A Strategic Plan for Duke Research:
Background and Recommendations

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Executive Summary

1. The external environment for sponsored research is quite positive, with substantial increases being proposed in both the President’s and Congressional budgets for FY01.
   - The national research priorities follow a new paradigm, termed "use-inspired" basic research, rather than pure "curiosity-driven" or "applied" research.
   - The federal budget priorities are highly favorable to non-defense R&D and university-based research, with several specific initiatives being closely aligned with Duke’s strategic priorities for development of science and engineering: e.g., nanoscience/nanotechnology, global change research, fundamental health and genome research, ecosystem challenges, and information technology.

2. At Duke, "Campus" (non-Medical Center) sponsored research funding has grown substantially since the "plateau" years of FY94-97. Campus research expenditures are 25% of the Duke total. The funding pattern on Campus shows the following pattern:
   - Three Schools at Duke (Arts and Sciences, Engineering, and Environment) are responsible for nearly all of the Campus sponsored research expenditures. The Research Plan analyzes some strengths and vulnerabilities in sponsored research in each School.
   - There is strong dependence of research funding on federal sources (82% of total), with relatively small contributions from private or state sources.
   - In FY99, the major federal sources of Campus research funding were NIH (33%), Department of Defense (29%), National Science Foundation (21%), and Department of Energy (12%).
   - The number of proposals submitted by faculty has been relatively unchanged since FY94.
   - Indirect cost recovery growth has lagged growth in research expenditures, so that as of FY99 Duke recovered only 72% of the indirect costs it spent in support of Campus research.
   - Sponsored research funding on Campus is concentrated in relatively few faculty and in a relatively small number of "niche" projects:
     - 5% of the faculty are responsible for >50% of the expenditures.
     - Only 8% of eligible faculty have 3-year funding exceeding $1 million.
     - 50% of eligible faculty have no significant funding at all.
     - >10% of all Campus funding (and nearly 20% of that is Arts and Sciences) in FY99 was due to one activity, the Free Electron Laser Laboratory.
- Duke is unusually dependent on the Department of Defense for its funding (much of which is associated with FELL), in contrast to NSF, with growth in the latter being relatively flat at Duke. Campus funding by NIH is also unusually distributed, with much more going to social science research and engineering at Duke in comparison to other universities, and much less to biology and chemistry. These funding patterns represent a somewhat unusual pattern of research choices at Duke compared to many other private research universities.

3. Duke ranked among the top 25 in sponsored research expenditures in FY98 among all universities in Physics (23), Biological Sciences (24), and Social Sciences (25). In contrast, none of the following rank in the top 60: Environment (65), Chemistry (68), Mathematics (74), Computer Science (77), Engineering (78).
   - Research funding roughly correlates with NRC ranking of Duke Ph.D. programs on the basis of recognition of a program’s faculty by disciplinary peers, with the exception of Physics, where the high funding level is largely due to FELL, which is not viewed by some as a mainstream area of physics research.
   - This suggests that even high levels of research funding in "niche" areas do not necessarily bring the scientific prestige that will attract top level students and faculty.

4. Duke’s priorities for strengthening science and engineering (e.g., global change; genome studies and bioinformatics; materials science, including nanoscience and soft/wet biomaterials; photonics; neural science and engineering; support for high performance computing) are fully congruent with major federal agency funding priorities, and are in scientific mainstream, not "niche" areas. As such, they are highly competitive for external funding, and have the chance to bring Duke research to another level in scientific prestige.
   - Research Plan gives the major external funding sources available.
   - Duke will need to make major investments in faculty, equipment, and space to develop these areas, but some of these investments can be in the form of matching moneys to leverage large interdisciplinary center grants.
   - It will be a challenge to both fund and administer centers that strongly cross school lines.

5. Duke can leverage development of its scientific research base by partnering with other institutions in the Research Triangle and nationally. A particularly exciting partnership is Duke’s participation in a consortium of six universities that will provide scientific advice and oversight for the Oak Ridge National Laboratory through a new corporation: UT-Batelle, LLC.

6. For Duke to reach a new level in science and engineering research, mechanisms must be put in place to encourage faculty to increase the amount of sponsored research funding on Campus. The "base" for sponsored research at Duke is much too narrow, and too many faculty are in effect shifting the indirect costs of research onto others. This will involve a significant change in culture among many Duke faculty.
   - Duke, for its part, needs to provide incentives to begin new promising research projects, such as internal "seed" funding, instrumentation matching moneys, start-up costs, graduate student tuition waivers, workshops, etc. Such incentives at other universities correlate strongly with the overall level of sponsored funding.
- It might also be a good investment for Duke to increase the support available to faculty for writing and managing grants in departments and/or the Office of Research Support.
- Return of indirect cost recovery dollars directly to departments or individual faculty, an incentive common in public universities (where operating costs are often budgeted by the state), is rarely done at private universities, since these dollars represents recovery of real costs by the university itself.
- The fundamental incentive for Duke involves "biting the bullet" to make space, salary, and graduate student allocations dependent to some degree on the level of sponsored research funding in fields where external funding is generally available.