Academic Data for Understanding and Showcasing University Global Knowledge Networks

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I am glad to be able to talk to you today about the efforts that Duke University has undertaken over the last few years to consolidate and display information about the accomplishments and expertise of our faculty. These efforts not only better network our faculty both internally and externally, but they also give the institution valuable information for assessment and strategic planning, and allow those outside Duke, in the United States and around the world, to understand and connect with the richness of our enterprise. I first provide some background on Duke, and its research and international footprints. I describe the data systems we use in support of research and scholarship at Duke, including tools for internal management, assessment of quality and productivity, and internal and external networking. I then describe Duke’s various academic data systems and finish with a description of the State of North Carolina’s system that displays the expertise of researchers at 19 institutions of higher education within the state.

Duke Context

Duke University is a $2.4B organization (based on annual spending), with a comparably sized University Health System not included in that total. We are organized into 10 schools, with distinctive missions, economies and scales, all devoted of course to excellence in teaching, research and putting knowledge in the service of society.

Duke has been a leader in interdisciplinary teaching and research, creating new organizational structures and financial mechanisms in place over the last decade to support such work. We have “signature” institutes and special initiatives with high institutional visibility and support in areas like Global Health, Brain Sciences, Environmental Policy, Ethics, Innovation and Entrepreneurship, and Energy.

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1 This is a slightly revised presentation with added graphics, adapted for those who did not attend the Scoping Meeting.
2 Duke has a Graduate School, and schools of Medicine (which is larger than all the other schools combined), Arts & Sciences (which is larger than all the remaining schools combined, and is organized into Natural Sciences, Social Sciences and Humanities divisions with related departments underneath), Engineering, Environment, Business, Law, Public Policy, Divinity, and Nursing.
Our management structure aims to provide a form of “managed decentralization” with strong entrepreneurial incentives for deans and faculty combined with effective executive leadership structures to capitalize on synergies that make the “Big Duke” whole greater than the sum of its parts.

**Research Profile**

Duke spends on the order of $720M per year on direct cost of sponsored research, about $420M from federal sources and $300M from other sources. (These figures do not include Duke’s extensive clinical trials programs, organized into a distinctive institute.) About 75% of this activity is based in the School of Medicine, with the remaining 25% concentrated primarily in Arts & Sciences, Engineering and the School of the Environment. As a corollary, about 75% of the federal portfolio is from the Department of Health and Human Services/National Institutes of Health, with the next largest funding sources being Department of Defense (9%) and National Science Foundation (7%). Duke’s 5600 faculty members (all ranks and affiliations) show a similar distribution, with about 70% of them being in the schools of Medicine and Nursing.

Currently, across the institution, we have over 4,000 ongoing projects with almost 1500 responsible PIs. About 450 current projects include subawards to other institutions, including 75 with international partners.

**International Profile**

Duke aspires to be a leading global university and is interested in expanding its international partnerships. In 2010, we established the Office of Global Strategy and Programs and in September 2013, a high-level, campus-wide committee released our strategic international plan, entitled “A Global Vision for Duke University.” While Duke has been prominent in international studies for 35 years, particularly through its federally funded Department of Education Title VI Centers, there is now a remarkable diversity of global projects taking place not just in Arts and Sciences, but also in Duke’s professional schools. These range from the Duke-National University of Singapore Graduate Medical School; the Global Health Initiative’s established priority partnerships in China, Haiti, India, Kenya, Sri Lanka, Tanzania and Uganda; Fuqua School of Business’s operations with partners in Dubai, London, New Delhi, Shanghai, St. Petersburg, and Johannesburg which made it a pioneer as a legitimately global business.
school; the ongoing development of a new university in China called the Duke Kunshan University; Duke’s hosting of the Organization of Tropical Studies, a 63-school non-profit consortium of U.S., Australian and Latin America universities that features undergraduate and graduate courses as well as research at tropical sites in Latin American and South Africa; to a huge array of study abroad and service abroad opportunities for Duke undergraduates. Members of the Duke community also collaborate with industries in the Research Triangle Park area and globally, with our Office of Corporate Relations helping to broker those collaborations.

The number of projects across the global is daunting from a data perspective. The challenge for the university is to know where the projects are in order to create learning, research and service synergies across what the 2013 report called Duke’s “three campuses” - its home campus in Durham, a world campus distributed across partnerships and sites around the globe, and a virtual digital campus of research and teaching across the world (almost one million students from around the world enrolled in Duke Coursera MOOCs last year).

**Data Systems**

*Internal Management*

Given the importance of the research enterprise to Duke and its high degree of decentralization, substantial administrative resources are required to obtain, manage and report on our research activities, especially in a complex and changing federal regulatory environment. A very senior team leads a multi-year Research Administration Continuous Improvement project that guides work process simplifications and technology investments; their goal is to ease administrative burdens on faculty so that they can devote their energies to the substance of their research.

*Assessment and Decision-making*

Data drives assessment activities at a variety of levels. Deans monitor grant submission and success rate, as well as research quality and impact through related publications. This informs the promotion and tenure process and allocation of resources like space and salary dollars. Duke, especially in the School of Medicine, is highly dependent on competitive external research dollars to ensure that faculty are top-notch and well-resourced. Central administrators also monitor trends across schools, working with deans and faculty to prod and incentivize
research innovation, effective use of resources like space, and competitive success.

We have recently experimented with the use of proprietary data provided by Academic Analytics to benchmark our faculty and research profile against similar programs at other research institutions across the country. Academic Analytics relies on a combination of data harvesting tools and authentication to create profiles and comparisons in distinct disciplinary areas. Data elements include grants, publications, citations, and professional awards. We may eventually use some of this information in our Scholars@Duke profiles.

Scholars@Duke

Like many of America’s great universities, Duke has a decentralized culture, which we regard overall as strength but also as a challenge. We realized that because many of our schools had unique and incompatible data systems of their own, we had no place whatsoever at Duke for consolidating information about accomplishments and expertise of our faculty. So several years ago, with advances in technology and the obvious need to better network our faculty both internally and externally, we embarked on a project to throw out the old and bring in the new. This has been a complicated undertaking, given that our faculty research interests, their teaching and their professional achievements cover such an enormous range.

But as of Spring 2014, we now display profiles for all faculty in all schools (some 5,600 entries) in a site called Scholars@Duke (scholars.duke.edu) We are not totally satisfied with where we are in some of the profiles, particularly with the book culture disciplines of the Humanities, but the profiles in the sciences and most of the social sciences are very solid. Our standard goal has been to present profiles representative of faculty accomplishments and interests, not a full CV.

VIVO Platform

Duke adopted the VIVO platform for this project. We chose the VIVO platform because of its inherent ability to link across many types of data, making it easy to explore connections between authors, researchers, and instructors. It has the added advantage that teaching and other activities can be added to the profile. As background, VIVO was developed by Cornell library staff and then adopted as the foundation of a networking collaboration project with 6 other
research institutions funded by a $12.2M NIH grant. VIVO has rapidly been adopted by more than 50 universities in the United States and more abroad. VIVO is governed by an open-source community led by DuraSpace, a non-profit that promotes the preservation of and access to digital assets. Duke is active in the leadership of these projects.

Because VIVO is based on shared standards and a general set of relational definitions or ontology, it makes VIVO data very searchable and sharable, and allows for the visualization of national and global research networks in ways that were not possible with previous technology. The screenshot below is for a single faculty member, Randall Kramer. There are embedded hyperlinks to many of his publications, grant abstracts, positions, networks and collaborators. It also links him to one of Duke’s signature institutes, its Global Health Institute, where one can find other associated faculty, research grants and more.
Here is another faculty profile, for Engineer Fred Boadu, with several sections expanded so that you can see where he got his Ph.D., his recent publications, and the courses that he has recently taught:

We have encouraged faculty members to input geographic information on where they are working – and in the profile below, of another Duke faculty member, Ann Yoder, you can see
that she has input information about the geographic focus of her research and expertise. Note you can also see her recent federal grants.

One can also search across the institution for a particular area of research, and even within a particular location. A search for journal articles on atmospheric chemistry with a reference to Asia yielded the results below:
The Office of Global Strategy and Programs, which helps coordinate global engagement and programs that support Duke’s global vision, will soon unveil their new website at global.duke.edu, which will map where Duke faculty members are doing research and teaching internationally, with those new maps linking to Scholars@Duke. A preliminary analysis of our international footprint from the geographical data in Scholars@Duke shows the most activity in China, India, France, South Africa and Brazil.

**Data Input**

Faculty members can but are not required to “perfect” their public profiles to CV quality. Most of the data displayed is automatically generated via feeds from Duke institutional systems and publication harvesting tools managed by the Duke libraries. Links to open source publications and Duke licensed materials can be accessed from the profile pages. Faculty members are encouraged to add their own brief narrative profiles, and also their geographical focus and expertise.
Academic Data and the State of North Carolina

I want to mention another effort in which Duke is also represented. It is REACH NC (www.reachnc.org), a statewide database of research expertise funded collaboratively but managed by the University of North Carolina system. The site consists of profiles for faculty members in 19 universities with 9,600 profiles created by compiling journal articles from Scopus, a bibliographic database that is a service product of Elsevier. Duke profiles in medical and science fields appeared in REACH NC early in our transition to more modern technologies and increased our confidence in available publication harvesting tools.

REACH NC helps people find collaborators, consultants, speakers, reviewers and experts in North Carolina. It includes facilities like wet labs, service labs, and resources like instrumentation and clinical trial opportunities. The Secretary of the North Carolina Department of Commerce, Sharon Decker, uses it to connect industries and other investors looking for experts to bridge R&D and manufacturing. REACH NC has been used to connect the North Carolina defense industry with local researchers, as well as finding partners on Small Business Technology Transfers, and many other partnerships that have no doubt been beneficial to our state and our universities.
Conclusion:

Our Scholars@Duke project is well launched, but not complete. It has already given the Duke leadership team new insights into the great range of activities across our schools. We are getting closer to understanding where and how the Duke community is engaged around the world. It has also made it easy for anyone inside or outside Duke to find people, research, teaching or international engagement at our university. As new VIVO modules are developed, we look forward to enriching our profiles and datasystems to capture more of the richness of our institution, and to using the new visualization tools to see it stretching across academic domains, across teaching, research and service, and across the world.