Chemical and Bioengineering. This expansion of the engineering mission would give the College a modern and comprehensive look and a more realistic base from which to achieve its stated goals.

2. The School’s current educational offerings should be expanded to include a Bachelors degree in Computer Engineering, co-sponsored by both of the School’s departments.

3. The School of Engineering should develop strategies to focus growth in the preferred strategic subjects identified by UTD; namely, Information Transmission and Processing, Advanced Materials and Instrumentation, and Disease-Centric Science and Technology. These strategies should be based on a realistic estimate of the funding projected over the coming five to ten years, and the effects of the strategies on tuition, faculty salaries, and available space and equipment for research. Large increases in faculty and research are essential for the expansion envisioned.

4. At present, the School is expecting to increase the number of tenure track faculty by 40 during the next five years. This rapid expansion of the faculty will be difficult if the quality of hires is to be maintained. Therefore, a rational academic and business plan must be developed that encompasses a strategy to attract the required talent, and deals with resource issues, including those related to space, equipment and infrastructure.

5. The School of Engineering should increase its support for the expansion of the biomedical program between UTD and UTSwMC, and develop a process that will allow and sustain joint appointments. It also should consider the development of an undergraduate program in biomedical engineering because of its great advantage in having a high quality medical school in the area.

Information provided to WAG by UTD.
6. UTD’s administration and the School are communicating with the local business community to create an awareness of UTD’s efforts and to foster a dialogue with the community. We recommend that this dialogue encompass the broadest industry participation, not just the electronics or communications industry, but aerospace and aeronautics, natural resource industries, and others that have a major presence in the region. The objectives of engaging in this type of dialogue should be to provide guidance to the School as it develops new initiatives and educational programs, and to foster industry funded research, collaborative efforts, the joint use of unique equipment, consulting arrangements, and other relationships.

SCHOOL OF MANAGEMENT

Management science (along with physical and biological sciences, electrical engineering, and computer science) is one of the key focus areas designated by the Provost, who notes that “aim[ing] first at building critical-size cohorts” in these areas is a key UTD strategy for the 1990s and the 21st century. The state-of-the-art new building, with some room for expansion, that houses the School of Management (one of only two new buildings authorized and built recently at UTD) is tangible evidence of the position this School enjoys. Clearly, it is one of the major areas of strength on which UTD is relying as it plans to take the next big step to becoming a first tier research university.

The School has 2,092 undergraduates, 1,653 Master’s and 83 Ph.D. students. It offers two undergraduate degree programs (in Business and in Accounting and Information Management), several at the Master’s level (three versions of the MBA, MS in Accounting and Information Management and in Information Technology and Management, and an MA in International Management), and two Ph.D.s (one in Management Science and one in International Management Studies). It also offers an Executive MBA and several certificate programs and short courses. It has 65 tenure and tenure track faculty, all of whom are research active; several of them serve on the editorial boards of first tier journals in their fields and many rank high in citation analyses. It also has 50 non-tenure-track lecturers and adjuncts. The Ph.D. students are virtually all full-time and supported as TAs and, we are told that several have gone on to find positions at such places as Stanford, Yale, Carnegie Mellon, Northwestern, Virginia, and Washington University in St. Louis.

The School has a strong quantitative-technical orientation, and it is in such areas that its comparative advantage is clearest. Although it is not ranked among the top 50 business schools in the widely followed U.S. News and World Report or Financial Times rankings, a recent article that rated such schools in terms of their publication in four leading journals of Information Science-Information Technology and Management-Science-Operations Research ranked UTD as number 13, just below Duke and Harvard and just above Washington University and the University of Michigan.

The School of Management is self-supporting, with funds coming primarily from tuition and fees. Its plan is to grow the faculty in proportion to the increase in student credit hours, with

94 Untitled document from Provost.
95 Information provided to WAG by UTD.
96 Id.
97 Id.
Research Capability Expansion at UTA, UTD, UTEP, and UTSA

particular emphasis on growing graduate programs because the state’s funding formula allots three times as much funding per credit hour at the Master’s level than for upper level undergraduate hours, and nine times as much at the Ph.D. level. It receives virtually no funding from external grants and the faculty has no interest or incentive to pursue such funds; as is true with all top tier business schools, research prestige comes from publication productivity (both quantity and quality), not from grantsmanship.

The School does receive, however, external funding from the business community. It has outside funding, much of which comes from 13 large corporate “strategic partners”, who earn that designation by contributing at least $20,000 per year to the School. Other business “partners” contribute lesser amounts, between $5,000 and $20,000. The vehicle for these partnerships appears to be the School’s seven Centers, all of which are largely or entirely self-funded and serve more as an outreach than a research function; they are managed by Directors who are Senior Lecturers and run short programs and certificate programs.

The goal of the School of Management, as enunciated by its Dean, is to be among the nation’s 20 leading business schools, measured broadly rather than just in its areas of primary focus, within 2 to 3 years. It has moved up slightly in the broad rankings, but is nowhere near the top 20 currently (it is in a 5-way tie for #78 in the U.S. News ands World Report 2003 ranking of MBA programs and #61 in the Financial Times 2003 ranking of Executive MBA programs). To achieve this level, the Dean asserts, will require some $40-$50 million in endowment to fund chaired professorships (the current 2+2 teaching load is not competitive with top ranked schools, which generally have 2+1 loads at most) and additional funding for graduate students, particularly at the PhD level. The faculty also stresses the need for direct funding for research, to provide both teaching relief and acquisition of data, etc. They feel, we believe correctly, that an expanded full-time MBA program would increase the School’s national visibility (currently almost all of the MBA students are part-time) but that such students would initially require a subsidy (as did the high quality undergraduates at first) until the program became better known.

**Recommendations for the School of Management**

1. The School should develop a specific plan for raising the endowment money needed (see above) to fund chaired professorships and funding for Ph.D. students – neither the faculty teaching loads nor the funds available for graduate students are currently competitive with those of the School’s aspirational peers. Expanding the “strategic partners” concept would be helpful, but some much larger gifts would also be essential; one cannot get to $40-$50 million in $20,000 increments. Whether funding of this magnitude is potentially available from the North Texas corporate-philanthropic community is something the School must ascertain, possibly with the help of a specialist consulting firm.

2. If the School is to rise in the broader rankings, which specifically rate MBA and EMBA programs, it will by definition have to improve the quality of the students in those programs, which means a substantial expansion of its full-time MBA cohort.

3. The Dean’s goal of reaching the top 20 in the broad overall rankings within 2 to 3 years is almost certainly too ambitious. Continuing to increase the visibility of the School in the technical-quantitative areas in which it is already very strong, along with a more gradual rise in the overall rankings, would be more realistic.
The School of Social Sciences (SSS), with some 1,000 students, offers six baccalaureate programs, four master’s programs, and three Ph.D. programs – a well established degree in Public Policy and Political Economy with 78 doctoral candidates, and two newly authorized programs, one in Economics with 17 doctoral candidates and one in Political Science with 12. The 49 tenure and tenure track faculty members are all research active and a number of them publish in the very top journals in their fields. Faculty teaching loads are 2+2; all full-time Ph.D. candidates are funded as either TAs or RAs.

The School’s goal, as articulated in a briefing paper provided to us, is “to develop several nationally-competitive graduate programs by limiting the scope of each program in order to build depth in selected subfields within disciplinary and policy areas. An integral part of the strategic plan is to seek complementarities across disciplines in order to leverage scarce resources.” The major areas of research concentration, all of which have substantial faculty strength, are: democratic support, electoral choice, and partisan attitudes (comparative studies); human resources; and geographic information science (GIS) for the social sciences. Much of the work in GIS is performed through the SSS’s Bruton Center, which conducts both basic and applied research relating to urban and regional development and performs grant and contract research with local, national, and international organizations. Similarly, many of the faculty involved in research on human resource issues work directly with the Texas Schools Project, a long term research project, funded with a $1.5 million grant, that can access individual longitudinal data on virtually every K-12 student in Texas (with plans to extend into college and the workplace). This remarkable database actually serves as a recruiting tool for new faculty interested in education-related issues.

The Dean estimates the average annual flow of research grant funding to his School at $150,000 and $250,000 (this is UTD’s share of grants totaling $400,000 or more; most grants are shared with faculty at other institutions, given the small size of his faculty). Included are a $600,000 multi-year FIPSE (Fund for the Improvement of Postsecondary Education) grant; 2 to 3 NSF grants generate about $150,000 per year and grants from local government, another $30,000 to $40,000. One faculty member has several small grants in the area of criminology, with a couple (including one for over $3 million) pending with the Department of Homeland Security.

The Dean and faculty are anxious to receive authorization for two innovative Ph.D. programs in areas where the faculty have particular strength: Criminal Justice and GIS. Everyone with whom we met agreed that the major obstacle to the SSS achieving national visibility as a first tier School is not quality but scale. One faculty member stated that the School needs an additional 15 faculty members in order to field all of its teaching and degree programs, and probably more if the new PhD programs are authorized. However, the School is not currently authorized to make any new hires. Also, the School’s interdisciplinary focus is both a strength and a weakness: a strength because it is a source of unique advantage in areas which are of growing interest both to students and to some granting agencies (e.g., the NSF), but a weakness because neither the Texas bureaucracy nor outside rating systems are familiar with such programs and therefore do not know how to categorize them.

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99 Information provided to WAG by UTD.
100 Id.
101 General Overview, School of Social Sciences, December 2003.
Recommendations for the School of Social Sciences

1. The School should be granted authorization for the two new Ph.D. programs described in the preceding paragraph. These are niche areas in which the School has particular strength, and it could gain both visibility and opportunities for external research funding by capitalizing on them.

2. The School’s faculty FTEs should be increased by at least 25% in order to reduce teaching loads for research active faculty and staff the new Ph.D. programs.

3. The School should preserve its interdisciplinary focus and should preserved and expand its emphasis on prioritizing areas with actual or potential complementarities with other Schools, both within UTD and in other, particularly nearby, institutions.

4. The School should work intensively to exploit such complementarities through joint research projects and proposals, in order to overcome the small-scale problem.

General Observations, Conclusions And Recommendations For UTD

Over the past decade, the University has developed truly excellent undergraduate programs and recruited actively and well in specific research areas. The University has the potential to achieve Tier 1 research university status, although whether it can do so within a decade is questionable. UTD must address a number of issues, some related to resource needs, and others more structural. We agree with the Provost’s assessment that UTD must double the size of its research active faculty and its current faculty members must double their research efficiency. UTD also must improve the quality of its graduate students. Finally, it must recruit a new president with appropriate expertise and standing, as well as a new dean for the School of Natural Sciences and Mathematics.

If it is able to recruit the right people in the right numbers; form meaningful and productive partnerships with UTA and UTSWMC and other institutions; and secure the resources that will be needed, it will be in a good position to achieve its goals. UTD is fortunate that it has been given a five year fundraising head start in its march towards Tier 1 status with Project Emmitt. Its success in attracting Emmitt funding suggests that the University has the support of the public and private sectors to achieve its goals and that it is capable of achieving substantial fundraising success. Emmitt and its aftermath, coming at this time of low expectations for augmented state financial support, are perhaps the most important advantages that UTD can count on in moving forward. In addition, its current partnerships with UTSWMC show much potential, and expanded partnerships with UTSWMC and UTA will be important to UTD's future.

UTD’s major strengths are:

- Its ability to recruit quality faculty, as demonstrated by recent hires;
- Project Emmitt and the industrial support it has received;
- Its existing and potential collaborations with UTSWMC, UTA, and other potential partners in the Metroplex;
- Its proximity to a community with record of large donations to research institutions; and
- Its excellent undergraduate students and programs.
Its weaknesses are:

- Its inability, so far, to attract significant levels of external research funding;
- Its inability in recent years to raise large philanthropic contributions (other than Project Emmitt) in comparison, for example, to the neighboring UTSWMC;
- The small size of its research active faculty; and
- The uneven quality of its graduate student populations.

In particular, UTD must build on its current research strengths which include:

- Brain and behavioral sciences (particularly audiology);
- Magnetic resonance imaging;
- Information technology (especially communications);
- Advanced materials;
- Advanced instrumentation; and
- Management science and operations research.

If UTD proceeds as described above, the next high opportunity research areas for it to consider are:

- The biological sciences through a larger and better funded Department of Molecular and Cellular Biology (this will be central for UTD if it is to become a Tier 1 research university);
- Expanded and new collaborations with UTSWMC and UTA, where there are many overlapping interests and opportunities for synergy;
- Further development of the engineering programs that underpin Project Emmitt;
- Expanded involvement in nanotechnology by broadening materials sciences, chemistry, physics, and computational research and visualization; and
- Geographic information science (GIS) which, if a strong PhD program were authorized, could pull in faculty participation from the School of Engineering and Computer Science and the School of Natural Science (geophysics) and, with this larger group, be in a good position to attract NSF funding.

All of the foregoing will require a major enlargement of resources:

- The University estimates that it must recruit 250 faculty members in science and engineering, each of whom brings in an average of $300,000 per year in research expenditures. 102 This $300,000 figure may be on the high side, given the $230,000 national average mentioned earlier, and UTD’s current average of $180,000. 103 Since state funding is not likely to be available for this type of expansion, UTD will have to identify other sources for it. As we mentioned earlier, we believe tuition increases represent the only realistic possibility for funding for the salaries of these individuals.

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102 Personal communication from Provost.  
103 Information provided to WAG by UTD.
However, some thought is being given to creating a country tax district to support the university, but this is at least 5 years away. Set up costs could then be funded from a variety of sources including the PUF, indirect cost recoveries, and philanthropy.

• In terms of facilities that will be needed to support the contemplated expansion, Project Emmitt should take care of UTD’s needs for the next five years. After that, additional capital projects on a scale similar to that of Project Emmitt will have to be undertaken, and sources to fund those projects will have to be secured.

The difficulty of accomplishing all of the foregoing tasks should not be underestimated. They will require rigorous and extensive planning by the faculty and administration, and not all areas requiring change and enhancement can be tackled at once. Priorities must be set, and we suggest the following:

• Develop an institution-wide strategic plan (including realistic timetables for achieving goals) that is properly vetted by responsible administration officials and the research active faculty;
• Develop and implement a plan for the Project Emmitt resources;
• Enhance the research capability of the School of Natural Sciences and Mathematics by expanding the faculty size to critical levels; and
• Broaden the disciplinary base of the School of Engineering.

As mentioned earlier, UTD estimates that it will take some 250 new research active hires, each with a research efficiency of $300,000 per year to reach Tier 1 status. If these individuals are recruited at the rate of 20 per year (a number the Provost believes is the maximum that can be achieved while insuring quality) it will take approximately 10 years to achieve Tier 1 status. We would have used the national research efficiency number of $230,000, in which case 325 additional faculty members would be needed. If recruited at a rate of 20 per year, it would take some 15 years to achieve Tier 1 status. The differences between these two calculations indicates the degree of uncertainty involved in any estimate of this type. In our view, either is reasonable. The main difficulty UTD will face in achieving its goal will be in obtaining state support for the additional FTEs, and in finding sources of funding for their set up costs and the required teaching and laboratory facilities.

The foregoing discussion provides an overview of what we learned at UTD and our broad recommendations for research areas to pursue. Our specific recommendations for the University are as follows:

1. **Recruiting.** The key to UTD’s success will be in recruiting the very best people to join the faculty. UTD’s leadership understands how to identify and recruit top people; the challenge will be to continue to do so at an appropriate pace that will maintain UTD’s momentum, but not compromise quality.

2. **Research Areas.** UTD has done a good job of focusing on a few research areas (and the people to go with them) that are topical. We emphasize the importance of maintaining or building critical strength in the basic science and engineering departments at the same time. The University should strive to be nimble with respect to changing trends in research support while developing a long-term vision of advancing science and engineering in the disciplinary departments.
3. **Partnerships.** Partnerships between UTD and other research entities in and near Dallas can become vital instruments for UTD in realizing its ambitions. Some such activities are ongoing, including individual collaborations among researchers at UTD and at UTSWMC. UTSWMC can be helpful in identifying and recruiting faculty for UTD in the life science and allied fields. More formal agreements for joint activities would be welcomed, and would help create an environment that encourages research cooperation. Both UTSWMC and UTD are interested in building closer relationships. In addition to further research collaboration and shared space and equipment, other ways in which bridges could be built include the use of joint search committees for key faculty hires, joint seminars, and the possibility of joint Ph.D. or even MD-Ph.D. programs with some of the Ph.D. thesis research being done at UTD. There are several examples of such successful MD-Ph.D. programs, e.g., Rockefeller University and Cornell Medical School.

4. **Collaboration with Other UT Institutions.** Both UTD and UTA are building quality research programs in Electrical Engineering, Computer Science and Engineering, and Material Sciences including Nanotechnology. Their proximity to each other opens the possibility of collaboration in jointly pursuing sizeable projects of the type frequently initiated by federal mission agencies. The combined strength of the two institutions would make for proposals that could compete very well. In general, joint activities and proposal submissions by the trio of UT System institutions in the Metroplex should be encouraged. Such activity could lead to highly competitive research proposals because of the strength of the combined teams. The three institutions together with the UT System Administration should put in place a 5-year joint strategy focus in engineering and science, including the biomedical sciences. The joint strategy should include a mechanism for frequent face-to-face dialogue between faculty members at the three institutions, since such dialogue is in important mechanism for launching new interdisciplinary concepts.

5. **Strategic Planning.** UTD should develop a strategic plan to guide its pursuit of research eminence, drawing on the expertise of the University’s Provost, deans, department chairs and research active faculty who know what it takes to build research strength, as well as on input from other interested parties. This plan should be detailed and level headed and include a timeline for recruiting faculty and key milestones along the way. It also must be realistic about the possibilities of state allocations.

6. **Facilities.** UTD has an extensive facilities plan that extends to 2025, which allows for a careful investment of resources and contributes to the goals of the institution. However, it is not clear that the plan and schedule can keep pace with the expansion expected by UTD. We suggest that the University develop a realistic, detailed space and infrastructure plan, one staged to match the anticipated growth in students and the research activities of its faculty.

7. **Recruiting a New President.** The recruitment of a first class president for UTD is an absolute must if it is to achieve its goals. This person should be an accomplished scientist or engineer and a strategic thinker. He or she should have both the reputation and the personality to coax funds from the Dallas philanthropic community and the state, and the administrative capacity to appoint an excellent executive team and, with them, execute the planned programs with courage, judgment, and precision.
8. *Grant Preparation.* Faculty members with whom we spoke would welcome more central support for grant preparation and management, and for identifying sources of support.

9. *Graduate Students.* UTD must allocate additional resources to improve the quality of its graduate students. The current unsatisfactory state of affairs has been attributed to factors such as non-competitive stipends, problems with tuition remission, and a lack of a good central recruiting policy. No successful research university has only a mediocre cohort of graduate students.

10. *Philanthropy.* UTD must develop a strategy for gaining access to major donors in the Greater Dallas region.
The University of Texas at El Paso (UTEP) opened its doors in the fall of 1914 as the Texas School of Mines and Metallurgy, with a mission of fostering the economic development of far west Texas and northern Mexico. In 1919, the University became part of the UT System, and while the engineering and science curricula predominated, many other courses and programs were added over the years. UTEP is now a Carnegie Doctoral Research Intensive university located in the largest bi-national metropolitan area on the U.S./Mexico border.

UTEP’s current president, Diana Natalicio, was appointed President in 1987, and during her tenure the University has experienced a period of remarkable transformation and progress on several fronts. In 1987, the University had $3 million in external research funding, just one doctoral program (in geological sciences), and a predominantly Anglo student body. Today, the University has nearly $33 million in external research funding, 11 doctoral programs, and a student population that is approximately 70% Hispanic, reflecting the demographic makeup of the region in which UTEP is located. The University is committed to providing access to a high quality education and to excellence in research and teaching. It rejects the traditional assumption that universities that aspire to excellence in research and graduate programs cannot also foster access to undergraduate education by students from a wide range of backgrounds.

Given the increasingly recognized importance of engaging the Hispanic population in higher education in general and in science and engineering in particular, UTEP’s mission – to provide both access and excellence – is of national, as well as regional, importance. UTEP can be the model for a university that has a positive impact on the economic and social environment of a region that is challenged by increasing cultural and economic changes.

University Leadership

The two things that strike one upon visiting UTEP are how much it has been able to achieve over the past 15 years with a striking paucity of external resources, and the charismatic personality of President Natalicio, about whom one heard not a single negative word. President Natalicio has accomplished much over the years. She has energized and inspired the faculty, articulated a clear vision for the University, and made many friends for UTEP in the community.

Under President Natalicio’s leadership, UTEP dramatically increased its external research funding, added ten new doctoral programs, successfully completed a $50 million capital/endowment campaign (ultimately raising $66 million), and became the second ranked U.S. college or university in terms of the number of its Hispanic graduates. UTEP is now ranked 5th among public institutions of higher education in Texas in terms of federal research activity and is ranked higher than any other non-health science center university in the UT System except

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104 This section of the report includes information that was provided to us during the course of our campus meetings. Where facts are given without citing to a particular document, that information was given to us orally during the course of those meetings.
105 NSF WebCASPAR Database System, op. cit.
106 UTEP Overview, chart briefing to WAG by The University of Texas at El Paso, November 10, 2003, unpaginated.
107 In a meeting with community leaders WAG found universal approval and support for the President. The leading member reported: “Whatever Diana asks us to do, we do.”
108 UTEP Overview, op. cit.
UT Austin. And the University has not limited its activities to expanding and enhancing its own research and education programs. UTEP has worked hard to improve schooling at the K-12 and community college levels in the area, and to focus much of its research on socio-economic and biomedical fields relevant to Hispanics and to residents of the El Paso and border region. President Natalicio is especially proud of the fact that TAAS (Texas Assessment of Academic Skills) math passing rates in the El Paso area have improved for Hispanic and African-American students from about 34% in 1992 to 88% today, and that high school graduation rates in the El Paso area are among the highest in the state, exceeding those of Austin, Dallas, Houston and San Antonio.

UTEP’s administration understands what it will take to move beyond regional to national (and international) recognition, and if anyone is capable of successfully leading the University in these areas, it is the current President. One of the uncertainties UTEP faces is the question of how far into the next 10-year plan President Natalicio will continue to lead the University. The challenge when she steps down will be to attract candidates of equal quality to succeed her. We were positively impressed by the deans and department chairs with whom we met, but the University’s upper administration did not appear uniformly strong. We understand that President Natalicio plans to make some changes in the administration’s makeup. If she does, we suggest that she attempt to identify individuals with experience in enhancing the research stature of a university.

Research at UTEP

UTEP wants to create a new model of excellence based on three primary goals:

- Creating an urban university that remains true to its values of serving an urban and predominantly minority community;
- Achieving early recognition as a Doctoral/Research Extensive university, and within 10 years rising in stature to a Tier 1 research university; and
- Achieving recognition as a Center of Excellence on U.S./Mexican Border Issues.

Its success in achieving these goals will be measured by the degree to which (1) its students graduate with solid academic credentials, qualifying competitively for careers in business, the professions, and for entry into the best graduate schools, (2) it expands its programs in graduate training and research, and (3) these programs meet the test of successfully competing for federal research grants and for grants from other sponsors. UTEP’s strategy, at least to the extent that it relates to research, relies on the selection of certain fields in science and engineering for special emphasis chosen on the basis of their relevance to its mission, the ability to build on existing research strengths, and opportunities presented for linkages and partnerships with regional institutions.

To date, UTEP has been remarkably successful in expanding its research programs and garnering federal support, skillfully using funds from programs targeted towards underrepresented minorities to acquire research equipment and in this way jumpstart research programs. As shown below, its research expenditures have increased dramatically over the years:

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110 Academic and Research Strategic Initiatives, a draft discussion paper dated March 18, 2002; reaffirmed and extended in interview with President Natalicio on December 2, 2003.
Of all of the institutions in the UT System (other than health science campuses), only UTEP and UT Austin even appear in *The Center’s* rankings of the top 200 American Research Universities based on federal research expenditures.\footnote{The Top American Research Universities, op. cit., p. 209.}

UTEP’s success in this area derives in large part from its ability to exploit the unique advantage provided by its location and the demographics of its student body. It has been able to capitalize on the availability of federal research funding geared towards minority institutions, faculty and students. For example, UTEP secured a $9.5 million Border Biomedical Research Center grant from the NIH Research Centers at Minority Institutions Program, and this has provided it with funds to develop research infrastructure in the University, including core facilities, some animal facilities and monies for pilot projects. UTEP also has successfully pursued SCORE (Support of Continuous Research Excellence) funding from the Minority Biomedical Research program of NIH’s National Institute of General Medical Sciences, and it is seeking funding for graduate student support from the Minority Office for Research at NIH. An NIH MARC (Minority Access to Research Careers) grant for undergraduate research has been funded, as has an AMP (Alliances for Minority Participation) grant from NSF for minority Master’s degree students.

UTEP’s strategy of pursuing this type of research funding is a logical one that will continue to pay dividends. However, to take the next big step, UTEP must visibly start to implement the goal of leveraging up its regional expertise to address issues of national and even international interest, using the “border zone as a laboratory for the U.S. of the future” model, as several faculty members we spoke with put it. Then UTEP must take the further step of increasing the visibility of such work, in order to become recognized as a general research institution that attracts competitive funding in the open competition for research funds with the
community of research universities. Finally, UTEP also must compete for private philanthropic support from outside its immediate neighborhood. This is of increased importance in these times of reduced state funding.

On several occasions, faculty members expressed a desire to wean themselves from sources of research support aimed at minority institutions and to attract competitively awarded federal research grants. In limited instances, they have been able to do this. For example, the Chair of the Department of Chemistry obtained an MBRS award from NIH when he first came to UTEP. Since then, he has been awarded over $12 million in research awards from NIH (RO-1), EPA, DOE and other government and industry sources. This augurs well for the future of the University, as does the fact that UTEP recently has hired a number of young, energetic faculty who are enthusiastic about the University and the direction in which it is moving. These individuals are already making a difference. Universities generally have trouble recruiting research qualified faculty since they must do so in competition with 100 or so other universities, but UTEP has developed some ingenious methods of recruitment. In UTEP’s case, we were told that once it settles on particular candidates, it does not have significant difficulty in actually hiring those individuals. The salaries it is able to offer are competitive, start-up packages are provided (although they may not be as competitive as the salaries), and the University is able to provide some first year teaching relief.

In its Academic Affairs and Research Strategic Plans, UTEP has identified seven research areas of emphasis, each of which “is conceived in interdisciplinary terms and emphasizes the bi-national, multicultural, and international dynamics of the U.S.-Mexico border region”.

1. **Biomedical and health sciences**, emphasizing the development and implementation of basic, applied and clinical solutions to regional, national and international biomedical, biomaterial, bioengineering, bioterrorism and health-related problems;

2. **Environment, energy and geosciences** addressing critical issues affecting the region including energy management, air quality, water quality and quantity, hazardous materials, affordable housing, commerce, ecological management, renewable energy, the development of multi-source power generating systems, and transboundary water issues;

3. **Materials and advanced manufacturing** focusing on materials and materials processing, nanotechnology and Micro-Electrical-Mechanical Systems (MEMS);

4. **Communication and information technology** focusing on a broad range of information technology including the theory of communication, high-assurance systems and parallel computation, human-computer interaction, architecture of high performance processors, signal and image processing, and neuro-fuzzy systems;

5. **Transportation policy and infrastructure** in areas such as improved cements and testing instrumentation, issues related to NAFTA and international trade interests,

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112 For example, UTEP holds seminars on best practices; it has, in a few cases, made offers of faculty position to outstanding graduate students at high ranking universities two years before their graduation; and it skillfully markets its campus and region.

113 Academic Affairs and Research Strategic Plans Executive Summary, undated document provided to WAG by the University, unpaginated.
6. **Education**, and particularly K-16 education reform, emphasizing second and dual language acquisition in the border region; and

7. **Business, policy and social and economic development** emphasizing economic modeling, feasibility studies, demographic forecasting, law and society, and assessments supporting growth in business.

An eighth area, Defense/Security, was recently added to this list.

UTEP’s initial emphasis on these interdisciplinary fields is a sensible way to build robust research centers that enhance the research foundation of the institution. But UTEP should not focus on these areas to the exclusion of maintaining viable research capacity in the basic fields of science and engineering.

In general, the faculty members with whom we met appeared to agree that the biggest challenge UTEP will face is in recruiting and retaining sufficient numbers of research oriented faculty to achieve Tier 1 status. They feel that the current faculty is too small, given its teaching responsibilities, to follow up on many opportunities for research grant funding. While other factors also undoubtedly contribute to the current faculty’s relatively low research productivity, it is clear that UTEP must hire a large cohort of new faculty members in order to reach $100 million in annual sponsored research expenditures.

In FY2003, UTEP had roughly $33 million of annual research expenditures. If one assumes that new, research active faculty recruits will generate $230,000 in annual research expenditures (a figure commensurate with the national average for academic researchers with at least some federal funding), then UTEP must recruit approximately 300 additional such individuals to hit the $100 million target. Given the effort and resources that must be devoted in order to identify and successfully recruit the right researchers, we believe that no more than 30 new research faculty members can be added each year. Based on these assumptions, UTEP would not recruit the requisite number of individuals, and therefore generate the additional sponsored research expenditures, until about 2014. For reasons given later in this report, we believe 2015 to 2020 might be a more appropriate target.

Another factor that can limit or impede the hiring described above is the availability of adequate research space and infrastructure for those researchers. At this point, UTEP’s core facilities in the biomedical sciences are good. Laboratory space has been tight, but a new Bioscience Research building is currently under construction which will have approximately 50,000 sq.ft. of assignable space. This is sufficient for UTEP’s projected needs in biological sciences. However, space for the Department of Chemistry is extremely tight. If UTEP is to grow in the manner contemplated, additional research space and equipment will be needed, and sources to fund these facilities must be identified.

As UTEP pursues its goals, it will continue to employ the strategies that have worked for it thus far, but these will not be sufficient to elevate UTEP to Tier 1 status. There is no question that UTEP will need additional resources to improve its performance. In fact, UTEP believes that a lack of capital funding for renovation and construction of facilities and the acquisition of
technology and library materials has been the "the single greatest constraint on UTEP’s development." UTEP also needs significant resources in order to recruit and retain the research active faculty that are crucial to its goals. These resource needs will be difficult to satisfy during these times of fiscal stringency. UTEP has identified the following potential sources of funding, although it is not at all clear that these will prove sufficient to fulfill UTEP’s aspirations for the next decade:

1. **Student generated funds.** As is true with its sister universities, UTEP, which assumes 3% annual growth in its student population, is counting on student derived income to partially fund its rise to Tier 1 status. Supposedly, this income will rise as enrollment grows (although it is important to keep in mind the fact that enrollment growth brings with it additional costs). However, UTEP cannot count on formula funding of enrollment growth. UTEP’s student generated income also could rise if tuition and fees are increased, but the depressed economic status of the community from which UTEP draws its students may limit UTEP’s ability to increase tuition.

2. **Federal and other sponsored research.** UTEP has been very successful in attracting sponsored research funds from programs geared towards minority institutions, faculty and students. Ultimately, UTEP must move beyond funding programs geared at minority serving institutions if it is to increase substantially its level of sponsored research.

3. **Philanthropy.** UTEP has been surprisingly successful in raising monies from the private sector, considering the relatively depressed state of the regional economy. For example, UTEP completed a successful fundraising drive in 2000 that raised $66 million. In addition, annual giving to UTEP has been impressive. In 2002, UTEP received about $20 million in gifts, and was the only UT System institution other than UT Austin and health science campuses to appear on *The Center’s* list of top 200 institutions in terms of annual giving. UTEP’s endowment now stands at roughly $103 million, and UTEP is working hard to increase that, as well as the level of annual giving. These results are very encouraging, but, at current levels, will not be sufficient to allow UTEP to grow its research enterprise in the way that it wants.

4. **Industrial Support.** Although UTEP is located in an economically deprived region, industry could be a source of equipment grants, fellowships, and possibly endowed chairs.

5. **PUF and other state funds.** The availability of PUF or other state funds could prove to be important sources of funds for UTEP. However, while UTEP’s performance over the past 15 years and its potential for the future would warrant additional state funding, given the current fiscal climate, the State is not likely to be able to provide it in the near term.

6. **Partnerships and linkages.** UTEP actively pursues partnerships and linkages with other institutions, and currently has some 100 existing cooperative national and international academic and research agreements with research and education organizations, including Sandia Corporation’s Regional Alliance for Manufacturing

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114 *The University of Texas at El Paso, Model of Excellence and Equity*, undated document provided by the University to WAG, November 2003, p. 4.

115 *The Top American Research Universities*, op. cit., p. 217.
Research Capability Expansion at UTA, UTD, UTEP, and UTSA

Project, the Research Center of Excellence in Biodefense and Emerging Infectious Disease (a 25 member consortium funded by NIH), the Materials Corridor Council (a consortium consisting of eight border higher education institutions led by UTEP and funded by DOE to focus on energy efficient, clean, sustainable materials industries on both sides of the border), joint programs on environment, health and materials research with the National Council of Science and Technology of Mexico, and collaborative research activities with the U.S. Army Research Laboratory. Despite its successes in this area, UTEP is disadvantaged because it is located in a remote, economically deprived region with no biomedical sciences center (related disciplines in these fields are the most rapidly growing and best supported fields in the U.S.). Effective cooperation at a distance in research involving joint appointments, shared research facilities and projects would be possible, but difficult to achieve. Stronger relationships and collaborative projects with the School of Public Health branch in El Paso could be beneficial.

Before turning to our discussion of the UTEP’s individual colleges and departments, we want to raise an issue that is not directly related to the UT System’s charge to the Washington Advisory Group, but that could have important implications for UTEP’s future. We understand that there is a plan to expand the Texas Tech medical program in El Paso, which currently has clinical faculty and third and fourth year medical students, to a four-year medical school. We were told that the construction of two buildings is underway, for research and classrooms, and that $2 million has been appropriated to get the development process going. At present, the Texas Tech program’s faculty is essentially fully engaged in patient care and clinical teaching rather than research.

If the new school is established, then the State must devote sufficient resources to ensure its success. The creation of a four year school, even one that falls in the lower third of medical schools in the U.S., will require hundreds of millions of dollars. The reaction of the UTEP community to Texas Tech’s expansion is mixed, primarily because there is a fear that the medical school might be under-funded. The concern is that, if this is the case, the school might try and draw on the UTEP faculty, which is already stretched thin, to help in teaching. Given the current fiscal status of higher education in Texas, this is a justifiable worry. On the other hand, a number of the faculty would welcome the opportunity to interact with colleagues in their fields at the medical school, assuming that there would be adequately funded significant research activities there.

Obviously, it is not within our task to review the decision to form a new medical school, but it can be noted that if a four-year medical school is created, it should be adequately funded in terms of both teaching and research functions. Indeed, the environment in which research is carried out is an important part of medical education. If the new school is established, then the state must devote sufficient resources to ensure its success. And it should consider whether it makes more sense to add it to the system in which UTEP is a part rather than to the distant Lubbock institution.
UTEP’s Academic Units

COLLEGE OF SCIENCE

The College of Science plans to lead UTEP’s transition to Carnegie Doctoral/Research Extensive status and beyond. We were impressed with the leadership abilities of the Dean and his depth of understanding of what it takes to build research quality. In 2003, the College accounted for 20% of the $143.6 million in active research and sponsored project awards at UTEP.116 This is an impressive statistic, particularly since the Departments of Chemistry, Physics and Mathematics cannot award doctorate degrees at this time, and are, therefore, limited in their ability to compete for research funding. Although a major fraction of the College’s funding comes from NIH grants targeted for minority programs, the Dean and faculty are committed to "weaning themselves away" from these sources and engaging in the open competition for federal research grants not specifically targeted to minority institutions (e.g., NIH RO1 grants and similar programs at NSF).

The College has 84 tenure and tenure track faculty members,117 approximately 20 of whom were hired in the last five years, mostly at the assistant professor level. The College’s record of hiring young, research capable faculty impressed us, considering the national competition for these individuals. It uses sophisticated, best case recruiting practices, and all tenure and tenure-track faculty in the College of Science are expected to be research qualified. Promotion and tenure decisions are strongly influenced by research productivity and direction and there are mentoring programs to assist new faculty with their teaching and research loads. Some 43% of the faculty is research funded – an impressive figure for a university in early transition to Tier 1 research university status.

The College of Science has the smallest enrollment among UTEP’s 7 colleges, with 7.2% of the total of 18,542.118 Clearly, this College has a head start in growing research programs, but it must do more (together with the El Paso schools) to attract students into science.

Research at the Ph.D. level in this College is conducted through two departmental programs (Biological and Geological Sciences) and through interdisciplinary programs in Materials Science and Engineering (MASE) and Environmental Science and Engineering (ESE). Environmental research is organized through the Center for Environmental Resource Management (CERM). The College expects to launch a Ph.D. program in computational science that will be focused in the areas of mathematical/computational physics. Research in this field will be carried out in a proposed Center for Computational Science and Engineering Research (CREST). The College also is beginning to develop a new departmental Ph.D. program in Chemistry.

Department of Biological Sciences

This Department is the most impressive among those in biologically related fields at UTEP. It has 23 tenure and tenure track faculty members and, at present, about half of them

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116 UTEP Overview, op. cit.
118 UTEP Overview, op. cit.
have some research funding. In 2003, the Department had $18 million in active grant awards.\textsuperscript{120} The Department recruited several junior faculty in recent years, and they appear enthusiastic and capable. However, some of the senior faculty are not active in research and they also may be inhibiting a modernization of the curriculum. This problem might be alleviated through retirements.

The Department has approximately 550 undergraduate majors and most new faculty members are teaching one course per semester – a reasonable load. Indeed, one person volunteered to teach an extra course this year to prevent it from being dropped from the curriculum. The Department graduate program, begun in 1997, has steadily grown and now has 52 graduate students, including 24 Ph.D. candidates. However, as was the case in many departments we visited, there was concern about the quality of the graduate students. The Department recognizes that it must do more to attract students and this will require more effort and better packages. In its favor, the Department does expect to have five slots for minority students at the Master’s level with $27,500 packages through an NSF AMP grant, and believes it also will get an NIH RISE (Research Internships in Science and Engineering) grant. The Department also receive funds from CONACYT, the Mexican equivalent of the NSF, which provides up to 20 fellowships at the $10,000-$12,000 level for Ph.D. students from Mexico. With the increasing quality of the faculty, a new building under construction, and more focused efforts, the graduate student situation should improve.

UTEP in general, and the biological sciences in particular, has successfully attracted substantial federal funding from NIH and NSF in programs geared towards minority institutions, faculty and students. The Border Biomedical Research Center (BBRC) and SCORE program project grants were mentioned earlier. The Department also is part of a large multicenter NIH grant on bioterrorism led by the University of Texas Medical Branch at Galveston. The Department’s greatest strengths are found in the quality and enthusiasm of the new junior faculty who are both research active and committed to the mission of UTEP, and in the great success it has had in attracting minority related funding. Faculty members also effectively collaborate with other departments, particularly in Chemistry (which recently made an important new hire in structural biology) and also in Mathematics (bioinformatics). Their current areas of research interest, e.g., immunology, bacteriology, particularly mycobacteria, virology, toxicology, metabolic disorders, drug targets, etc., appear to be well chosen, relating to the health and environmental problems of the region. They dovetail nicely with the interests of faculty members in the Chemistry Department in combinatorial and synthetic chemistry, and in structural biology. The members of the Departments of Biological Sciences and Chemistry work very closely together in immunology, bacteriology, particularly mycobacteria, virology, toxicology, metabolic disorders, and drug targets, and these areas overlap with interests of faculty in the College of Health Sciences as well. These departments should continue to build on these areas of strength.

To approach Tier 1 university status, this Department should double in size, which probably would require $9 to $15 million in start-up packages and 38,000-60,000 sq. ft. of additional laboratory space. If these resources can be mustered and appropriate recruitments made, the Department has a good opportunity to build an area of first tier excellence in structural biology and the related fields of combinatorial and synthetic chemistry, and drug targets that can be a “beacon” for UTEP.

\textsuperscript{120} Physical and Interdisciplinary Science, UTEP briefing paper for WAG, November 10, 2003, unpaginated.
Department of Chemistry

The Department of Chemistry sets a high standard for itself. It has 14 tenure and tenure track faculty, 5 of whom have been hired during the past three years (of these, 4 are externally funded). Even though the Department does not have a Ph.D. program, essentially all faculty members are involved in research and publish in refereed journals. They contribute to interdisciplinary centers in environmental and materials science and to research in health-related areas. The total of active research grants associated with faculty members in Chemistry is approximately $6 million in 2003, an impressive number for the size of the department. We were told that half of this funding was from grants made under programs geared towards minority institutions, faculty or students. This provides a good example of UTEP’s effective strategy of using set aside funds together with competitive awards to advance a field.

Although Chemistry seems quite productive, it cannot expand much more because it lacks research space. Funding also is an issue – one individual did not receive his promised setup funds because of state imposed budget cuts. Others complained of the difficulty of producing research results while carrying a high teaching load. The Department may need 2 or 3 new hires of research qualified faculty to build up to critical size. We believe the Department has significant potential for growth in research because of its intrinsic research strength and the importance of chemistry to interdisciplinary programs in the materials and biomedical sectors. The environmental chemistry program has the kind of critical mass of faculty and staff researchers, post-docs and students that one expects of a lively research department.

Department of Geological Sciences

This is an exemplary Department. It has a Ph.D program of its own, and is also engaged in interdisciplinary doctoral programs in Environmental Sciences and Engineering and Material Sciences and Engineering. The Department has 13 tenure and tenure track faculty members, all of whom are funded as PIs and who published 30 papers in refereed journals in 2003 alone. The Department manages 28 grants and is involved in 10 interdisciplinary/interdepartmental grants. It currently has $9.7 million in active grants, a number that is impressive for so small a faculty. The awards mainly are from NASA and NSF, and were mainly won in open competition. The Department participates in large national earth science projects as a consortium member. It is strong in solid earth geosciences and would use new FTEs, if available, to expand into the frontier fields of paleoclimates and global change by adding an isotope geochemist and soil scientists. With a few more faculty members, this Department could be a respectable member of many Tier 1 universities.

Undergraduate enrollment in geological sciences is small, as is true in many earth science departments across the country. The Department should be recognized for its success in the open competition for research grants and not penalized in the allocation of faculty slots because of its small enrollment. It also should be allowed to grow by mounting its own undergraduate, entirely geology-based environmental degree, because it believes such a program would be unique (and different from the current interdepartmental offering).

121 Physical and Interdisciplinary Science, op. cit.
122 Id.
123 Id.
Department of Mathematical Sciences

The Department of Mathematical Sciences currently has about 23 tenure and tenure track faculty members. Ten years ago, it was significantly larger (~30), and the faculty describes itself as "swamped" by students. Given the limited educational resources in the El Paso region, it is difficult for the Department to hire adjunct faculty (instructors) when needed to support the service courses for which the Department is responsible. These instructors are shared with the single local community college, so students have no other options for introductory math courses; such courses are being covered by essentially a fixed pool of qualified teachers.

Over half of the faculty members in this Department have published research papers in the last three years. This is a good indicator of its potential. One area of traditional strength is statistics, but this strength is eroding due to retirements. Research active faculty members cover a respectable range of research topics in pure and applied mathematics and numerical methods. The total of active research grants held by members of the Mathematics faculty is well below $1 million this year, but the Department has the potential to increase this amount because of the important role that mathematics will play in a new degree in the computational sciences. Computational physics, biology, and engineering all rely heavily on new mathematical approaches, as demonstrated by recent breakthroughs in genomics.

Department of Physics

The Department of Physics has 9 tenure and tenure track faculty members, an implausibly small number for a field so important to the University’s Tier 1 aspirations. In addition to the critical role of a physics faculty in teaching service courses, the tools, methods and ideas of front-line physics research often find important applications in other, multidisciplinary areas of research when applied by knowledgeable and imaginative researchers expert in their use. The Department currently is in the process of recruiting 2 additional faculty members, but this will only bring its numbers up to 11. Five years ago, the Department had 14 members. At the time of our visit, the Department was still reeling from a denial-of-tenure case involving a young faculty member with a national research reputation by the Provost. The already small size of the research faculty and this issue rendered the Department largely dysfunctional.

The Department’s total research funding for this year is $1.2 million, generated by about one-half the faculty. Roughly half that total comes from grants made under programs geared towards minority institutions, faculty or students. The research areas in which they are working include astrophysics, environmental science, materials and space science/plasma. The small research efforts in astrophysics and space sciences are probably the best areas on which to build critical mass research efforts over the short term.

The Department has invested considerable effort in recruiting undergraduate majors with outreach programs to local (including Juarez) high schools. As part of its outreach efforts, it produces an English/Spanish newsletter and it brings recognized speakers to local high schools on a regular basis. We are told that there has been significant growth in undergraduate majors as a result of these activities.

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125 Physical and Interdisciplinary Science, op. cit.
Recommendations for the College of Science

1. The College should be authorized to apply for Ph.D programs in Chemistry, Physics, and Mathematics, (as distinct from interdisciplinary degrees) and should be allowed to grow to the critical faculty size that such programs will require.

2. The Geology Department, in view of its strength and performance in open competition for research funds, should be allowed to diversify its educational offerings as indicated above.

3. UTEP should bring the size of the Department of Physics faculty up to critical mass.

College of Engineering

The College of Engineering has consistently ranked among the top five schools in the continental U.S. in the production of Hispanics receiving BS degrees. Also, it has been identified as one of the top 20 universities in the U.S. with exceptional successes in education of minorities. The National Action Council for Minorities in Engineering has noted that UTEP is a model for engineering institutions who say that today’s minority young people from low income families can’t succeed in a rigorous math or science-based discipline.

The College has 62 tenure and tenure track faculty members divided among 5 departments – Civil Engineering, Computer Science, Electrical and Computer Engineering, Mechanical and Industrial Engineering and Metallurgical and Materials Engineering. It has an undergraduate enrollment of 2,099 students, representing a 23% increase since 1998. Graduate enrollments are 486, corresponding to an 80% increase since 1998. Of that total, 100 are Ph.D. students and 386 are MS students. In 2003, Engineering is graduating about 220 BS degrees, 120 MS degrees and 10 Ph.D degrees.

At present, the College of Engineering offers degrees in technology areas emphasizing important border technology, social, and health issues. These programs are important to the mission of the University. Engineering, however, has many small departments which operate at the threshold point. The faculty is heavily loaded with teaching thus there is little time to devote to research. Moreover, faculty members support the teaching mission of their institution and do not want to see it displaced by demands for more research. Despite these hurdles, almost 60% of the Engineering faculty is research active. Currently, the College has roughly 90 active grants and contracts, with total annual expenditures of almost $9 million ($2 million in Education, $1.5 million in Communications and IT, $1.2 million in Materials and Manufacturing, $1.1 million in Environment and Health, $9 million in Transportation, and the rest in Aerospace/Defense/Energy and Biomedical).  

127 College of Engineering Overview, presentation prepared by The University of Texas at El Paso for The Washington Advisory Group, November 11, 2003, p. 3.
129 We did not meet with anyone from the Department of Metallurgical and Materials Engineering. Accordingly, that Department is not discussed individually in this report.
130 UTEP Fact Book 2002-2003, p. 4-1.
131 College of Engineering Overview, op. cit., p. 8.
132 Id., p. 8.
133 Id., p. 5.
In order to encourage interdisciplinary research, the College has established or is involved in five research centers focusing on subjects involving cross-disciplinary research – the Material Research and Technology Institute (MRTI), the W.M. Keck Border Biomedical Manufacturing and Engineering Laboratory, the Center for Transportation Infrastructure Studies (CTIS), the Future Aerospace and Technology Center (FAST), and the Institute for Manufacturing and Materials Management (IM3). As focal points for research themes, these Centers are effective in attracting both graduate students and research grants. However, their research output is not consistently high and some have an embryonic look and require further development.

The College of Engineering very wisely is focusing on efforts that address the needs of the region and that are aligned with the strategic research areas identified by the University, namely, biomedical and health sciences; business, policy, and social and economic development; communication and information technology; education; environment and energy; materials and advanced manufacturing; and transportation policy and infrastructure. Progress in these areas will hinge upon the quality of the 40-100 new faculty members the College intends to recruit over the coming five years. Attention to specific research activities should focus on topics relevant to the El Paso-Juarez Metroplex, and be reflected in recruiting new faculty. Appropriate fields mentioned during our visit were water resources, manufacturing, transportation, health, and applications of computational techniques.

Department of Computer Science

This Department has about 10 tenure and tenure track faculty members, 300 undergraduate students, and 140 graduate students. The faculty members are all enthusiastic and supportive of the University plans for growth, and the Department Chair is a very energetic individual with an active attitude towards success. Computer Science has four focus areas: Software Engineering, Applications of Theory, Human and Computer Interface, and Interactive Systems. The quality of these programs is high in terms of both research and education. The Department wants to increase the size of its Ph.D. program, which makes sense if the region’s demand supports such an expansion.

The Department’s faculty has an interest and some strength in geo-informatics and bio-informatics. Both areas are computer intensive and in growing fields of research for computer applications. The Department needs to add approximately 20 new researchers to be able to contribute significantly to UTEP’s goals. It also needs to recruit graduate students from other universities to create more intellectual diversity (currently, it admits students mainly from among UTEP’s own graduates).

During the course of our meetings, we heard of a plan to split the Doctoral Program in Computer Science and Engineering into a separate Computer Science Program and Computer Engineering Program. Many people we spoke with feel this would provide little advantage and could be damaging to the department. Any decision to split the program should be driven by the demands of students, industry and regional needs.

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134 UTEP Fact Book 2002-2003, pp. 6-2, 4-1 and 4-7.
Department of Electrical and Computer Engineering

This Department has 16 tenure and tenure track faculty members, 377 undergraduate students, and 93 graduate students, of whom 27 are working towards their Ph.D.s.\textsuperscript{135} Student retention is a problem. The current retention level is only about 20% although the Department has been able to improve it to 50% by providing special tutoring and mentoring in courses that had resulted in high drop out rates. The Department’s challenge is to change the culture so that faculty members improve their teaching and increase their research output. While the faculty shows an interest in research, most faculty members do not travel to conferences or other technical meetings and do not graduate many Ph.D students. As a result, research is limited and individual researchers are not very competitive in seeking external funding. We are told that this is due, at least in part, to heavy teaching loads that leave little time for scholarship.

Department of Mechanical and Industrial Engineering

This Department has about 14 tenure and tenure track faculty members, and approximately 400 undergraduate students and 100 graduate students.\textsuperscript{136} The Department Chair is very energetic and successful in motivating the faculty and communicating the University’s strategic objectives. The Department’s faculty seems to understand how to move forward and improve quality standards for education and increase research output. Its research capability is limited, however, by its lack of a Ph.D. program.

The Department sees research opportunities in computational mechanics – a fundamental field in which it has some strength – and its members are open to a more interdisciplinary approach to research. Faculty members in this Department realize they need an innovative plan in order to become successful in research.

Department of Civil Engineering

This Department has 12 tenure and tenure track faculty members, 127 undergraduate students, and 53 graduate students (all of whom are MS students).\textsuperscript{137} Student enrollments have dropped in recent years, following a national trend. The Department does not now have a Ph.D program, but it expects to start one in the spring of 2004. It also expects to grow to 20 faculty members from its current level of 12.

The Department’s faculty members are participating in a number of community projects and are involving undergraduates in research projects. Like some of the other departments in this College, this Department’s lack of a Ph.D. program has been a limiting factor in its efforts to expand its research programs.

Materials Research and Technology Institute

MRTI is a research unit whose participating faculty are members of other academic departments in the Colleges of Engineering and Science. The participants are cultivating research interests with the Stanford Linear Accelerator (Synchrotron radiation applications). One of the Institute’s priorities is to train graduate students in materials research.

\textsuperscript{135} Id., pp. 6-2, 4-1, 4-7.
\textsuperscript{136} Id., pp. 6-2, 4-1, 4-7.
\textsuperscript{137} Id., pp. 6-2, 4-1, 4-7.
Recommendations for the College of Engineering

1. The College of Engineering is a central academic resource for UTEP and its community as well as a potentially significant contributor to regional economic development. The College should develop a strategic plan with participation from faculty, staff, and students, to achieve its potential in these areas.

2. While focus must be directed at the expansion of tracks in the Engineering and the Computer Science curricula, the present undergraduate educational offerings should be expanded to include a Computer Engineering degree, co-sponsored by the departments of Electrical and Computer Engineering, and Computer Science in the College of Engineering, and the Department of Mathematics Sciences in the College of Science.

3. At present, the College of Engineering expects to increase the number of tenure track faculty by 40-100 individuals during the next five to ten years. This will be a difficult task if the quality of hires is to be maintained and it will be impossible if appropriate funding is not available. Therefore, a rational academic and business plan should be developed that encompasses space and facility needs, starting salaries, and a strategy to attract the required talent.

4. There is a perception that the University is not providing the financial support needed to allow faculty members to pursue research and scholarly activities. The Administration needs to take visible steps to restore the confidence of the faculty that it is serious about supporting the research component of its mission.

COLLEGE OF HEALTH SCIENCES

This College encompasses a variety of disciplines relating to health, health care, health education, including nursing, health science, pharmacy (in collaboration with UT Austin), kinesiology, clinical laboratory sciences, physical therapy, occupational therapy, and speech-language pathology. It is located in a separate facility about a mile from the main campus. Because UTEP does not have a medical school, and the El Paso-Juarez region is greatly underserved with regard to medical care, allied health services, and health education, this College has extensive interactions with the community in terms of both education and provision of services.

The College has 38 tenure and tenure track faculty members and approximately 1,900 students enrolled in the health education programs, both as Bachelor’s and Master’s degree candidates. A proposal is pending for an inter-disciplinary Ph.D. program involving all disciplines and programs in the College. Teaching loads are heavy (3 + 3 is the standard, and many also must teach 3 courses in the summer session). Several of the groups listed above, particularly in the rehabilitation sciences, are very small and consist mostly of junior faculty.

The Interim Dean seeks to increase the level of research. It is estimated that about a quarter of the faculty members pursue research in their own fields, about half collaborate with others, and a quarter are not involved at all. The relative paucity of research is due to a variety of factors, including heavy teaching loads, the fact that some of the disciplines are not in research intensive fields; and the fact that efforts to create a research culture in the College are still in their

138 Id., pp. 6-2, 4-1 and 4-7.
early stages. There is not now a critical mass of researchers in any field that would enable a rise to a leadership level, and it appears unlikely that this situation will change soon. On the other hand, one of the two NIH RO1 grants in the University is based in this College. Other sources of research funds being tapped by this group are the NIH and NSF Minority institutional support grants, and funding from the Paso Del Norte Foundation which provides about $4 million a year for grants on community health care and related research on a peer-reviewed basis.

Faculty members in this College have a number of collaborations, both across the University (mainly with Engineering faculty on environmental issues) and with the Texas Tech Medical School in El Paso, the University of Texas Medical Branch in Galveston, the University of Texas Houston in Public Health, the UT Austin in Pharmacy, the University of Arizona College of Public Health, and others. At present, this group’s best opportunities with respect to research would appear to be in enhancing these collaborations while trying to recruit new faculty to both lighten the teaching load and to provide a source of some research grant funds.

**College of Business Administration**

As is clear from UTEP’s strategic plan, the seven areas of strategic emphasis are defined not in terms of Departments or even Colleges, but rather in terms of interdisciplinary issue-areas. The Dean of the College of Business underscored this perspective, stating that UTEP cannot compete within traditional silos, therefore it is focusing on programs that cut across these silos.

The individuals with whom we met stressed their desire and intent to recruit and retain research-oriented faculty, but no single department appeared to be operating from a position of strength in this regard. Faculty members feel the faculty is currently too small, given teaching responsibilities, to allow them to follow up on opportunities for research grant funding. The College is recruiting 5 new tenure and tenure track faculty members this year, and those with whom we met generally feel that their five year goal for faculty increases is realistic. However, they stress that recruiting must be done strategically, rather than simply replacing those that retire with people in the same area/department. Most, if not all, of the faculty members with whom we met were active in publication and/or journal editing, but generally not in first tier journals.

**Institute for Policy and Economic Development (IPED)**

This is a University-wide Center, established in 2000, but its fulcrum appears to be in the College of Business. It is also the unit by far the farthest along of any in the College in orienting itself toward the next leap forward. That is due mainly to the activities of the Border Region Modeling Project, a semi-autonomous unit within IPED but also claimed by the College of Business. We were told that this project, which produces and maintains current several quantitative economic models, has generated over $300,000 in external research funding over the past 7 ½ years. These models appear to be unique and are clearly useful for a variety of forecasting and policy purposes. Graduate students, and even some undergraduates, are actively involved in the research conducted by this Project.

**College of Education**

The College of Education is a turbocharged engine propelling UTEP where external funding is concerned. It has built strong partnerships with K-12 schools and regional communities over the years as well as, more recently, interdisciplinary partnerships with faculty and programs in Liberal Arts, Health Sciences, Engineering, and Science/Mathematics. It has obtained and implemented numerous grants, mainly from the U.S. Department of Education.
While these grants have been focused primarily on teacher training and outreach services to schools and communities, the programs they have generated provide significant opportunities for publishable follow-up and outcomes research on student achievement. The Dean and faculty stress the inseparability of training/service and research. For example, the College recently received a $5 million grant from the Carnegie Corporation (which will be shared with the Colleges of Liberal Arts and Science) focused on training/service, but opening up substantial areas for research.

The College has a well-articulated plan to build on existing activities and partnerships, exploiting the fact that the relatively isolated local area is virtually a “closed loop” in which to conduct research (that is, local students are primarily taught by UTEP-trained teachers, and a large proportion of students in the College of Education are products of local or regional primary and secondary schools). There are also exploitable opportunities for comparative research on education in the U.S. and Mexico. Among the specific potential sources of funding they are starting to pursue are interdisciplinary collaborations to respond to RFPs from NIH, NEH, etc. in the areas of health, education and community development; building on existing grants as seed money for larger research projects; and getting further grants from Carnegie and the Fund for the Improvement of Postsecondary Education, for example, for proposals to increase the retention of undergraduate engineering students (principally minorities) through innovative teaching. The College has a proposal for a new Ph.D. in Teaching and Learning (separate from the traditional Ed.D. in Education Leadership, which they already offer), stressing literacy, including bilingual literacy, in science and mathematics.

The College currently has 39 tenure and tenure-track faculty\(^{139}\) and is actively recruiting for 10 new positions, all net increases. Apparently the new junior faculty are well oriented toward research, but the College is losing mid-level faculty and some of the more senior people need to be re-oriented and assisted in grant writing if an intellectually dynamic culture is to bloom. One estimate we heard was that only about 20% of the College’s faculty are actively engaged in research.

The challenges this College faces are the familiar ones: lack of research oriented tenured faculty to mentor the new junior recruits; 3+3 teaching loads for most faculty, including a lot of time spent in the field (many education courses are offered on-site in the El Paso Schools).

The College of Education has three separate departments: Educational Leadership and Foundations, Teacher Education, and Educational Psychology and Special Services, but virtually all of the research and grant-getting activity appears to be housed in the College’s interdisciplinary Center for Research on Educational Reform. This Center currently has some $14 million in active grant funding (total, not annual expenditures). This includes a $10 million five year grant from the U.S. Department of Education (ending this year), mainly to support 200 graduate students earning masters degrees in instructional technology, but the final year is devoted to research on the impact of the program and is providing research assistant employment for five doctoral students. Other grants include one from the NSF for a PETE (Partnership for Excellence in Teacher Preparation) follow-up impact study, and the Noyce Scholars program, also funded by NSF, again mainly for student support but also for follow-up research on teacher retention. The El Paso Math/Science Partnership is also funded by the NSF at $28.6 million, and there are other grants from the Meadows Foundation and the National Board for Professional Teaching Standards, both oriented toward teacher training at UTEP.

\(^{139}\) Id., p. 6-2.
What are described as “pending” Center grants total $6.3 million, all from NSF. In order to increase its visibility, the Center is planning to celebrate its official inauguration via a research conference that will bring noted researchers to campus. It also aims to use Center-generated grants to support more doctoral students, as well as to build strong connections to doctoral programs in the social sciences.

**COLLEGE OF LIBERAL ARTS**

The College of Liberal Arts has for some time been bi-modal: favored departments have Ph.D. programs and reduced teaching loads for graduate faculty, while other departments’ faculties carry 3+3 loads and have virtually no research infrastructure support. Like the rest of UTEP, however, this College is currently moving toward a focus on interdisciplinary centers, where most research activity will be based. There are four such Centers now – the Sam Donaldson Center for Communications Studies, the Center for Civic Engagement, the Center for Law and Human Behavior, and the Center for Anthropology Research. The following discussion is therefore an amalgam of the two organizational frameworks.

The Dean of the College of Liberal Arts stresses the importance of continuing the interdisciplinary approach UTEP has been developing over the past 15 years, both to take advantage of and to compensate for the small size of most departments. While he describes UTEP’s relative isolation and “sense of place” as an advantage, he also cites as a major challenge the need to leverage the College’s (indeed, the University’s) traditional service focus into research opportunities, which means finding funding sources interested in taking advantage of the school’s comparative advantage in border region studies. New strategies are needed, furthermore, to increase significantly the number of faculty actively involved in funded research.

**Department of Psychology**

The Department of Psychology, with 13 tenure and tenure track faculty members,\(^{140}\) has had a Ph.D. program since 1995. It currently has some $2.5 million in active grants designated for minority health and health disparities programs to allow recruitment and incubation of junior faculty until they become competitive in the general pool of grant-seekers. This is already beginning to happen in some cases. Every member of the tenure track faculty has had external funding at some point, though none currently have individual funding.

The psychologists stressed that the local community provides ‘an incredible laboratory’ where research can be combined with providing services and care. Two new hires are anticipated in clinical psychology. Additional hires are planned for this area and that would appear to be the best opportunity to capitalize on the overall focus of the university and the community. The Department also aspires to create a Ph.D. program in clinical psychology which would strengthen their efforts. Increasing the present level of collaboration with faculty members in the College of Health Sciences could be beneficial.

This Department’s junior faculty appear to be the strongest, a frequent finding among the departments we visited. That is a good sign as long as they can be kept happy and supported. The senior faculty are said to be “winding down” and 4 are to retire soon. The new Chair has an informal commitment from the administration to increase the faculty to 20, and perhaps even 30. With the anticipated 4 retirements, growth to 20 or more would mean at least 10 new hires within the next several years. It is important that these be people active in research at a level of quality

\(^{140}\) Id., p. 6-2.
that merits external support. If that were to happen, 20 to 30 faculty members could handle the current approximately 670 majors and 40+ graduate students, and also could have a significant impact on the University. In general, the start-up packages that the University has been offering may be adequate for those hires; however, space is said to be available for only 6 or 7 faculty members, beyond that would definitely require additional facilities, with the exact amount of space needed varying, depending on the nature of the research in the subdisciplines.

Faculty teaching loads are nominally two courses per semester, but most teach less, and these loads are not considered a problem. The Department has an active graduate education program involving both MA and Ph.D. students. However, as with most departments we visited, there is a need for more and better graduate students. More effort and resources at both the departmental and central levels should be put into achieving this. The major impediment to seeking grant funding, faculty say, is that little or none of the indirect cost funding comes back to the individual researcher or even to the Department to provide infrastructure support. This fact, plus the difficulty in accounting for teaching credits across units are bureaucratic obstacles—the flies in the ointment of a generally supportive environment for building a research program.

The greatest weakness for this Department is the fact that although all faculty members are said to be participating in some research, none currently has individual funding. Although they do draw some support from the large institution’s minority support grants, this is clearly not enough. The success of this Department will be determined by the ability of the new Chair, with the support of the administration, to recruit faculty who can obtain independent support.

Department of Sociology (including Anthropology)

There are 11 tenure and tenure track faculty in this Department.\textsuperscript{141} We met with only 2 of them and thus it was difficult to evaluate the interests and quality of research, but it appears that this Department is unlikely to play a significant role in the overall research strength of the University. There is not a critical mass in their areas of interest, and their teaching load is heavy (3 + 3). They have some support from collective sources, but no individual grants.

The greatest need that they expressed is to forge collaborations and inter-disciplinary research partnerships, e.g., they are working on a proposal on water and health with engineering. With their heavy teaching loads, they are also said to suffer from inflexibility in accounting for credit for teaching in collaborative situations. This discourages interdepartmental and interdisciplinary undertakings. Interactions with other institutions are also said to be difficult to achieve. UTEP should endeavor to foster intra- and inter-institutional activities.

Department of Political Science

This Department has 15 tenure and tenure track faculty members.\textsuperscript{142} A number of these individuals are active in the Center for Inter-American and Border Studies. The Department has had 3 faculty departures recently and no authorized replacements, leaving them with a bi-modal structure of research oriented junior faculty and senior faculty who by and large are not. One commented that “you can’t build a viable Ph.D. program on the backs of untenured faculty”. They also complain of 3+3 teaching loads, and a highly bureaucratized system that occupies a lot of faculty time. More differentiation of teaching loads between research active and non-active

\textsuperscript{141} Id., p. 6-2.
\textsuperscript{142} Id., p. 6-2.
faculty members would relieve some of the teaching burden placed on young, research oriented faculty.

*Center for Inter-American and Border Studies*

This is a University-based rather than a college-based Center, implying that its interdisciplinary focus extends beyond the Liberal Arts to other Colleges. Its Director defines the intellectual raison d’etre of this Center by place, specifically, the U.S.-Mexican border, viewed from two different perspectives, as a line of separation and as a zone of attraction. Using this paradigm, his goal for the Center is to focus initially on practical regional issues in such diverse areas as economics, environment, health, education, culture, language, political and governmental systems, and the tradeoff between homeland security and economic development, but then to leverage up from there to more theoretical, analytical issues relevant to the nation and the world – i.e., using the border region as a “laboratory” for how the U.S. deals with the rest of the world.

The intellectual case is well thought out and articulated, though it does appear to overlap with the goals of some other centers in UTEP. There are, however, significant practical constraints on its implementation. In addition to increases in both the quantity and quality of UTEP faculty in general, structural changes are needed that would stimulate more effective interdisciplinary forms (this Center has just made its first appointment jointly with a Department) and reduce current tensions between centers and departments regarding how funds are allocated. More flexibility on teaching loads is also an issue; again, one that would be alleviated by more external funding.

*Center for Civic Engagement*

This Center’s goal, according to its Director, is “to connect faculty and students to community organizations to deepen learning and enhance responsiveness to the (bi-national) regional community”. The Center has very limited infrastructure (it operates with one-half of a staff person), and its Director is a Professor of Political Science who was previously Chair of that Department. She is extremely active in publication and research, and got the Center going 5 years ago with a $1.4 million grant from the Kellogg Foundation which she coordinated.

*Center for Law and Human Behavior*

This Center, like so many of UTEP’s projects, focuses on border issues, dealing with cross-border legal, immigration, and homeland security issues. It is attempting to enlarge its service/intervention focus to encompass research as well, and its Director feels that there are ample opportunities for external funding.

**General Observations, Conclusions and Recommendations For UTEP**

As is evident from the foregoing, we all were impressed by how much UTEP has been able to accomplish over the past 15 years. UTEP’s vision is nontraditional but exciting, with the twin goals of providing high quality education in a socially responsible way, and at the same time achieving national research prominence. If excellence is measured both by a University’s research prominence and education programs, and also by its impact on the intellectual, social and economic well being of a community, then UTEP clearly has great potential.

The University’s research strategic plan identifies opportunities for excellent research programs. They draw on traditions and strengths already in place to some extent at UTEP and
they represent areas with substantial federal funding. How they develop depends, of course, on the quality of the people recruited to carry out the research.

Based on the information provided to us both before, during and after our campus visit, we found UTEP’s major strengths to be:

- Its demonstrated ability to attract federal research funding by exploiting the advantages of its location and the demographics of its student body;
- Its determination to win federal research grants in open competition with other research universities;
- A modest but good research base on which to build and a demonstrated ability to recruit quality new faculty;
- Well chosen interdisciplinary focus areas;
- UTEP’s remarkable fundraising success; and
- The strong support it enjoys from the El Paso community.

The major challenges that it will face are:

- The few potential sources of support available to UTEP to fund the faculty recruitments (including set up costs) and capital projects that would enable UTEP to go beyond Carnegie Doctoral/Research Extensive status and achieve Tier 1 status;
- UTEP’s lack of Ph.D. programs in certain basic areas of science and engineering, including Physics, chemistry, mathematics, electrical engineering, and mechanical engineering;
- The fact that UTEP’s faculty members must wean themselves from sources of research support aimed at minority institutions and researchers and attract a larger proportion of competitively awarded research funding;
- Student retention; and
- The economically depressed nature of the El Paso community.

UTEP's confidence in its ability to achieve its goals is rooted in the remarkable progress it has made over the past 15 years. Although federal funds targeted towards programs for underrepresented minorities were important in the extraordinary growth of UTEP research endeavors, UTEP has begun to wean itself from these sources in some areas. As it expands the research areas in which it is able to compete successfully, its stature will grow, and the University will have access to a much larger pool of external funding. Its current research strengths and best opportunities are in the following areas:

- UTEP’s strongest scientific research group is in geophysics; three recent hires came from top ranked departments in the field;
- Social and economic development, with a strong cross-border focus is an interdisciplinary area with great promise that involves the Colleges of Business, Education and Engineering, and several departments in the College of Liberal Arts;
- Biology, environmental chemistry and education are additional centers of strength and opportunity; and
- UTEP should consider building on its existing engineering strengths to develop research activities addressing border issues such as border transportation and border
security. These areas are relevant locally and also have the potential to establish UTEP as a national leader.

The fields that can be the next high opportunity research areas for UTEP include:

- Health related sciences focusing on infectious diseases. The new biomedical sciences building together with the Border Biomedical Research Center (BBRC) grant, which provides 6 new positions over three years, each with $150,000 in setup funds, makes this a next high opportunity field.
- Structural biology, an important new frontier of the biological sciences. The University recruited an excellent new faculty member who is now in place and is in the process of adding a new hire in biophysics. The research group in this area will include faculty from the Departments of Physics, Chemistry, and Biology; with 3 or 4 new positions this can become a nationally ranked research effort. We note that the Coordinating Board unfortunately rejected planning authority for a Ph.D. program in biosystematics.

In order to pursue the opportunities described above and achieve Tier 1 status, UTEP will have to expand its faculty and provide it with the necessary research facilities and infrastructure. Specifically, UTEP will have to:

- Increase the number of its research active faculty members. The University estimates that it will need to hire an additional 150 or so new faculty members (in addition to those who are replaced) over the next 10 years. This number seems low, if UTEP is to achieve $100 million in annual research expenditures. If one assumes that each such researcher will generate the $230,000 national average for active academic researchers, then UTEP will need approximately 290 new research active faculty members. Using UTEP’s current average annual expenditures per research active faculty member of $210,000, it would need roughly 320 such individuals.

- Provide new researchers with the facilities they will need to do their work. UTEP estimates that it will need new facilities for the College of Health Sciences ($70 million), Engineering and computer Sciences ($20 million) and Chemistry/Physics ($25 million), in addition to other campus renovation and upgrade projects ($95 million). These estimates appear reasonable. The challenge will be to secure funding for these projects.

In terms of establishing priorities, we believe UTEP should:

- Recruit health related biology researchers with the resources available from the BBRC;
- Join meaningful national consortia to enhance its capabilities and research stature. It has done so recently in joining a multicenter consortium on bioterrorism led by the University of Texas Medical Branch; and
- Launch a Centennial Endowment/Capital Campaign with a minimum goal of $100 million.
As stated above, UTEP estimates that it will require roughly 150 new faculty members to achieve Tier 1 status. We believe that roughly double that number will be necessary, unless the productivity of the existing faculty increases substantially. Using the 300 estimate, and the fact that we believe that no more than 30 high quality researchers can be recruited each year, it will take at least 10 years for UTEP to achieve Tier 1 status – longer if the estimate of new faculty needs is low, or if the estimate of their research efficiency is too high. Considering these uncertainties and the present lack of doctoral programs in basic fields of science and engineering, we believe 15 years would provide a more realistic time frame for achieving Tier 1 status.

UTEP has successfully secured substantial federal set-aside funds to jump start its research expansion campaign and its private sector fund raising ability has been impressive considering the resources available in the greater El Paso area. UTEP also has shown the capacity to recruit well and to take advantage of the unique opportunities arising from its border location. Taking this into account, we believe that UTEP can become a Carnegie Doctoral Research Extensive university, and receive national recognition as a research capable, urban university in this decade. If it can secure the resources for the new faculty positions we mention above, and for the facilities they will require, UTEP should be able to reach Tier 1 status in 15 years or so.

Having provided these general observations and recommendations, we now turn to specific recommendations for the University as a whole:

1. **Ensuring a Critical Mass of Faculty in Key Science and Engineering Fields.** UTEP intends to emphasize certain targeted research areas with relatively narrowly defined interdisciplinary focus areas. However, unless UTEP also has critical faculty mass in the basic science and engineering departments that will keep research viable, it will be difficult to rise to national status in funding and recognition. Obviously, UTEP must make choices of which research areas to pursue initially, but ultimately strong foundations in chemistry, mathematics and physics are needed to support most, if not all strategic areas. These, in themselves, will continue to stimulate excellent students and provide substantial research opportunities. The President understands this.

2. **Development of Strategic Plan with Faculty Participation.** UTEP’s Research Council developed a draft Strategic Research Plan that identifies certain strategic research areas for focus and development. Those areas appear logical, but our conversations with faculty members from several departments within the College of Science revealed certain tensions over the formulation of this strategic plan and the interpretation of which research areas would fall within these strategic research areas under the plan. By all accounts, the plan was developed by the upper administration with little or no input from departments and regular faculty. If this is the case, comments should be invited from department chairs and faculty.

3. **Planning for the Necessary Faculty Growth.** As mentioned above, in order to achieve Tier 1 status, we believe UTEP will have to add nearly 300 new research faculty members over and above the number that it will need to replace departing faculty. To recruit these individuals will require a great deal of money, both for salary and start packages, and also for new research space and infrastructure. UTEP should develop a realistic and detailed plan showing the various ways these costs might be funded (e.g., student generated income, philanthropy, and other state funding) and the corresponding levels of faculty that they will permit. The plan also should include realistic timetables for achieving its desired research growth.
4. **Add Ph.D. Programs in Chemistry, Physics and Mathematics, Electrical and Mechanical Engineering and Computer Science.** In order to build strong interdisciplinary programs, institutions must have a foundation of research strength in the basic disciplinary fields of science and engineering. To do this well, requires doctoral programs in those fields.

5. **Organization.** UTEP should rationalize the current conglomeration of colleges, departments, centers (at several levels) and institutes in order to evolve a more effective structure for inter-disciplinary work, which is a major strength for the University. The current situation is a confusing mish-mash, which has led to considerable confusion about resource allocation and some unnecessary turf battles.

6. **Improve Graduation Rates for Undergraduate Students.** Only 25% of UTEP’s entering classes graduate from the University within 6 years, although perhaps as many as 60% have graduated from UTEP or another school, or are still enrolled at UTEP within 10 years. The reasons for this are clear – many students have outside jobs and many may not be prepared for college level work. (It must be said that the top students are superb and the faculty over and over again expressed their enthusiasm about these students and how gratifying it was to teach them and to work with them in the research laboratory.) Nevertheless, the fact that more than 40% have not received a degree 10 years after entering the University is troublesome. UTEP’s administration is well aware of this problem and is working on developing ways of addressing it. It should redouble its efforts in this area, and continue to work with the local community college to develop solutions.

7. **Indirect Costs.** The general consensus among those with whom we met was that the amounts of indirect cost recoveries distributed to departments were low, on the order of 5-10%, and while large amounts of money are not involved currently, when an institution is striving to increase the amount of external research funding, which requires greater activity on the part of faculty in submitting grants, the return of some indirect costs to them and their departments can be an important incentive. The faculty expressed concern about the issue, and the administration should review its policies in this area.

8. **Graduate Students.** High quality graduate students are a critical component of a robust research enterprise. Like the other UT institutions that are the subject of this report, UTEP must take the steps necessary to ensure a high quality graduate student body.

9. **Endowment/Capital Campaign.** One of the key determinants of UTEP’s success in achieving Tier 1 status will be its ability to mount a successful Centennial Endowment and Capital Campaign with a goal of $100 million. UTEP must deploy adequate resources to assure success in this endeavor.
THE UNIVERSITY OF TEXAS AT SAN ANTONIO (UTSA)\textsuperscript{143}

The University of Texas at San Antonio (UTSA), established by legislation passed in 1969, is a relatively young public university. It was formed to provide educational opportunities to “nontraditional” college students, particularly the historically underserved Hispanic population of south Texas,\textsuperscript{144} and it is the only public four year institution of higher learning in the San Antonio area. Over the years, UTSA has successfully fulfilled its mandate from the state "to serve the needs of the multicultural population of San Antonio, south Texas, and the state, emphasizing programs that contribute to the technological, economic, and cultural development of the city, region, and state."\textsuperscript{145} The student population has grown from roughly 17,000 students in 1993\textsuperscript{146} to almost 25,000 students today,\textsuperscript{147} and we were told that it expects to grow to as many as 30,000 or more over the next five years.

UTSA aspires to extend its role significantly by increasing its ability to conduct research and provide graduate education and, in this manner, enter the ranks of nationally recognized research universities. UTSA serves an important, dynamic and growing community in the San Antonio area and across south Texas. It is certainly correct for the University to make bold plans for its future that can be of particular benefit to the region and its large and diverse population. Given the great changes in the regional economy and society, UTSA is well positioned for major new roles.

\textbf{University Leadership}

UTSA’s current President arrived on campus in May, 1999. President Romo is a credentialed academic scholar, a historian who was trained and taught at highly rated universities. He is a charismatic figure, and is thought of highly throughout the state for his intellectual attainments, the force and gravitas of the image he projects, and the vision he presents for the future of UTSA. President Romo is committed to moving this institution to a higher level of recognition for its educational and, particularly, its research programs.

President Romo’s first significant move to advance his plans was to revamp the University’s outdated organizational structure. Prior to the reorganization, UTSA was comprised of four colleges, each of which had divisions, rather than departments, and in several cases those divisions covered far too much territory.\textsuperscript{148} The University now has seven colleges, each of which has a new dean and a mostly departmental structure. We were told that the restructuring greatly improved morale at UTSA and led to new research initiatives.

With the restructuring accomplished, UTSA now is focusing on building its stature as a research university. The President has assembled a team of decision-making administrators who are all committed to this goal. However, none have scientific or engineering backgrounds. Both aspiring and nationally recognized research universities have in common programs to build or

\textsuperscript{143} This section of the report includes information that was provided to us during the course of our campus meetings. Where facts are given without citing to a particular document, that information was given to us orally during the course of those meetings.

\textsuperscript{144} \textit{UTSA Agency Strategic Plan for the 2001-2005 Period}, The University of Texas at San Antonio, June 200, page 7.

\textsuperscript{145} http://www.utsystem.edu/news/CampusDescriptions/UTSA.htm.

\textsuperscript{146} NSF WebCASPAR Database System, op. cit.

\textsuperscript{147} Information provided to WAG by UTSA.

\textsuperscript{148} For example geologists, physicists, and chemists were lumped into a single division, as were civil, electrical and mechanical engineering.
Research Capability Expansion at UTA, UTD, UTEP, and UTSA

maintain excellence in their science and engineering programs. They are continually on the lookout for new, research proven faculty members to expand their research capacity, enter new fields, and replace retirees. To hire well requires knowledge of the current research scene in a variety of frontier fields, the ability to locate and discriminate between followers and innovators, and an understanding of the culture of funding agencies. To create an environment that promotes cutting edge research requires knowledge of the facilities and equipment that such research requires. All of this knowledge is best developed through years of personal research experience. We believe that, if the University is to make significant strides in science and engineering research, it is important to include at least one individual with a background in science or engineering research among the University’s most senior administrators.

Research at UTSA

The University’s total research and development expenditures in fiscal year 2001 were a modest $11.3 million.149 Of that total, roughly $8 million came from federal sources,150 $3 million from state and local government, and the remainder from industry and the university itself.151 UTSA ranked 247th nationally in total research and development expenditures in 2001 (177th among public universities) and 235th in federal R&D expenditures (168th among public universities).152 The universities UTSA identifies as its peers – Georgia State, University of Alabama (Birmingham), University of Central Florida, University of Nevada, Las Vegas, University of North Texas, University of New Orleans and San Francisco State University – rank 117th, 28th, 82nd, 136th, 201st, 140th, and 218th, respectively, in total expenditures among public universities, and 137th, 15th, 113th 129th, 218th, 163rd, and 194th, respectively, in federal expenditures among public universities.153

In order to reach a level of research comparable to its aspirational peers, UTSA will have to increase significantly the amount of sponsored research conducted by its faculty. To achieve $100 million in annual research expenditures, it will have to do even better. To do this in less than a decade is likely to be difficult, and will require that the University recruit a large number of research qualified faculty members and provide them, as well as current faculty members, with sufficient time to develop research programs and the requisite infrastructure. Competition for new research faculty will be fierce, and President Romo clearly understands that achieving national stature as a research university will depend entirely on the University’s success in recruiting these individuals.

UTSA’s administration is looking toward some aspects of biology/health sciences, national security technology, and environmental science and engineering as areas of intellectual challenge and potential sources of research support, believing these provide it with the best opportunities for achieving excellence in the near term. Each field presents broad research opportunities for faculty from all departments in the Colleges of Sciences and Engineering and also in the College of Liberal and Fine Arts, and for each there is an opportunity to link with a successful institution or company in the corresponding field and/or a growing federal grants program.

149 NSF WebCASPAR Database System, op. cit.
150 Federal allocations are a key marker used by rating organizations because such allocations are tend to be based on the quality of the proposals submitted.
151 NSF WebCASPAR Database System, op.cit.
152 The Center at the University of Florida data on American research universities, op. cit.
153 Id.
As we understand UTSA’s plans, academic disciplines that bear most directly on these areas of greatest interest, particularly biological and closely related sciences such as chemistry and biomedical engineering, are being emphasized for faculty recruiting and new Ph.D. programs. Given funding constraints and competing demands for resources and attention, it is appropriate for UTSA to focus on certain areas of science and engineering, at least initially. However, UTSA should not neglect the basic fields of science and engineering. As mentioned earlier in this report, the very focused approach taken by some universities to improve their research income and rankings has been described as “pumping money into marquee programs [that] could drain money from other departments leaving steeples of excellence surrounded by tenements of mediocrity.”

UTSA should avoid such extreme approaches for a number of reasons, including the following:

- UTSA’s desire to provide an underrepresented community with access to all of the science and engineering fields.
- UTSA’s existing resources – the University already has departments of varying quality in the basic sciences and engineering.
- The desires and aspirations of the San Antonio community – San Antonio wants a recognized, broadly based, research university in its community.
- It would be unwise to tie the future of the University too narrowly to today’s most attractive (and trendy) potential sources of research funds. Those research areas may turn out to be of short term interest to government funding agencies.

Every science and engineering department has something to offer in the niche areas identified by UTSA for near term priority, but only if they are kept viable. For example, some aspect of materials science, which is involved in all the high priority research areas, is typically covered in each of the basic science and engineering departments of research universities. Computer modeling of relevant physical and biological phenomena and processes likewise is now important to nearly all the sciences. Imaging systems and sensor arrays, which are key technologies in all three high priority areas, draw on experts from physics, chemistry, mathematics, computer science and engineering in addition to the scientists using such systems to advance their particular research areas. It is true that in some situations the traditional departmental structure can impede the development of leading edge interdisciplinary fields. However, high ranking research universities have both flexible and strong departments and engage in developing research fields through new departments, centers and programs, with mutual benefits to both the traditional disciplinary departments and the new interdisciplinary programs.

As mentioned above, UTSA’s student population is growing at a staggering pace – the student population has grown from roughly 18,000 in 1998 to nearly 25,000 today. Over the next five years, enrollment is expected to increase by another 5,000 – 6,000 students. UTSA’s faculty can barely keep up with the teaching loads associated with this enrollment growth. Current teaching loads for too many are so high that they do not provide potentially research active faculty members with a realistic opportunity to carry out competitive research. And while

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156 NSF WebCASPAR Database System, op.cit.
157 Information provided to WAG by UTSA.
158 Id.
instructors and adjunct faculty have an important role to play in teaching service and elementary courses, as UTSA grows to be a “full service” research university, the sophistication of many of its new course offerings likely will require that they be taught by tenure and tenure track faculty or adjuncts that are recognized experts in a particular area.

UTSA estimates that its faculty will grow by roughly 350 new slots over the next 6 years, and that approximately 200 of those will be allocated to science and engineering.\textsuperscript{159} We note, however, that in the smaller science and engineering departments we studied (and even some of the larger ones), we believe the growth in tenure and tenure track faculty may have to double in order to reduce teaching loads to the point that faculty members have a chance of competing in research. For example, an additional 20 to 25 positions may be required to bring along the smaller departments of Earth and Environmental Science, Applied Mathematics, and Physics if a "two class" College of Sciences is to be avoided.

The University intends to offer competitive recruiting packages and to train its search committees to cast a wide net to find the best people. It is prepared to offer salaries as high as $80,000 to $100,000 for outstanding assistant professors in science and engineering fields with correspondingly competitive salaries for more senior professors.\textsuperscript{160} To jumpstart the recruitment process, President Romo has identified an overlooked endowment fund that will enable him to create ten new $1 million endowed chairs, a number of which will be used for candidates in biological and other science and engineering fields selected to build on local strength at linking institutions.

While the University stands ready to devote significant resources to faculty recruiting, recruiting the number of individuals that are contemplated will require a monumental effort on the part of faculty and staff who will be diverted from other important tasks. We do not believe UTSA can recruit as many individuals as quickly as it intends without compromising quality. Moreover, it is not clear where UTSA will put those individuals once they are recruited. UTSA’s capital plan calls for the completion of new teaching and research facilities in 2004, 2005, 2007 and 2009, but it was not clear to us that these new facilities are staged in a way that will accommodate the anticipated arrival of new faculty members. Also, the capital plan, which assumes an average lab size of 1,200 square feet, does not seem to take into account the fact that "one size does not fit all" and that different disciplines generally require different labs in terms of size and infrastructure. For example, theoretical researchers increasingly need access to high performance computing resources, and an organic chemist needs more laboratory space than a computational physicist. Plans for new research facilities and equipment should be made in close consultation with affected departments. Because these resource needs are best understood and planned by active researchers, such individuals must be included in the planning and decision making process.

The Lombardi Program at the University of Florida, which ranks American research universities based on several measures, has concluded that “money matters” in achieving high performance.\textsuperscript{161} UTSA will need resources at a time of fiscal stringency to improve its performance, and it has identified the following sources:

\textsuperscript{159} Id.
\textsuperscript{160} We note that salaries of $80-100,000 for entry level assistant professors will create a salary gap of between $20,000-$30,000 when compared to current faculty at higher ranks. This could create some tensions.
1. *Rapid enrollment growth.* UTSA is one of the fastest growing campuses in Texas. The University expects enrollment to grow from nearly 25,000 students today to over 30,000 in 2008. Graduate student enrollments have grown at twice the rate of undergraduate enrollments. This enrollment growth is supposed to provide the financial energy to transform UTSA, since Texas’s system of higher education links student enrollment and credit hours to funds received from the state. Unfortunately, however, substantial increases in state funding cannot be counted on.

UTSA’s leadership expects student generated resources (including possible tuition increases) to underwrite in significant measure an increase in the number of tenure track and tenured faculty who are research qualified, and to build the requisite classrooms, laboratories, and other infrastructure. It is thought that these new resources will provide for enough new faculty members to teach the larger student body and to conduct research, thereby enhancing UTSA's stature in both education and research. We are concerned that income from enrollment growth cannot be counted on to keep up with the facilities growth that will be needed to accommodate both the additional students and the ambitious research expansion.

2. *Linkages and partnerships.* UTSA wisely plans to begin expansion of its research programs in fields that provide opportunities to collaborate with leading research centers in San Antonio, or build on research being done at those institutions. It expects that its growing commitment to basic research will be facilitated by building partnerships and linkages to the several strong research institutions located in the community. These include: The UT Health Science Center – a well ranked center of research and education in the biomedical sciences; the Southwest Research Institute, a successful private, non-profit company that conducts scientific and engineering research for industry and government; and several DOD research centers.

These external institutions are rich in M.D. and Ph.D. level scientists engaged in basic and applied research in many important fields of science and engineering. For example, the UT Health Science Center is active in neurosciences, and this is an area that UTSA focuses on as well. The Southwest Research Institute is particularly strong in materials engineering, lubrication development and analysis, signal processing, and other leading edge technologies. Some of the military bases emphasize research in computer security and intrusion detection. All of these institutions could be sources of advice in recruiting; might provide support and access to facilities for newly recruited UTSA faculty; and might be sources of part time faculty for graduate courses or share in the training of graduate students. In exchange, UTSA could collaborate on joint proposals to NSF, NIH, and DOD and provide access to special funding programs for historically underrepresented minorities, appoint joint professors, provide access to graduate students engaged in research, and provide access to growing programs of research in scientific and engineering fields of interest to the potential partnering institutions.

3. *Philanthropy.* Because of the severe fiscal constraints faced by the state and federal governments, philanthropy will become particularly important in maintaining, let alone building, research universities over the next few years. Several universities and medical centers in Texas that have achieved national recognition were aided to a significant degree by large philanthropic contributions. UT Austin and UT SWMC, for example, have succeeded in finding affluent supporters in their local communities.
and elsewhere. This has not been the case for UTSA, and the University will find it difficult, though not impossible, to find donors capable of funding chairs, buildings, fellowships and scholarships. San Antonio has a modest development program that needs to be strengthened considerably in order to reduce its near total dependence on student tuition and state support.

4. **Industrial Support.** At our request, community leaders were invited to meet with us. We found them to be successful founders or managers of small businesses or foundations, loyal to the university and supportive of its aspirations. We came away with the impression that President Romo enjoys their strong support, although none of the individuals seemed suitable to provide financial support on a par with the very large donors to UT Austin or the UT Southwestern Medical Center at Dallas. Nevertheless, industry could be a source of equipment grants, fellowships, and possibly endowed chairs.

5. **Federal research grants.** Eventually, as new faculty recruits come on board, federal grants should grow to be the major source of research support at UTSA, as they are at most nationally recognized research universities. We are concerned, however, that UTSA’s expectations are unrealistic. During our meeting with the University Affairs Committee, we learned that UTSA’s leadership is assuming a higher average research grant per new faculty member ($500,000 per year) than we believe is reasonable, particularly in today’s more difficult fiscal environment and in light of the fact that many of the new faculty members to be recruited will be junior and, although research qualified, may be untried in securing competitive grants of that magnitude.

As discussed above, it is extremely difficult to implement an integrated, large scale faculty recruiting and facilities growth plan of the type contemplated by UTSA. UTSA’s plans rely on a number of assumptions, including: that it will be able to recruit very large numbers of outstanding researchers expeditiously; that those researchers will be able to secure, on average $500,000 per year in sponsored research (more than double the national average of $230,000 for academic researchers with some federal funding); that the number of new faculty positions will be sufficient to keep up with enrollment growth and at the same time increase sponsored research by a factor of nine; that UTSA’s rapid growth will result in stable compensatory growth in formula derived income from the state; and that new facilities can be funded and constructed in time to match the arrival of new students and faculty. For reasons already mentioned, we believe these assumptions are unrealistic in certain respects.

UTSA should not give up its goal of becoming the home of a respected research university, but it should scale back its plans to achieve to top tier status by 2010. In this decade, UTSA might dedicate itself to building national research eminence in several niche areas of biological and health sciences, technology for national security, and possibly other fields (which might best be identified through a strategic planning process led by the Deans of the Colleges of Sciences and Engineering and involving science and engineering faculty). For the University to qualify as a Carnegie Research Extensive University by the end of this decade will be difficult. It would have to award 50 or more doctoral degrees per year across at least 15 disciplines. UTSA plans to have 15 doctoral programs in place by 2008 (it has 8 now) and the requisite 50 graduates by 2010.\(^\text{162}\) With this task accomplished, UTSA could then dedicate itself to becoming a more broadly based, Tier 1 research university.

UTSA’s Academic Units

COLLEGE OF SCIENCES

The College of Sciences is important in the initial growth plans of UTSA. According to a publication issued by the College in Spring 2003, it currently is responsible for 75% of the sponsored research funds expended by the University. The College consists of the Departments of Chemistry, Computer Science, Applied Mathematics, Biology, Earth and Environmental Sciences, and Physics, as well as the Office of Instructional Mathematics and Science and Mathematics Education. Except for Biology and Computer Science, no department has an approved Ph.D. program of its own; all but Physics and Astronomy have masters programs and the Department of Earth and Environmental Science shares a Ph.D. program with the College of Engineering. Recognizing that Ph.D programs are essential to research departments and successful competition for federal grants, all of the departments seek Ph.D. programs. Their proposals are at different stages of internal and external review and their approval is of critical importance.

We met with faculty groups and departmental chairs from the School and generally found them to be dedicated, well prepared in their respective disciplines, and interested in research. They were aware and supportive of UTSA’s goals to grow into a significant research university, but, for the most part, did not seem to be engaged in strategic planning or other activities directed toward the administration’s growth plans.

The recent history of organizational and leadership changes at UTSA seems to have raised the hopes of many faculty members that the institution will improve, particularly individuals who have been at UTSA for longer periods of time. By all accounts, most of the changes, especially the move from a divisional structure to a departmental one, were long overdue and represent improvements. But some faculty members voiced concern that ‘legacy’ faculty members could hinder recruiting new research oriented faculty, at least until the new organizational structures and leaders prove themselves. We note that an interim Dean was recently appointed to the College of Sciences. As the University attempts to enhance significantly the quantity and quality of its scientific research, it will be critical to recruit a permanent Dean for the College.

Teaching loads for tenure and tenure-track faculty in the College of Sciences are high by the standards of successful research universities, particularly in departments outside of the areas that the University has chosen for immediate focus. The departments that have been given higher priority, for example, Biology and Chemistry, have lighter teaching loads. Outside of these departments, we found the typical load to vary from two to three organized courses per semester. At other research universities, teaching loads vary as well, but one or at most two courses per semester are the norm for those engaged in research. UTSA’s heavy teaching loads all but preclude serious research programs in some departments, and are demoralizing to the faculty, ultimately redounding negatively on the administration’s goals. The growing linkages between the biological sciences, physical sciences, and engineering that are occurring nationally, will be diminished at UTSA by this selective treatment and will hurt recruitment in all fields. It is especially important for young researchers to have sufficient protected time to attain early research prominence if they are to be able to secure continued funding through peer reviewed sources and to attract and advise graduate students.
Some of those with whom we met described a management tool related to the notion of a faculty member being "in deficit" with regard to teaching that we believe is counterproductive. As we understand it, a kind of net worth is computed for each faculty member based on the formula funding for each class taught and the number of students registered. The professor's salary is then deducted from the total "income" to the university derived from his or her specific courses. In cases where a faculty member does not “break even” (i.e., where the computed income is less than the salary), the faculty member is declared to be in deficit and must take action to rectify the deficit. This bean counting diminishes an institution aspiring to research university status. As a practical matter, it can only increase the difficulty of attracting and retaining research qualified faculty to the extent this practice is employed at UTSA. We strongly recommend that it be reconsidered. Top ranked universities in Texas subject to the same legislative prescriptions as UTSA have found ways to accommodate these regulations that are less detrimental to morale.

The science (and engineering) faculty view securing adequate research space as vital to the future of education and research at UTSA. The need for more space is driven by growing student enrollment in science, engineering, and health related fields and by San Antonio's ambition to join other major cities as the home of a nationally recognized research university. As mentioned earlier, UTSA’s aggressive building plan, intended to keep pace with planned faculty and student growth, may be unrealistic in light of the University’s ambitious hiring plans – new buildings might not be staged to coincide sufficiently with recruiting plans. For example, we were told of a young, newly recruited, research oriented faculty member who has waited months for her space to become available, and whose newly purchased equipment still sits in its original crates. In addition, certain assumptions underlying the plan regarding the amount of space that will be required are questionable. The plan assumes 1,200 sq ft per faculty recruit in science and engineering, but we were told that a recent recruit required (and was promised) four times that amount of space. These and similar issues led us, and faculty members in several science departments, to conclude that an individual with experience in building university research capacity and the infrastructure should be included in planning and decision making on these types of issues.

Department of Applied Mathematics

This Department has 11 tenure and tenure track faculty members, and has no Ph.D. program. In fact, the Coordinating Board rejected its application for planning authority for this program last month, a decision that will impede the Department’s research and education efforts. The Department has 220 undergraduate majors and graduate students, a number that would be respectable in many research universities. Unfortunately, the faculty teaching load is one of the heaviest we heard of – three courses per semester – leaving little time for research. Moreover, the break-even analysis described earlier has left faculty members in this Department in a state of distress, since they have been found to be “in deficit.” We understand that other departments use adjunct faculty to generate revenue that allows a reduced teaching load for tenure track faculty, but this Department is unable to use this tool because of a University decision to put all math instructors – adjunct faculty – into the Office of Instructional Mathematics. Faculty specializing in science and mathematics education are housed in a separate department in the College of Sciences, and statistics faculty are housed in the College of Business. The dispersed nature of mathematics at UTSA seems to have created confusion over the respective roles and responsibilities of the faculty members in these departments.

163 Information provided to WAG by UTSA.
Despite heavy teaching loads, the individuals with whom we spoke seemed eager to conduct research and publish results, and their publication list is impressive. Two of the Department’s four recent hires have received research grants in a field that is highly competitive for research funding. One of those published six papers this past year alone. Some of the faculty members felt that people making fundamental research contributions are not well treated and as a result, these individuals might leave the University. This would be an unhappy consequence of current policies – a competent mathematics teaching and research department (which this department could become with more felicitous treatment) is an important component of almost all research universities, and the importance of applied mathematics as a growth area should not be underestimated in view of the contributions this field makes in areas such as bioinformatics, computational chemistry, physics, mechanical engineering and other the subjects. It has similar potential in medical imaging, structural biology, engineering, economics, computer science and computer engineering, and computational mathematics.

Department of Biology

The Department of Biology is the largest in the College of Sciences with 29 tenure and tenure track faculty members, approximately 2,200 undergraduate majors, and 160 graduate students, including 120 MA students and 40 Ph.D. students. At present, the Department has the largest Ph.D. program on campus and the only one in the College of Sciences. This program’s emphasis is on neurobiology, and another program in cell and molecular biology, including microbiology, are expected to be approved this year. Although the Department has some good graduate students, we were told that their overall quality is not high, due in part to noncompetitive stipends and inefficient recruiting policies.

Faculty members generally were enthusiastic and pleased with the direction of the University and its future prospects, and with their own Department which has the critical mass that allows it to make excellent new hires. The Department was described by some as a “favored child” and its members do have lighter teaching loads than faculty members in other departments. Those with external support usually teach one course per semester (1+1), and others teach 1+2. New recruits may be exempt from teaching the first year. The Department employs adjuncts as well as non-tenure faculty who do not do research but teach 3+3 or sometimes even 4 courses per semester.

Of the 29 faculty members in this Department, 15 were described as “grants capable,” but only 9 or 10 have external grant support at this time. Clearly this situation must improve if the Department and the University are to move up to a new level of research prominence. The Department recently recruited an immunologist from the University of Texas Health Science Center at San Antonio (UTHSCSA), and it is in the final stage of hiring a senior microbiologist who is said to have three current NIH grants and several post-docs. This individual is being offered 4,800 sq. ft. of lab space and $700,000 in start-up funds, which illustrates the problem in assuming that 1,200 sq. ft. of space will be adequate over the long run. Four additional searches are underway now, with start-up packages of $350,000 at the assistant professor level and $500,000 at the full professor level. This will probably be adequate for some, but not all, recruits.

The Department intends to focus its recruiting in its areas of strength. The strongest group is in neuroscience with an emphasis on vision, cognitive, developmental, and channel biophysics. The other areas are cell and molecular biology with emphasis on transcription, microbial pathogenesis, and bioinformatics and genomics. These are reasonable areas to build

\[164\] Id.
upon, but it would be advisable for the Department to develop a cogent, written plan of action for its future.

The Biology faculty feels space is adequate now and more will be available in the new building, but that there may be a crunch soon. With 25 new hires projected over the next 5 years, they believe they will run out of space in approximately 2 years. Animal space is said to be deficient. There are 7000 sq.ft. available for mice and rats, and they use the UTHSCSA facility for rabbits. They share a veterinarian with UTHSCSA.

Faculty members in this Department recently formed the Cajal Neuroscience Institute and 7 or 8 individuals are associated with it. It is anticipated that some salary funds will flow through this Institute and that the Institute will submit grants and receive indirect cost recoveries. In addition to fostering collaboration across the campus and hopefully with UTHSCSA, one of the goals of the Institute is to “present a good face” to the outside world. The faculty associated with this Center are among the best at UTSA, but since the Institute has been in operation only a few months, its impact is not yet clear. It is apparent that neuroscience, microbiology and immunology, and bioengineering, are opportunity areas where UTSA has the greatest possibility of succeeding.

Department of Chemistry

In contrast to some of the other departments, the Department of Chemistry is treated well and this shows in its faculty’s enthusiastic view of the future. The Department has 11 tenure and tenure track faculty members, 8 of whom were hired since 1994, and 7 adjunct faculty members. Three assistant professors were hired last year, and the Department currently is recruiting a senior researcher. All faculty members have research interests that include the study of biological systems, and UTSA’s administration wisely recognizes that chemistry is a growth area because of its intimate connection to almost every field in the biological sciences. The Department does not have a Ph.D. program at this time, a situation that has slowed its ability to improve. However, the Coordinating Board granted planning authority for this program last month and we hope the Ph.D. program ultimately will be approved.

We were told that the Department’s externally funded research exceeded $1 million in FY 2003, or about $100,000 per faculty member. The typical teaching load for faculty members in this Department is 1+2, or 3 organized courses over the full, two-semester academic year. While there are complicated logistics involving renovating and equipping labs, the Department expects to be able to count on 15 new laboratories as it grows over the next few years. However, it is not likely that they will be available in time for the new searches that currently are underway, and faculty members expressed some concern that the University’s building plans underestimate the needs for laboratory space in the experimental sciences.

The Department of Chemistry has developed a detailed hiring plan for the next four years that calls for two new tenure and tenure track faculty recruits per year until the Department reaches a level of 16 or 17 faculty members. The Department expects to reduce its number of adjunct faculty by one FTE for every 2 or 3 new researchers over the same period of time. This opinion could threaten UTSA’s reputation and, perhaps, accreditation.
growth in the tenure and tenure track faculty will permit a continued teaching load of 2 or 3 courses per year per faculty member.

If the Department’s doctoral program is approved, its space needs are meet, and new, research active faculty members are recruited, it has the foundation to grow into a creditable research department. The Department has a base of researchers in organic/inorganic chemistry, biochemistry, polymers, and analytical and physical chemistry. They are active in exploring initiatives to participate in the biosensor effort in collaboration with Brooks City Base. These are appropriate areas of expertise for Chemistry to allow it to contribute to identified high priority research topics. New hires are projected in computational chemistry and the “base” areas of chemistry and biochemistry. These strike us as sensible areas that should provide good matches to the overall research opportunities and goals of the University.

Department of Earth and Environmental Science

The Department of Earth and Environmental Science has 12 tenure and tenure track faculty members\(^\text{168}\) and a search underway for an additional slot. We were told that every faculty member has grant support, with total sponsored program awards of over $400,000 in FY03.\(^\text{169}\) This is a modest amount, and it is not clear how much the Department can increase its sponsored research volume given the small number of new hires it has been allotted. The Department’s entry into research on the environmental aspects of Earth Sciences is laudable since this field is experiencing rapid growth in external research support and in student interest in research universities across the country. We note that this Department, like others at the University, is experiencing severe laboratory space problems, which in one case resulted in equipment for a recent recruit being held unused in a warehouse awaiting the availability of promised space.

Almost every earth science department in the country and every new earth science textbook emphasizes environmental geology, recognizing that environmental teaching and research are important growth areas.\(^\text{170}\) As a result, for the first time in years, universities are giving these departments priority in receiving support, and we believe UTSA should do so as well. We estimate that UTSA’s Department is about 5 positions short of critical mass. Forefront fields that present particular opportunities at UTSA are geobiology, environmental geochemistry, and hydrogeology.

The Department does not have its own Ph.D. program, but collaborates with the College of Engineering in the Civil Engineering Department’s Ph.D. program in Environmental Science and Engineering. Currently, there are 16 Ph.D. students in this program.

Department of Physics and Astronomy

The Department of Physics and Astronomy has 6 tenure and tenure track faculty members\(^\text{171}\) and 6 adjunct faculty, not all of whom have Ph.D. degrees. The Department’s sub-critical size does not allow it to function as a research department. The faculty members with whom we spoke pointed out that San Antonio is the only major city in the country that does not offer graduate courses in physics, and they still recoil from a statement of a former dean to the

\(^{168}\) Information provided to WAG by UTSA.
\(^{169}\) Id.
\(^{171}\) Information provided to WAG by UTSA. In contrast, UT Austin’s Department of Physics has 55 faculty members.
effect that Hispanics cannot do physics. The Department has proposed a Ph.D. program, but the status of its proposal is unclear.

Teaching loads average 3 courses per semester, and we were told that the Department has the highest ratio of semester-credit-hours per faculty member in the College of Sciences. (They teach a calculus based physics course to 1,000 students and earn more in contact hours than is paid out to them). The Department has one funded grant in laser physics and believes that a recently submitted proposal was not funded because of the heavy faculty teaching load.

Faculty members believe they have been excluded from University plans for new space, and told us that in an allocation by UTSA’s administration for new equipment, the department received $\frac{1}{20}$ the amount awarded to chemistry. The College’s interim Dean recognizes the problem but does not think that resources are available for physics in the administration’s current planning.

Considering the small size of the Department, faculty members represent a reasonably broad spectrum of backgrounds in theoretical and experimental physics, but all are directing their research interests toward areas of biophysics. The reasons for this focus in bio-related areas includes general excitement in these areas of science and the priority afforded to biology by the University’s administration, both of which are related to the perception that biomedical research offers the best opportunities for short term growth and support. This raises a question of whether faculty are merely chasing money and working in fields selected by administrators rather than in fields that attract the individual or are in the forefront of physics research today. It does have collaborative programs with the Southwest Research Institute, providing another example of how important such linkages will be to strengthening research at UTSA.

Very few, if any, established research universities lack a viable physics department, and we would advise the University to build the required critical mass with roughly 6 additional research qualified faculty members as an investment towards the goal of building a nationally respected university. It is disappointing that UTSA’s administration does not appear to recognize the importance of physics as an intrinsically basic science and as an important contributor to almost every field of science and engineering. Funding for physics is likely to grow along with funding for other physical sciences as Congress, the NSF and NIH, and the President's Science Adviser follow through on their public statements that the imbalance in federal budgeting favoring the biological fields over the physical sciences needs to be corrected in the years ahead.

Department of Computer Science

The Department of Computer Science has 17 tenure and tenure track faculty, 172 800 undergraduate majors, 80 Masters students, and 25 Ph.D. students. 173 During the course of our discussions, faculty members expressed some confusion over the goals and objectives of the University’s strategic plan, and indicated they were not consulted in the development of the plan. They also were not aware of the administration’s plans to hire new faculty members. For these reasons, and because the University budget process was not well understood, the faculty members with whom we spoke felt that their ability to develop a strategic and financial plan was limited, and that they were competing for resources with the Department of Electrical Engineering in the College of Engineering. A well functioning department of computer science is too important to the goals of the University to allow this state of confusion and lack of direction to continue.

172 Id.
173 Id.
Student interest in the field of computer science is clear – enrollment has doubled over the past 6 years, and the Department’s 17 faculty members minister to over 900 students, with a student to faculty ratio of 47:1. This is too high a ratio to provide high quality undergraduate education. Faculty members expressed an interest in the joint development of a computer engineering program with the Department of Electrical Engineering. A third department, Applied Mathematics, also could play a role in the development of a computer engineering degree program.

The Computer Science Department is not one of the top departments at UTSA. Its research activity is relatively small. However, with appropriate investment in faculty, it has the potential to become more active in research in information, technology, security, networking, etc. Computer science is a field with student interest, available federal funding, and multiple opportunities for research and education. Unfortunately, the present state of the Department denies it the ability to vigorously pursue them.

We believe the capabilities of this Department, as well as of Electrical Engineering and Applied Math, should be harnessed better than they now are. While a merger might be difficult to achieve, and even counterproductive, a virtual faculty of computational science and engineering that share a common educational track and joint research might be helpful at UTSA, as it has been at other institutions.

Recommendations for the College of Sciences

Our general recommendations for the College of Sciences are as follows:

1. While we recognize that the approval of doctoral programs is not totally within the control of the University, we recommend that UTSA pursue approval of doctoral programs in the basic fields of physics, chemistry, earth and environmental sciences, and applied mathematics, and not in restricted, narrow specialties. Departments without such programs are impeded in the competition for federal research grants, and a lack of such programs ultimately hinders the University's progress towards national research status.

2. The Applied Mathematics Department is research capable but thwarted by heavy 3+3 teaching loads. Also, it is demoralized by having been found "in deficit" with respect to teaching. This situation, together with the dispersed nature of mathematics at UTSA should be corrected.

3. The Department of Biology’s 27 tenure and tenure track faculty members cannot deal with the teaching load associated with 2,200 undergraduates and 160 graduate students, and at the same time increase research efforts and achieving critical mass in its areas of research strength. Many more faculty members are needed. The 25 new hires projected for the next 5 years should, if possible, be research active individuals, and additional laboratory space will be needed after the first 10 hires.

4. The Department of Physics should be authorized to hire six or so research qualified new faculty members and should be provided with facilities support that it needs to grow to critical size.
5. The Department of Computer Science is not a strong one. Because the field is so important, this situation must be addressed by hiring additional research qualified faculty members and by examining the possibility of a computational science and engineering degree program that could be developed in coordination with the Departments of Electrical Engineering and Applied Mathematics.

College of Engineering

The College of Engineering was created in the fall of 2000, when the University was restructured into seven colleges. Prior to the reorganization, engineering was a division within the College of Science and Engineering. Currently, the College’s enrollment is 1,650 students, including 1,450 undergraduate and 200 graduate students. Engineering has 49 tenure and tenure-track faculty members distributed in four programs: Civil Engineering, Electrical Engineering, Mechanical Engineering, and Biomedical Engineering (inaugurated as a Ph.D. program in Fall 2003), with an undergraduate student-to-faculty ratio of 29:1, as compared to 18-25:1 in the top 50 institutions.\textsuperscript{174} We were told that roughly 50 of the new faculty positions that will be created over the next 5 years will be in the College of Engineering.

The Dean expects the College’s enrollment to grow by about 1,000 to 1,200 over the next 5 years. While this would result in a significant increase in the size of its student body, the percentage of UTSA’s students going in to Engineering would remain relatively low. San Antonio and Texas will need well trained engineers as its economy and demographics change in the years ahead, and UTSA should think about whether it could or should be more ambitious in its undergraduate engineering recruitment plans for this College, especially for underrepresented minorities. To arrive at a firm conclusion on this question, one could survey business, high schools and community colleges, as well as the population and regional government agencies to obtain a more quantitative picture of what can be expected over the next decade.

The transformation of UTSA from a teaching to a research university is causing some discomfort in the College of Engineering. Faculty members exhibited a high degree of both excitement and nervousness related to the strategic goals of the University. The excitement derived from the eagerness of the faculty to be members of a high quality research university. The nervousness was caused by the perception that the University’s goals and strategies may be unrealistic. For example, in order to become a credible research university, UTSA must reduce the teaching loads of its research qualified faculty. One way of doing this is to bring on more adjunct faculty members to shoulder some of the teaching load. However, there is no plan to add adjuncts at this time and, in fact, there is some pressure to reduce their numbers across the University. We were also told that UTSA plans to hire 50 new faculty members in the College of Engineering over the next 5 years, and such hires could ease teaching loads. However, while UTSA is able to offer competitive salaries, it is not at all clear that resources for start up packages are available and there does not appear to be sufficient research space to house these individuals at this time.\textsuperscript{175} And given heavy teaching loads and other demands on faculty time, we believe the administration may have seriously underestimated the ability of faculty to staff the number of search committees that will be required to hire so many new individuals.

\textsuperscript{174} Information from data distributed to Big10+ deans.
\textsuperscript{175} The 225,000 square feet of new space planned for science and engineering faculty will not be sufficient, considering the numbers of new faculty members that will be recruited in those colleges.
Department of Electrical Engineering

The Department of Electrical Engineering has 14 tenure and tenure-track faculty,\(^{176}\) and 4 adjunct faculty. It has 530 undergraduate majors, 100 Master’s students, and 22 Ph.D. candidates, resulting in a student to faculty ratio of 38:1 (not counting adjunct faculty). As a result of this high ratio, the number of contact faculty hours per student is low, compromising the quality of education. At the same time, the teaching load for faculty members is high, with most teaching 3 courses a semester. This makes it nearly impossible to conduct research, and a lack of resources exacerbates this problem. Moreover, we were told that salary release funds generated by research done by faculty in this Department do not stay in the Department. Rather, they are held at the College level and used for other purposes. This practice takes away an incentive for faculty members to conduct sponsored research.

The Department will be hiring 3 new tenure track faculty members in the next academic year, which will improve the situation but will not resolve the problems of high teaching loads and large student-to-faculty ratios. This Department has the potential to grow a good research program, but this would require a substantial investment in new faculty positions and start up packages.

The most productive faculty in the Department support the biomedical engineering program, which is the only one that offers a graduate degree. The other areas of electrical engineering do not produce Ph.D students and as a result the quality of their research programs is compromised. In the area of computer security, there are a number of projects that are supported by congressional funds and performed in coordination with the Brooks Air Force Base. These have interesting practical applications but their innovative content does not seem very high.

Department of Civil Engineering

The Department of Civil Engineering has 9 tenure or tenure-track faculty members\(^{177}\) and 2 adjunct faculty. It has 310 undergraduates and 50 Master’s students, but no Ph.D. students. As is true in other departments, faculty members are expected to teach a minimum of 3 courses each semester and they have not been successful in attracting any substantial research funding. A number of these individuals have focused on their teaching responsibilities, and expressed frustration with the new goal of making the University a top research institution. They do not see how this transition will be accomplished and are not aware of any serious discussion of how to succeed in research and how to recognize the varying contributions of faculty members. A number of individuals indicated that they have not done research for many years, indicating this Department will find it very difficult to make a successful transition.

One of the Department’s successful research areas is environmental engineering, which is primarily supported by very few faculty members who have been active in a number of outreach programs. This area should be expanded by hiring additional faculty and introducing a Ph.D. program.

\(^{176}\) Information provided to WAG by UTSA.
\(^{177}\) Id.
Research Capability Expansion at UTA, UTD, UTEP, and UTSA

Department of Mechanical Engineering

The Department of Mechanical Engineering has 13 tenure and tenure-track faculty, and 420 undergraduate students and 46 Master’s students. Faculty members in this Department were not involved to any meaningful extent in the strategic planning process for the University, and appear at a loss as to how to proceed in the face of the University’s goals with respect to research. For example, they have no idea how to start the process of developing a Ph.D. program. This, coupled with high teaching loads, has created a morale problem, and, for these reasons, the research potential for the Department is low.

Biomedical Engineering Ph.D. Program

The Biomedical Engineering Program is a joint UTSA, UTHSCSA Ph.D. program with approximately 15 faculty members, roughly half of whom are from UTSA’s Departments of Electrical and Mechanical Engineering. UTSA is now recruiting for two endowed chairs in bioengineering and expects to have $1 million in start up funds for these recruits in addition to space in a new building. The Biomedical Engineering Program was described as having been developed at the grass roots level of the faculty, not by direction from above. It arose from mutual interest of faculty at each institution, recognizing what the other had to offer, e.g., engineering and physical sciences at UTSA and clinical sciences at UTHSCSA. There was already a bioengineering unit at UTHSCSA, and after the faculty got together, the program “took off.”

Faculty members participating in the Biomedical Engineering Program will focus primarily on research, and will not have to teach in the main engineering disciplines. Their teaching loads are one course per semester for the first three years of their appointments. After the first three years, they are evaluated on the basis of their productivity, with the ongoing load depending on research support. The program currently has 12 Ph.D. students who were selected from among 40 applicants, which was described as a good pool. Courses are taught at both UTSA and UTHCSA, and students are free to select their faculty advisors wherever the fit is best.

The Biomedical Engineering Program is very important because it is an up and running collaboration with UTHSCSA, is addressing a key research field, and seems to be doing well. Good, actively working partnerships with UTHSCSA will be essential if UTSA is to achieve its goal of moving up to the research university level.

Recommendations for the College of Engineering

In general, the College of Engineering has good people on the faculty and among the staff and student body, but it appears that the development and communication of strategic plans for the University did not involve them to any significant degree. We recommend that engineering activities be expanded so that progress can be made in the priority fields of communications, information and security; transportation and environmental resources; bioengineering and biomaterials; computer engineering; and materials engineering. Research in these fields will address local and national needs and build on the College’s existing strengths. We also recommend that the College undertake the following:

1. A survey to determine future regional demand for engineering graduates.

Id.
2. The development of plans for establishing closer relationships with local businesses and for increasing their support. These relationships are critical in helping the College develop new research directions and participate in technology transfer as needed to allow the institution to successfully contribute to the economic development of the City of San Antonio and the State of Texas.

3. The development of plans to attract more students into engineering fields.

4. The creation of Ph.D. programs in all engineering departments and research areas. Without these, the College cannot establish itself as a research oriented school and will not be able to take full advantage of research funding opportunities provided by NSF, DoD and NIH.

5. The nurturing of biomedical engineering as a focus area and the linkage to UTHCSA. The University should negotiate ways to make joint appointments with UTHCSA and explore possibilities of joint research proposals.

6. The development of a comprehensive strategy to take better advantage of computer related departments and groups so as to develop a more coherent approach to computational science and engineering.

7. An assessment of faculty needs and competitive recruitment practices in a tight labor market.

8. The development of comprehensive teaching and research labs. These are necessary to the training of undergraduate and graduate students and the ability to perform high quality innovative work.

**College of Education and Human Development**

The College of Education and Human Development was established as part of the University reorganization three years ago, and consists of one division and four departments. The new Dean is knowledgeable in the field of education and dedicated to building up the College. Under her leadership, faculty salaries have increased following years of poor salaries, and several significant new hires have been made. Faculty members in this College have not been very successful in getting external funding, but the Dean recognizes that UTSA is “sitting on a gold mine” in terms of educational problems facing the nation in educating Hispanic children and is eager to capitalize on this.

The Dean recognizes the importance of research for her faculty and graduate students, is savvy about developing external funding, and understands the need to improve the “grantsmanship” capability of her faculty. All of this portends growth in sponsored funding for improving training and research capacity dedicated to preparing better teachers, and providing quality programs for counseling, curriculum development, language and literacy, and the development of education leaders in the region.

*Department of Health and Kinesiology*

The College’s Department of Health and Kinesiology is unlike its other departments and divisions, in that faculty research is concerned with topics such as altitude physiology, motor
control, impact of disabilities, adolescent risk taking, excessive effects on myocardial function, nutrition, diabetes, biomass index, etc. This Department has 7 tenure track members\(^{179}\) and several times that many adjunct faculty. We met with four of the faculty members, including the Chair; all have been at UTSA for four years or less. They have heavy teaching loads (most teaching 2 + 3 courses), which they hope to reduce to 2 + 2.

Due to both the culture and resources in the College of Education and Human Development, the faculty in this Department have offices but no research space, and salaries that are significantly lower than faculty members in the College of Sciences. They need not only space, but also equipment, and there are no start-up packages for new recruits. All faculty members in this department do some research, but most do not now have external funding. Three faculty members are currently being considered for tenure. This is a crucial decision point for the Department, as tenure is needed if a faculty member is to have graduate students.

If this Department, which has some well trained and enthusiastic people, is to contribute to the overall research program of the University, it will have to be provided with these essentials of research – space, equipment, start-up funds for recruits, and reduction in teaching loads for research active faculty. One of the more impressive members of the group said that if things did not change, when his next grant is funded he will leave. This small group, whose members individually appear competent, cannot rise to the level of a significant research unit without a major injection of support. That seems unlikely under present circumstances.

**Department of Psychology in the College of Liberal and Fine Arts**

The Department of Psychology has 16 faculty members\(^{180}\) who work in the areas of social, developmental, cognitive, health, behavioral, and clinical psychology. The Department has roughly 1,300 undergraduate majors and 30 to 40 Master’s students, about half of whom do theses. Faculty teaching loads are heavy – most teach 3+2, although new recruits teach 2+2 the first year. Almost all of the faculty are engaged in research, but less than half have external support most of which comes from the NSF and the Army, and the amounts are not large (in 2001, total research expenditures in psychology were $81,000\(^{181}\)).

Space is a serious problem. Faculty members have offices, but no interview rooms, and the Department has only 100 sq.ft. of faculty research space which is shared and must be scheduled – an arrangement that is not compatible with productive research. Faculty members in this Department feel that the Colleges of Liberal and Fine Arts is not oriented toward research, particularly laboratory research, and the problems of increasing enrollment, teaching loads, and lack of adequate facilities may not be fully appreciated by the leadership of the College. As in other departments, rapidly increasing enrollments and heavy teaching loads work against the ability to conduct research. Department faculty members would like to have more collaboration with the neurobiologists on the campus, but thus far collaborations have not been extensive. There is a low level of collaboration with the UTHSCSA, where researchers can use the imaging center, and the General Clinical Research Center. There also is some collaboration on an individual basis with the School of Public Health at the University School of Public Health, UT Austin, and at UCLA.

\(^{179}\) Id.
\(^{180}\) Id.
\(^{181}\) NSF WebCASPAR Database System, op.cit.
It is possible that with enhanced space and support from the University, a doubling of the existing faculty, decreased teaching loads, approval of the proposed Ph.D. program, and significant increased collaboration with stronger units, i.e., with the neurobiologists in the College of Science and the Cajal Neuroscience Institute and with neuroscientists at the UTHSCSA, the Psychology Department could become a part of a successful neuroscience program in San Antonio. For the reasons discussed above and in the subsection on the Department of Biology, we believe that the life sciences field with the best chance of moving to the level expected of a first tier research university is neurosciences, broadly interpreted. Interactions among the entities mentioned above should be strongly encouraged at every level.

**COLLEGE OF PUBLIC POLICY**

The College of Public Policy consists of two departments – Public Administration and Criminal Justice – with a third (Social Work) in the process of creation. External funding for research is minimal – it is currently comprised of two grants, one from HUD and one from the Packard Foundation, totaling less than $100,000. The Dean has high hopes that the central administration’s recent assignment of a full-time development officer to the College may bring some much needed expertise in identifying potential sources of grants and pursuing them.

The Dean feels that the greatest strength of his College in contributing to the research goals of the University is the recent recruitment of research oriented young faculty members, particularly in the Department of Public Administration. A related weakness, however, is that these newcomers are novices when it comes to the mechanics of grant writing and therefore need considerable additional training and infrastructure support. He adds that all the faculty need to be “socialized” to a more research oriented environment than they were accustomed to in the past. He sees an additional strength in the very recent creation of a Center for Non-Profit Management, offering non-credit training assistance to members of the local non-profit community, and he believes it has “rich potential” for a flow of external grants.

Both the faculty and the Dean agreed that the most urgent step toward the stated goals is the creation of a PhD. program, which is currently authorized and underway. The initial areas of focus will be environmental and development policy and administration and social policy and administration. The program will involve faculty from all three departments of the College, as well as sociologists, economists, and historians from other colleges at USTA. They see a big market for their future Ph.D.s, in government and think tanks as well as in academe, because of the dearth of Hispanics holding such degrees.

**Department of Public Administration**

This Department has 6 tenure and tenure track faculty,\(^{182}\) 3 of whom are active in research and publication, although without external funding at present. One faculty member had an NSF grant on science and technology policy in the past and continues to serve on NSF review panels. The Department offers a Master of Public Administration degree, and expects to exceed its goal of doubling MPA enrollment within five years. The teaching load in this Department is 2+2, which seems compatible with active research in this area.

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\(^{182}\) Information provided to WAG by UTSA.
Department of Criminal Justice

This Department offers undergraduate and graduate courses: a BA in Criminal Justice and an MA in Justice Policy. It has 8 faculty members,\textsuperscript{183} 5 untenured, all of whom have a 3+2 teaching load.\textsuperscript{184} All appear to be genuinely engaged in some form of applied research, but none has external funding. Those recruited recently say they were attracted to UTSA primarily because of the level of commitment to the strategic plan shown by the University, the College, and the Department, and add that they are getting everything they were promised in terms of infrastructure support (e.g., 2 departmental shared research assistants, any software they ask for, and a little bit of travel money). They seek a reduction in teaching loads in order to have more time for grant writing as an immediate goal. In sum, this is an energetic, enthusiastic, “can do” but relatively untried group. The Department currently is conducting 2 searches and is authorized to hire up to 4 new faculty members, 2 at the associate level and 2 at the assistant level. A 50% increase in faculty size should help alleviate the teaching load burden.

Recommendations for the College of Public Policy

1. The newly authorized Ph.D. program in Public Administration needs to get underway both quickly and strategically, since it is key both for national recognition and to retain the young, research oriented junior faculty members who have recently been recruited. The goal of involving faculty from other colleges in UTSA in developing and implementing this program should be strenuously pursued.

2. The Dean should give high priority to finding resources that will enable him to reduce the teaching loads of the research active faculty, which, at least in the Department of Criminal Justice, are uncompetitive and, in most areas, not fully compatible with high level research activity.

3. Similarly, ways will have to be found to fund the initial crop of Ph.D. students at competitive levels, if a new and untried program is to attract high quality candidates who, once they go on the job market, will achieve placements that have a positive impact on the School’s visibility and reputation.

4. Since research savvy senior faculty to serve as mentors for their junior peers are in short supply, research active senior faculty with related interests in other Colleges should be encouraged to assist in this process.

College of Business

The Dean of the College of Business was recruited 3 to 4 years ago for the specific purpose of lifting the College to a higher research level. His believes that, of the 75 tenure and tenure track faculty in seven departments, the 25 hired during the past three years are seriously oriented toward research. He is concerned, however, about the availability of resources necessary to allow an expansion of the level of research in the College. Business schools are not traditionally the recipients of significant research grants; the University’s capacity to raise private money is very limited; and, with the deregulation of and anticipated substantial increase in University-wide tuition, the College’s ability to increase student fees (traditionally the primary source of money for infrastructure in this College) is severely constrained. In addition, the

\textsuperscript{183} Id.
\textsuperscript{184} Id.
infrastructure is inadequate for research oriented faculty (e.g., inadequate telephone allowances, little or no travel money and administrative support). The College’s departments receive little if any of the indirect funding from grants, which currently amount to $300,000 to $500,000 annually according to the Dean, most of it generated by the Center for Infrastructure Assurance and Information Management.

Despite these financial constraints, the Dean informed us that he is raising standards for promotion to tenure, and has reduced the teaching load for tenure and tenure track faculty to 2+2 from 3+3 and, at the same time, is creating a cadre of full-time doctorate-holding non-tenure track faculty to teach a 4+4 course load. Departments tend to be small (7 to 14 tenure and tenure track faculty) and, even though some have grown very rapidly recently, all regard themselves as short of faculty to service course demands. In addition, as a major step toward the University’s goals, four Ph.D. programs were inaugurated last Fall in Accounting, Finance, Management, and Information Systems, each with 6 to 9 students. But the infrastructure is not evolving fast enough to keep up with these expanded activities.

The Dean is confident that the College is making steady progress toward the University’s research goals, but the views of his department chairs and faculty are more mixed, with some faculty members feeling that there has been significant backsliding in the last year or two. One example given of this backsliding was the replacement of the Graduate Dean, who had tried to accelerate research oriented standards, with an individual seen as particularly vocal in her desire to slow the pace of change.

Department of Accounting

This Department of 14 tenure and tenure track faculty members has a core of recently recruited faculty active in peer reviewed publication, all of whom have 2+2 teaching loads. They are able to provide their 8 Ph.D. students with $15,000 per year in stipends, funded tuition waivers, and some health insurance, due in part to funds from KPMG’s Ph.D. Project for minorities in accounting (4 of the 8 are minorities). The first year Ph.D. students serve as shared RAs; the second years as TAs (none are third year yet, but they may be assigned undergraduate courses of their own to teach at that point). The faculty complain, however, that because of recent faculty turnover and the fact that they have no authorized open tenure and tenure track positions, they are not able to keep up with course demands and are frequently required to teach uncompensated overloads.

Department of Management

This Department has 13 tenure and tenure track faculty members. Those with whom we met were publishing in peer reviewed journals of varying quality; one is in his third year of a federal grant that yields about $100,000 per year, and several of the doctoral students have presented papers at Academy of Management meetings (a nationally prestigious organization in their field). About 70% of the teaching hours are delivered by non-tenure track faculty. This is an unhappy and alienated group (perhaps in part because the displaced Graduate Dean referenced above is one of them), despite the fact it has 8 doctoral students and recruited two tenured full professors from good schools (e.g., Purdue) in the past 3 years. Faculty members feel that there is no correlation between the size of salary increases and research productivity (salaries are public

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185 Id.
186 Id.
187 Id.
information), and that totally arbitrary decisions are made regarding the allocation of hiring slots among Departments, without consultation with the faculty.

**Department of Finance**

This is a small but high quality department, as demonstrated by its publication record. It has 5 tenured and 3 tenure track assistant professors,\(^{188}\) 5 Ph.D. students, and 2+2 teaching loads.\(^{189}\) About 50% of classes are taught by adjuncts, a two tier system that is bound to grow, and undergraduate classes have gotten very large—the only way to square the circle, since teaching loads for tenure and tenure track faculty have dropped from 3+3 to 2+2 over the past three years and a PhD program has been added, all without any increase in faculty headcount.

The faculty recruited recently have on the whole come from high quality schools and seem to feel that the Administration is supportive and delivering what they were promised. The Chairman is proud to have “attracted people far better than I am”. There is general agreement that the recently hired faculty, all of whom are active in research, have put the Department and the College well on track to the University’s goals, but that a growing body of publications, more attendance by faculty at conferences, a cadre of completed PhDs, etc., will be required before UTSA acquires the desired reputation and visibility.

**Department of Economics**

This is a somewhat over-tenured Department. Of the 12 tenure and tenure track faculty,\(^{190}\) the only Assistant Professor is leaving and they are recruiting for his replacement.\(^{191}\) Some of the senior faculty members are research active and some are not; teaching loads appear to be calibrated according to publication record (using a controversial system of journal rankings) and participation in the graduate program. The latter is currently an M.A. in Economics, inaugurated four years ago, which they plan to grow, as well as at some point to initiate an “independent” Ph.D. in Economics (rather than a Ph.D. in Business with an Economics concentration). So far, the faculty has been unsuccessful in grant proposals and has focused instead on writing for peer reviewed publications (there actually is some trade off between the two in Business fields), though one individual is working on several small grant proposals. The research active faculty members are publishing in peer reviewed journals, mostly not in the top tiers. These faculty reiterate the problem of an inadequate research support infrastructure.

**Department of Management Science and Statistics**

This is a very strong department, with 6 tenure and tenure track faculty\(^ {192}\) (all with 2+2 loads), 5 in Management Science and one in Statistics (though several of the former are Ph.D.s in Biostatistics), plus 3 adjuncts with Ph.D.s. Most of the tenure and tenure track faculty (perhaps even all of them) either have grants from such agencies as NIH and NASA or have had them in the past and are in the process of applying for new ones. The Department is recruiting for 1 open position, and 2 instructors.

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\(^{188}\) Id.

\(^{189}\) Id.

\(^{190}\) Id.

\(^{191}\) Id.

\(^{192}\) Id.
The Department has 2 recently approved masters programs, an MBA in Management Science and an MS in Statistics, and has been asked to prepare a proposal for a Ph.D. program – the most urgent next step in the upward climb, along with continued aggressive faculty hiring.

Department of Information Systems

Information Systems is the third area of real strength in the Business College (in addition to Finance and Management Science and Statistics), based on its reputation, publication record and the schools from which it has made its recent faculty hires. It has 11 tenure and tenure track faculty, including 6 assistant professors, 4 of whom were hired within the past year\textsuperscript{193} – all “from good schools and with well known dissertation advisers” according to the Chairman. The Department has several authorized graduate programs: an MBA, two MS’s, one in Information Technology and one in Information Assurance, and a Ph.D. in Business. At present, 6 Ph.D. candidates in the Business Administration program are concentrating in Information Technology Program. First year Ph.D. students are supported as RAs; 2\textsuperscript{nd} and 3\textsuperscript{rd} years (when they get there) as TAs.

Unlike most other departments, this group does have successful grant getters. One faculty member has a large grant from the Air Force and a smaller one from DOD/NSA to establish a Research Center on Computer Security. We were told that another has just finished one grant in the vicinity of $265,000 and has been awarded another of similar magnitude. These funds come through the Centers for Academic Excellence programs, and are focused on the yet-to-be-established Center for Infrastructure Assurance and Information Management. The faculty also hope to get grants in this area from U.S. Department of Homeland Security in the future.

Department of Marketing and Tourism

This Department has 7 tenure and tenure track faculty, 4 of whom are research active, and about the same number of adjuncts\textsuperscript{194}. The newest, both associate professors, are among the research oriented group, and the Department has lines for two additional junior people (one just hired from the University of Pittsburgh) and one senior position. The research active faculty have 2+2 teaching loads; the others, 3+3. The Dean has been forthcoming with both faculty lines and salaries, as well as RAs and TAs, but there is a dearth of travel money. The Department hopes to build its research capabilities to the point where it can start a Ph.D. program within two years, but the faculty recognizes that any research oriented grants will have to come through interdisciplinary alliances that do not now exist.

Recommendations for the College of Business

1. The infrastructure support essential for a research oriented faculty must be made available to the College; both Dean and faculty are virtually unanimous in stressing the inadequacy of such support as travel funds, telephone allowances, assistance in grant proposal preparation and grants accounting, with the latter acting as a positive disincentive to applying for grants.

2. Both the Dean and the Provost need to be sure that the faculty have adequate access to them and that the message regarding a shift to a more research oriented

\textsuperscript{193} Id.
\textsuperscript{194} Id.
environment is clear and unequivocal; a number of the faculty members in the College feel they are getting mixed messages at present.

3. The Dean needs to make a special effort to dispel the notion among some of his faculty that resource allocation (especially in the form of authorizations for new hires) is a zero-sum game, with other departments gaining at the expense of theirs.

**General Observations, Conclusions and Recommendations For UTSA**

UTSA has set its sights on becoming one of the top 100 universities in the nation in terms of federal research dollars and becoming a Carnegie Doctoral-Research Extensive institutions, both by 2010. We believe a 20 year time frame would be more achievable. Nevertheless, we were positively impressed by the University leadership’s evident motivation and drive to improve. Even if UTSA’s plans do not proceed precisely on the pace outlined to us, and we are skeptical as to whether they can, there is good reason to expect that UTSA will become a much better university as it strives to achieve its aspirations as a Carnegie Doctoral-Research Extensive and Tier 1 research university.

The strengths upon which UTSA can rely as it pursues its ambitions are:

- A dedicated, prominent, goal oriented new President;
- The support of the San Antonio community which wants to be the home of a nationally recognized, full service, research university;
- Proximity and partnership opportunities with UTHSCSA, the Southwest Research Institute and DOD research laboratories; and
- The creation of 10 new endowed chairs, a good kick off for a development campaign.

The main weaknesses that must be overcome are:

- The currently low level of sponsored research and sub-critical size of many basic science and engineering departments;
- Lack of research experience in science and engineering among top administrators at the University;
- Lack of a realistic and detailed strategic plan for growing the research enterprise, including realistic plans for recruiting faculty and staging the construction of research facilities;
- Too few doctoral programs in basic fields of science and engineering;
- Heavy faculty teaching loads; and
- Uncertain sources of support for the University’s growth plans, including too much reliance on tuition funds from rising enrollment and unrealistic estimates of the average grant funding that will be obtained by the research faculty.

UTSA’s research strengths currently are in the biological sciences, and the University is wisely investing resources in that area. It also has a nucleus of research faculty in the following fields:

- Neurosciences;
- Cell and molecular biology;
• Microbial Pathogenesis; and
• Bioinformatics and genomics.

These fields are in the forefront of current biological and biomedical research, and support for work in these areas is available from NIH.

UTSA’s next high opportunity research areas are:

• Chemistry, as UTSA has a core of well qualified researchers that are poised to advance in stature; and
• Biomedical engineering, where UTSA has made a promising start through its joint program with UTHSCSA.

The research areas listed above provide UTSA with its best opportunity for enhancing the University’s research stature and increasing the level of its sponsored research. However, fields such as physics, mathematics, earth and environmental sciences, the computational sciences and engineering cannot be allowed to deteriorate since they are vital components of any research university of national stature, and provide the underpinning for much of the interdisciplinary work that UTSA wants to do. If UTSA is to expand its research enterprise to the level of $100 million in research expenditures each year, it must expand significantly its faculty size, facilities and infrastructure.

• The University estimates that if it recruits 200 new faculty members in science and engineering, it will be able to achieve its goal of Tier 1 status. In this analysis, the University assumes that each such researcher will bring in an average of $500,000 in research expenditures annually. We do not believe that average of level of research expenditures is achievable. It is more than twice the national average. If one uses the national average of $230,000, UTSA will have to recruit 434 researchers. With salaries and start up packages (which can be as high as $500,000 or more), UTSA will have to identify a major new source of funding for its expansion. To achieve Tier 1 status in 6 years would require UTSA to recruit 70 new science and engineering faculty members each year – too many to sustain quality.

• UTSA has a capital plan that calls for roughly 265,000 square feet of space. The Provost has assumed an average of 1200 square feet of research space for each new recruit, and believes the buildings described in the capital plan will be sufficient for the 200 anticipated hires. If UTSA winds up needing more than 200 researchers, or if the 1200 square foot estimate is low, it will need to identify and fund more facilities than are planned for currently.

As UTSA moves along the path it has established for achieving its research goals, it will have to establish clear priorities. We believe it must first:

• Develop an institution-wide strategic plan (including realistic timetables for achieving goals, realistic estimates of resource needs and identification of funding sources) with the participation of the University’s research active faculty.

195 Id.
As the UT System’s most rapidly expanding university, USTA must address the problems associated with its rapid enrollment growth and the effect of that growth on its efforts to improve research capacity.

All of these issues, as well as many others, are discussed in more detail in the body of this report, where we describe a number of our observations and provide recommendations for the Institution as a whole and, in some cases, for schools and departments independently. Our most significant concern is that UTSA’s upper administration has set goals for itself that are unrealistic in certain respects. UTSA’s plan calls for recruiting and accommodating some 200 new faculty members in the fields of science and technology in 6 years. UTSA assumes a research efficiency for each new hire of $500,000 annually in total research expenditures and this allows it to reach the $100 million with 200 hires. We believe the national average of $230,000 is more likely, although still optimistic, implying that 435 new faculty would be needed to reach $100 million in research expenditures. As mentioned before, to do this in 6 years would mean that UTSA would need to recruit some 70 research-active faculty each year. We believe that a hiring rate of 30 per year is the maximum that can be undertaken without impairing quality. Therefore, based on our estimates, it would take some 15 years to achieve Tier 1 status, more likely 20 years considering the small research base at present. Also, UTSA has to organize a campaign to finance these new positions and the ancillary facilities beyond the revenue they anticipate from enrollment growth, tuition increases and revenue bonds. Despite this, we are very supportive of the University’s overall aspirations if not its timetable.

Our recommendations for UTSA are set out below:

1. **Scale Back Goals to More Achievable Levels.** The University’s current plans seem overly ambitious and in certain regards, risky, and dependant on many questionable assumptions. Rather than trying to "become one of the top 100 universities in the nation in federal research dollars generated by 2010"\(^\text{196}\) it is more realistic for UTSA to achieve, in the current decade, a respectable position in the selected niche areas of science and engineering in which it now has a base upon which it can build. In particular, biological sciences and engineering, the health sciences, chemistry computational science and engineering activities, electronics in the sensor and communication areas and well defined materials programs are candidates to pursue as research focus areas. In addition, all the basic fields of science and engineering should have doctoral programs, and UTSA should work to achieve Carnegie Research Extensive Status by the decade’s end. Then UTSA can dedicate itself to building out into the other key research fields of science, engineering, and social science to fully achieve the community’s goals of being home to a broadly based and nationally recognized Tier 1 research university.

2. **Slow Recruiting Plans.** UTSA’s ability to achieve its goals depends on a number of factors, the most important of which is its ability to recruit outstanding researchers. These new recruits will bear disproportionate responsibility for fulfilling UTSA’s research aspirations, and the University will have a difficult time competing with the top 100 research universities for these individuals. UTSA’s goal of rapid hiring of

\(^{196}\) *Action Plan for UTSA*, op.cit., p. 1. UTSA defines its goal to be “Texas’ next premier university” and “top 100 … in federal research dollars” rather than to achieve $100 million in annual research expenditures. As shown in Table 1, institutions in the top 100 in federal research dollars also hover around the $100 million mark in total research expenditures.
large numbers faculty members while improving quality is overly ambitious in light
of the time and effort required to recruit research quality faculty, the tentative basis of
funding for the research infrastructure underpinning those positions, and the
uncertain timing of space availability. Therefore, we recommend that UTSA slow
down its recruiting plans so that it is able to take maximum advantage of the new
positions and be selective in the hiring of key faculty. Given the effort and resources
that must be devoted in order to identify and successfully recruit the right
researchers, we believe that no more than 30 new research faculty members can be
added each year without sacrificing quality.

3. **Include Scientists and Engineers among Senior Administrators.** UTSA’s
administration should include scientists or engineers among its highest ranks.
UTSA’s plans require that it be selective in phasing growth in judiciously selected,
diverse and forefront fields of science and technology, and while its leaders are
seeking advice from a various sources, invariably such advice will be diverse and,
often, contradictory. We believe that the absence of a scientist or engineer
experienced in building a research university, at the decisionmaking leadership level
is a serious and worrisome flaw in the endeavor.

4. **Improve Strategic Planning Process.** The strategic planning process should be
improved so that UTSA’s research qualified faculty are involved in the process, and
experienced outside researchers should be consulted. As part of the strategic
planning process, UTSA needs to estimate the dollar amount of additional resources
that will be required to meet its goals, and then match those estimates against what
might realistically be expected to be raised from various sources: enrollment growth,
increased tuition, external research funding, corporate and private philanthropy.
Also, UTSA should improve its communications with its own faculty. Faculty
members should be well versed in the overall goal of the institutions and the plans for
their own colleges and departments, and they should have a responsibility in defining
and achieving strategic goals. Finally, input from community leaders and other
interested parties (e.g., students), should be solicited.

5. **Consider Slowing Enrollment Growth.** UTSA should consider slowing the
extraordinary growth rate of its student population if it wants to significantly expand
its research programs over the next five or ten years. While the income associated
with enrollment growth may be slated to fund some of the expansion of research, the
increasing teaching load that necessarily accompanies an increasing number of
students may impede any increase in research activity. One sentiment we heard
expressed was that faculty members are running as hard as they can just to stay in
place.

6. **Ensure Critical Mass of Faculty in Key Science and Engineering Fields.** In
anticipation of its build out in the next decade and in support of its activities in this
decade, fields such as physics, mathematics, earth and environmental sciences, the
computational sciences and engineering, should be kept viable and not allowed to
decay. Teaching loads should be adjusted so that those who are research qualified

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197 Best recruiting practices involve much faculty and administration time and include search committee
deliberations, multiple nominations for each position, selection based on recommendations and
performance at invited seminars, interview with faculty and administration, finding spousal jobs,
negotiating set up packages and finding lab space.
can engage in research. We believe that such steps are important to achieving the University’s announced goal of national recognition.

7. **Review Capital Plan.** Staging the growth of new buildings to match the recruitment of new tenure track and tenured faculty members is difficult. Many faculty members believe that the current plans do not adequately account for the real needs of experimental scientists. We recommend an independent assessment of these plans by a combined external and internal committee consisting of individuals with research university experience.

8. **Discontinue Break-Even Analysis.** Some individuals with whom we met mentioned a sort of “break-even” analysis that is employed in some departments. Essentially, this involves a net worth computation for each faculty member, based on the formula funding for each class taught and the number of students registered. The professor's salary is then deducted from the total "income" to the university derived by his or her specific courses. In cases where the faculty member does not “break even” (e.g., where the computed income is less than the salary), he or she is declared to be in deficit and must take actions to rectify the deficit. This practice should be discontinued since it has caused unnecessary distress to hardworking research faculty who also have a role as teachers.

9. **Grant Support.** A number of individuals with whom we spoke found the University’s grant infrastructure insufficient, and in some cases, obstructionist. We heard that researchers receive little support in the grant writing and submission stages, and then they have to manage their own grant accounting in the post award stage. UTSA should review its grants and contracts infrastructure, benchmarking these activities against those of other institutions, and improving them where appropriate.

10. **Expand Development Office.** UTSA will need to attract considerable private sources of funding to make its goals more secure, especially in these times of fiscal austerity in Washington and Austin. The task is difficult but not impossible, especially if the University portrays itself as a primary university in the nation providing access to higher education and research to the underrepresented Hispanic community. However, it will need to expand its Development Program Office and that Office’s activities.

11. **Technology Transfer.** Technology transfer and intellectual property (IP) are only just becoming established at UTSA. A few patents have been granted, but little has been done on the licensing side. We commend the effort at UTSA to establish policies and regulations for this area. While this activity is at a low level today, as UTSA becomes more research intensive, this operation also should become more active, with a size and effort appropriate to its research volume.

12. **Graduate Students.** An increase in both the quality and quantity of graduate students is critical for the growth of the research enterprise at UTSA. This could be approached by increasing graduate student stipends, expanding recruiting efforts, and approaching recruitment in a coordinated fashion.
APPENDIX 1

SCOPE OF WORK

The Consultant shall perform the following Work in connection with the development of a detailed plan (the “Plan”) to significantly expand the research capabilities of the following eight (8) academic institutions (the “Institutions”) of the University:

Group A
- The University of Texas at Arlington
- The University of Texas at Dallas
- The University of Texas at El Paso
- The University of Texas at San Antonio

Group B
- The University of Texas at Brownsville
- The University of Texas – Pan American
- The University of Texas of the Permian Basin
- The University of Texas at Tyler

In accordance with Section 4.d. of this Agreement, Consultant shall assemble two teams of individuals to perform the Work:

- One team, composed of seven or eight members, shall conduct and supervise the Work at the Group A Institutions.
- A second team, composed of six members, shall conduct and supervise the Work at the Group B Institutions.
- Team members shall include nationally recognized leaders with demonstrated competence, knowledge and experience in developing research capabilities for scientific, technological or higher education enterprises.

Consultant, through its teams, shall:

- Review background information provided by the Institutions as well as information developed independently, and shall request additional information from Institutions as the Work progresses.
- During January 2004 and February 2004, both teams shall identify their major findings and conclusions, answer questions in this Exhibit, and provide recommended strategies and tactics for using current resources to greater effect and for future development of the Institution, and for significantly expanding the Institutions’ research capabilities, in light of constraints and opportunities described in this Exhibit.

Consultant shall include the following work product in the Plan:

1) A set of strategies and tactics for using current resources to greater effect and for future development of each Institution.
2) Highly focused solutions to significantly expand the research capabilities of each Institution that are aligned with national and state research priorities.

Consultant shall address the following questions concerning each Institution in the Plan:

1) What are the current research strengths of the Institution?
2) What are the possibilities for further expansion of the research profile at the Institution, using its existing strengths?
3) What are the next high-opportunity research areas that the Institution could develop? Explicit recommendations concerning numbers of faculty, target departments, and specific disciplines or sub-disciplines shall be addressed.
4) What are the additional resources that the Institution needs to pursue its high-opportunity research possibilities? Specifics of support personnel, graduate students, space, and equipment shall be provided.
5) In what order should actions be taken to develop research at the Institution? What is the set of priorities, and why are these the priorities? What is a likely time frame for the research enhancement?
6) Are there partners (local, state, or national) who could help the Institution increase its research profile?

Consultant shall address the following questions for the group of Institutions as a whole in the Plan:

1) To what extent do the strengths of the Institutions overlap?
2) Are there obvious opportunities for collaboration among the Institutions that should be pursued?
3) Are there shared resources that should be developed for the Institutions?
4) What are the high potential possibilities for collaboration with a nearby medical or health science campus?

Consultant shall address the following constraints in the Plan:

1) Each Institution’s enrollment is expected to grow. Largest growth is anticipated at U.T. Arlington and U.T. San Antonio. With the exception of U.T. Dallas, the Institutions do not currently pursue selective admissions policies. The pressure of enrollment, however, may lead to greater selectivity at all campuses over the next five years.
2) The principal basis for state appropriations is formula funding, based on semester credit hours of instruction, with a two-year lag. The formula provides additional funding for graduate and upper-division courses, and the formula also funds engineering and science courses at a higher rate. Because of the lag in formula funding, increased growth will not pay for itself in the short term.
3) The State faces a current revenue shortfall of approximately $9 billion. Part of this shortfall will be met with a budget cut in appropriated funds. Even when the economy improves, it is not realistic to expect substantial increases in state appropriations.
4) Although six of the Institutions are entitled to share in the proceeds of the Permanent University Fund (“PUF”) endowment, recent losses in the stock market make additional distributions from the PUF unlikely in the short term.
5) Current State law does not permit the University to waive tuition for graduate students. Research and teaching assistants who are appointed at least half time have been eligible to pay resident (in-state) tuition, and, were eligible for staff benefits, including health benefits. Recent legislative changes impact this eligibility. Funds available for graduate fellowships are quite modest.

Consultant shall address the following opportunities in the Plan:

1) The local communities are very supportive of the Institutions.
2) There may be philanthropic support from foundation or individuals for research expansion.
3) The Texas Legislature recently deregulated tuition. Authority for setting tuition, for the first time, will be delegated to the Board of Regents, allowing for a more differentiated tuition structure.

4) The state legislature recently approved legislation that will allow the Institutions to retain all of their indirect costs reimbursements. Formerly, these Institutions were permitted to retain only 50% of their indirect costs.

5) There is a possibility of some special item funding from the Governor’s Office.

In addition to the forgoing questions, constraints and opportunities, the Consultant shall identify and respond to any additional issues relevant to the specific challenges of each Institution.
APPENDIX 2

THE WASHINGTON ADVISORY GROUP TEAM

**Erich Bloch** is a Washington Advisory Group principal who 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, he oversaw the Foundation’s $3B annual budget. Previously, he was Corporate Vice President for Technical Personnel Development at IBM. He received the National Medal of Technology for developments that “revolutionized the computer industry,” and is the recipient of the 2002 Vannevar Bush Award.

**Purnell W. Choppin, M.D.** is a Washington Advisory Group principal who advises on biomedical research organizations, foundations, and on medical research organizations, life sciences academic research and education programs, foundations, and other philanthropic endeavors. Dr. Choppin is President Emeritus of the Howard Hughes Medical Institute (HHMI), a medical research organization that is among the largest philanthropies in the world. During his tenure as President of HHMI from 1987 through 1999, its programs were greatly expanded and strengthened: the number of HHMI investigators increased from 96 to 330; the number of host institutions from 19 to 71; and a major grants program was established to further science education at all levels and provide support for international biomedical research. Prior to joining HHMI as Vice President and Chief Scientific Officer in 1985, Dr. Choppin was Leon Hess Professor of Virology, Vice President for academic programs, and Dean of graduate studies at The Rockefeller University. Dr. Choppin is a member of many scientific and professional societies, including the National Academy of Sciences, the Institute of Medicine, and the American Philosophical Society (currently vice president).

**Edward E. David, Jr.,** is a Washington Advisory Group principal who advises on R&D strategic planning and management, intellectual property, technology transfer, enhancing corporate research programs, and developing corporate-academic research partnerships. Dr. David was Science Advisor to the President and Director of the White House Office of Science and Technology from 1970–1973. From 1977–1986, he was President of Exxon Research and Engineering Company. Dr. David spent the first two decades of his research career at Bell Telephone Laboratories, latterly as Executive Director. He was also the U.S. Representative to the NATO Science Committee.

**John E. Dowling** received his A.B. and Ph.D. from Harvard University. He taught in the Biology Department at Harvard from 1961 to 1964, first as an Instructor, then as Assistant Professor. In 1964 he moved to Johns Hopkins University, where he held an appointment as Associate Professor of Ophthalmology and Biophysics. He returned to Harvard as Professor of Biology in 1971 and is presently the Llura and Gordon Gund Professor of Neurosciences and Harvard College Professor. He was Chairman of the Biology Department at Harvard from 1975 to 1978 and served as Associate Dean of the Faculty of Arts and Sciences from 1980 to 1984. He was Master of Leverett House at Harvard from 1981-1998 and currently serves as President of the Corporation of The Marine Biological Laboratory in Woods Hole. Professor Dowling is a Fellow of the American Academy of Arts and Sciences, a member of the National Academy of Sciences and a member of the American Philosophical Society.
Linda P. B. Katehi joined Purdue University in January 2002 as the John A. Edwardson Dean of Engineering and professor of electrical and computer engineering. Before joining Purdue, Dr. Katehi served on the faculty of the University of Michigan, where she was the associate dean for academic affairs in the College of Engineering and a professor of electrical engineering and computer science. Dr. Katehi holds a master’s degree and doctorate in electrical engineering from the University of California at Los Angeles and a bachelor’s degree in electrical engineering from the National Technical University of Athens. She has received a number of awards and honors, including the Distinguished Educator Award of the IEEE Microwave Theory and Techniques Society (2002), IEEE’s Marconi Prize (2001, Best Paper Award), the Third Millennium Medal of the IEEE Microwave Theory and Techniques Society (2000, Best Paper Award), the 1997 Best Paper Award by the International Microelectronics and Packaging Society; the Microwave Prize of the IEEE Microwave Theory and Techniques Society (1996, Best Paper Award), selection as an IEEE fellow (1995), the Humboldt Research Award (1994), the Presidential Young Investigator Award of the National Science Foundation (1987), and the Schelkunoff Award of the IEEE Antennas and Propagation Society (1985, Best Paper Award).

Micki Leder serves as Chief Operating Officer of The Washington Advisory Group. Drawing on her background as an Associate Dean at the Stanford University School of Medicine, COO and general counsel of a healthcare related REIT, and legal counsel with both government (the National Science Foundation) and private firms, she focuses on projects involving R&D strategy and implementation in both the private and public sectors. Ms. Leder holds a B.A. in Political Economy from The Johns Hopkins University, and a J.D. from the University of Pennsylvania.

Frank Press is a Washington Advisory Group principal who advises on R&D strategic planning; management and research scenarios for new undertakings in industry and academia; and international research opportunities. He was President of the U.S. National Academy of Sciences and Chairman of the National Research Council from 1981–1993; and Science Advisor to the President and Director, Office of Science and Technology Policy from 1977–1980. Previously, he was at the Massachusetts Institute of Technology and the California Institute of Technology. He is a recipient of the U.S. National Medal of Science and the Japan Prize. He has been awarded thirty honorary degrees and holds decorations from the German and French governments.

Roy F. Schwitters is the S.W. Richardson Foundation Regental Professor of Physics and Chair of the Department 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 is a fellow of the American Academy of Arts and Sciences, the American Physical Society and the American Association for the Advancement of Science. He received the 1980 Alan T. Waterman Award of the National Science Foundation, the 1996 Panofsky Prize of the American Physical Society and was awarded a Research Prize by the Alexander von Humboldt Foundation of Germany in 1998.

Marina v.N. Whitman: Dr. Whitman is Professor of Business Administration and Public Policy at the University of Michigan. From 1979 until 1992 she was an officer of the General Motors Corporation, first as Vice President and Chief Economist and later as Vice President and Group Executive for Public Affairs. Prior to her appointment at GM, Professor Whitman was a member of the faculty in the Department of Economics at the University of Pittsburgh. She served as a member of the President's Council of Economic Advisers in 1972-73, while on leave from the University. A director of Procter & Gamble, and Unocal, and recently retired from the boards of
Research Capability Expansion at UTA, UTD, UTEP, and UTSA

Alcoa and JPMorganChase, she serves or has served on numerous national boards and committees dealing with economic and governmental issues, as well as on the Boards of Harvard and Princeton Universities. She holds honorary degrees from more than twenty colleges and universities and is a member of a number of honorary associations, including Phi Beta Kappa and the American Academy of Arts and Sciences. She is the author of many articles and several books, most recently New World, New Rules: The Changing Role of the American Corporation, published by the Harvard Business School Press in 1999.