

Tomorrow's Knowledge
12-16-11

Main Goal: Promote excellence in research and scholarship.

Virginia Tech will strive to foster an environment, both physical and virtual, to support and ignite groundbreaking research that is high quality and has impact. Research and scholarship that is valued by the Virginia Tech community is:

- Innovative
- Collaborative
- Interdisciplinary
- Internationally recognized
- Relevant locally and globally
- The primary means of educating the next generation of innovative researchers

Virginia Tech is currently recognized for its profound and meaningful impact of our scholarship across all its domains of inquiry. Our research identifies important new questions, addresses fundamental issues, helps shape the direction of knowledge creation, and has a significant impact on practice. By focusing more closely on creating an environment conducive to research excellence, our faculty will achieve further national and international recognition for scholarship that already makes a significant contribution towards the generation of new knowledge in our multiple domains of inquiry. To solve the complex problems facing our world, we need interdisciplinary research that brings together diverse sources of expertise under strict time and resource constraints. By building upon its research strengths, Virginia Tech can become more competitive not only for research funding and investment but also for recruitment of well-known or promising faculty and top-performing students.

Virginia Tech's research portfolio has grown dramatically over the past six years, both in size (~\$400M) and scope (life and health sciences, innovative technology, energy and environment). A continued focus on growth in size and scope should be complemented by an emphasis on research and scholarly excellence across all disciplines. A focus on the **quality** and **impact** of faculty research and scholarship as demonstrated in ways appropriate to each discipline will provide indicators of the national and international reputation of Virginia Tech faculty, and will further the continued rise in prominence of Virginia Tech as a comprehensive research university.

Research-extensive universities face a number of challenges in the near term, as each strives to build programs and a reputation that will differentiate the university from its peers. The projected growth of graduate programs at Virginia Tech, paired with the continued focus on the quality of scholarship and depth of faculty expertise, will require consistent investment over time. Though the economic climate has become increasingly uncertain, the university has expanded its research portfolio. Such investments have positioned Virginia Tech favorably to meet today's economic

challenges with a more diverse research portfolio, creating potential for growth and excellence in cutting-edge, high demand disciplines. In the near term, it will be necessary to identify the areas in which the university can or will claim distinction, and to allocate the resources that will enable Virginia Tech to attract and retain the best faculty and students in those areas. Such research investments will be enabled, in part, through development of strategies to increase efficiencies, to leverage partnerships with the commercial sector, national laboratories, international partners, government agencies, and other universities, and to reduce administrative barriers to collaboration with these entities, whether they are local, national, or international.

To promote excellence in research and scholarship, Virginia Tech should focus on four strategies:

1. Define and implement the mission of the modern land grant university by expanding our scope of research.
2. Foster synergies between research institutes and academic departments.
3. Establish an innovative process for promoting collaborative research and scholarship in selected areas to enhance Virginia Tech's research mission.
4. Focus resources on a selected number of domains of discovery that optimize our return on investment as indicated by both quantitative and qualitative (e.g., scholarly productivity and societal importance) measures.

Strategy 1: Define and implement the mission of the modern land grant university by expanding our scope of research.

The land grant mission commits Virginia Tech to research and discovery that serve the public good of the community, the commonwealth, the nation, and global society. Advancing the land grant mission in creating tomorrow's knowledge connects the most advanced fields of inquiry with the obligation to transform this knowledge into practical, aesthetic, social, and commercial applications that serve the public good.

In the traditional land grant model as pursued at Virginia Tech, research in certain fields (engineering, agriculture, life sciences, and transportation) has been prioritized over others (business, the arts, humanities, and theoretical sciences). Citizens of the 21st century, however, recognize that an environment of academic excellence in all fields provides fertile ground for innovation across disciplines. This requires the support of research excellence in business, the humanities, as well as the sciences. To truly serve the citizens of Virginia, Virginia Tech must strive to invest in research areas that will prepare both their students and community members (via outreach programs) for competition in a global community. Virginia Tech can distinguish itself by

carefully examining the changing nature of the role of a land grant university and reinvigorating its commitment to the land grant mission with a fresh interpretation.

As a modern land grant university, Virginia Tech must seek to expand its research activities nationally and internationally, to capitalize on the success of traditional land grant research (e.g., agriculture) and to broaden Virginia Tech's portfolio in a range of research areas such as business, the social sciences, health sciences, and science policy, to highlight a few examples. The relative contribution of the different Virginia Tech campuses, colleges, and institutes also needs to be assessed. We must educate the public about both the emerging and future role of land grant universities and affirm Virginia Tech's identity as a modern land grant institution.

Strategy 2: Foster synergies between research institutes and academic departments.

If we can create greater synergies to better integrate our research institutes with our traditional academic mission, we can create more research opportunities for faculty and students, improve Ph.D. student recruitment, increase Ph.D. production, and enhance our curricular breadth and teaching quality.

Almost one-third of Virginia Tech's research expenditures now come through the large centers and institutes, and over one-quarter of Virginia Tech's faculty members are research faculty. This is a tremendous resource that is under-utilized in our current environment. If we could develop systemic changes that incentivized more faculty and students to work and learn across traditional organizational boundaries there would be tremendous benefits, including:

- Increased student exposure to highly interdisciplinary research opportunities
- Increased student exposure to industrial and government sponsors
- Increased funding for graduate students; thus increasing our ability to recruit the top students and increase Ph.D. production
- Increased numbers of faculty available to teach; particularly innovative courses where research faculty are at the state-of-the-art and are nationally/internationally renowned scholars.
- Increased number of faculty available to advise graduate students
- Increased opportunities to develop state-of-the-art multidisciplinary curricula

There are no incentives for research faculty, many of whom not only hold Ph.D.s but are world-class researchers in their own right, to fund graduate students or teach. There are also built-in disincentives for academic faculty to collaborate through institutes and large centers (shared overhead, most notably). These constraints lead to a traditional, albeit very unfortunate, divide between institutes and departments. While many at Virginia Tech work to bridge these gaps on an ongoing basis, much more could be done by eliminating existing obstacles and creating innovative incentive programs to foster collaboration.

This strategic plan needs to commit to developing creative mechanisms to incentivize collaborations across institute/department boundaries through a process of benchmarking, brainstorming, and implementation. This commitment needs to be a priority so that Virginia Tech can move forward in its mission the greatest extent practical by better utilizing existing resources in its resource-limited environment.

Strategy 3: Establish an innovative process for promoting collaborative research and scholarship in selected areas to enhance Virginia Tech’s research mission.

Virginia Tech will benefit from implementing a process to establish groups of faculty who will pursue collaborative research and scholarship in high profile, high impact, high growth areas. The task force process implemented for health sciences is the first such initiative. In the future, other task forces will be established, driven by collaborative faculty efforts around a common research area.

The Task Force on Health Sciences has recommended the formation of the Faculty of Health Sciences as the best organizational framework to promote health sciences research and graduate education in the near future. The Faculty of Health Sciences will help form synergistic interactions among Virginia Tech faculty and build partnerships with all potential external collaborators at a variety of medical and health sciences institutions

Virginia Tech has developed a robust and expanding set of endeavors in the health sciences arena. Estimates developed from data gathered for the Committee from the Office of Sponsored Programs indicate that annual research funding in the health sciences is currently at approximately \$100M. Recent investments have been made in the Virginia Tech Carilion Research Institute, the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences, coordinated research efforts in life sciences and translational medicine, along with broader efforts in other health-related investment institutes. Individual faculty researchers across numerous departments and all of the Colleges are also building research portfolios in the health sciences. However, despite these investments, the health sciences at Virginia Tech remain fragmented and lack a single focal point for building new collaborations, developing and coordinating large (\$10 million plus) research programs that require clinical partners, and creating a set of graduate degrees that can attract the best students in the health sciences.

For Virginia Tech, the Faculty of Health Sciences will:

- Allow Virginia Tech to respond rapidly to the world’s evolving scientific landscape and emerging trends in the health sciences;
- Promote the “health sciences” brand at Virginia Tech and truly “invent the future,” particularly through partnerships with other institutions, clinical and otherwise;
- Shift the paradigm at Virginia Tech to focus on interdisciplinary scholarship through the creation of “faculties” that cut across and leverage multiple departments, institutes, and colleges. The Faculty of Health Sciences could be the first “faculty” created at Virginia Tech

and offer a testing ground for a new approach that could be employed for other emerging strengths.

For faculty at Virginia Tech, a coordinated and leveraged health sciences presence will:

- Promote the “health sciences” brand at Virginia Tech, thereby increasing the visibility of the health sciences at Virginia Tech;
- Promote synergistic research collaboration among Virginia Tech faculty in ways that afford faculty the freedom to roam in their research across many health centers, both within and outside of Virginia Tech;
- Afford them new opportunities for work with clinical partners by providing infrastructures to better develop and manage such partners.
- New sources of financial aid for graduate students in the health sciences;
- Build comprehensive multi-disciplinary research teams that can compete for center grants;
- Provide benefits to individual faculty members with access to shared facilities, partnerships with clinical components (including clinical trials), equipment, access to a pool of graduate students (both GTAs and GRAs), grant support, travel support, and IRB support;
- Develop core facilities that might include shared central laboratories, each capable of performing a specific set of experimental functions that enable investigators to perform experiments more efficiently and at a more affordable cost. Cores thus facilitate research activity by providing resources and services that are beyond the means of most individual labs. The Faculty of Health Sciences could assemble a comprehensive reference inventory of University-wide core facilities that are of interest to faculty and graduate students;
- Serve as a gateway to and amplifier of health sciences research at Virginia Tech.

Strategy 4: Focus resources on a selected number of domains of discovery that optimize our return on investment as indicated by both quantitative and qualitative (e.g., scholarly productivity and societal importance) measures.

Virginia Tech must focus resources on a selected number of domains of discovery that optimize our return on investment as indicated by both quantitative and qualitative (e.g., scholarly productivity and societal importance) measures. To accomplish this, we need to select and invest in domains of discovery for which three criteria have been satisfied:

1. We have significant capabilities in a domain, and we have the resource needs to develop it, or maintain it, as world-class capability.
2. There are both opportunities and needs present in a domain, in terms of research sponsorship and societal need.
3. We are able to compete in a discovery domain to garner resources and make a substantial impact. This requires that we understand research organizations that operate in a domain, their level of investment, and our ability to compete with them.

As we move forward with the long range planning process, we need to continuously select and modify discovery domains to maximize their overall impact. These domains need to be specific enough to develop a meaningful capability without being overly constraining. To make necessary resource investments on an evolutionary basis, we must support domains that meet above criteria. Selection, investment, modification, and continuation of these domains need to be an ongoing mission of the Office for Long Range Planning, with support from the Office of the Vice President for Research and focused advisory panels of internal and external experts to advise the University Administration on resource investment.

All universities operate in a resource-limited environment. Almost all invest strategically in centers/spires of excellence. Such investment allows research universities to:

- Garner substantial institutional resources while building large-scale research enterprises.
- Make substantial impacts in areas of societal need.
- Greatly increase their standing and notoriety in the University Community, both nationally and internationally.
- Build student research opportunities at both the undergraduate and graduate levels.

Virginia Tech, relative to many of its peer institutions, has only recently begun to make sizable investments in discovery domain of excellence. Despite this late start, almost one-third of Virginia Tech's research expenditures, and over two-thirds of its research growth has been from the large Centers and Institutes. If we can continue this trend through careful, nimble and informed decision making, it will greatly benefit the University moving forward.

There are few obstacles to developing an evolutionary and continuous process for selection and strategic investment in domains of discovery. It will require minimal resources and many support systems are in place. This strategic plan needs to commit to developing a process that utilizes the long range planning effort on a continual basis with the advice of key internal and external experts in selected domains of discovery. If we can more effectively utilize our limited resources, we can continue to progress as a research university at a pace greater than many of our peers. This will provide benefits across all aspects of the Virginia Tech mission.