A School Without Walls: Data Science at the University of Virginia

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Introduction

Academic culture has long been defined by collaborations between scholars with top knowledge in their fields. However, in the past 100 years of scholarship, colleges and universities have tended to silo research efforts, keeping scholars within their own disciplines. Drive from agencies that control grant funding and push from individual scholars to collaborate with experts in various disciplines (witness the number of joint appointments) has caused a shift for universities to show that their individual schools, departments and programs are highlighting the impact and significance of interdisciplinary research[1]. This is the context in which the Data Science Institute (DSI) at the University of Virginia was established in September 2013 as the first pan-university Institute. With seed funding from a $10 million endowment from a private foundation, an institutional commitment with resources from leadership, and an internal University grant, the DSI was well equipped to move forward with the development of the degree-awarding MS in Data Science (MSDS) program, and collaborative research initiatives.

Growth and Transition

With the tuition from the MSDS program available to bolster a sustainable financial infrastructure, the DSI grew as an initiative within the Office of the Provost. Control over budget, and reporting structure of the Director directly to the Provost allowed for agile change in agreements with other schools in the University, and coordination with the leadership. The formation of an Advisory Board of industry leaders in the field provided essential guidance in the curriculum, student outcomes, talent pipelines, and direction on the evolution of the programs. However, it became clear that with its scale of growth, the Institute required the autonomy other schools at the University had.

Therefore, with support of new leadership and strategic planning and a transformational gift of $120 million—the largest private donation in University history—the DSI transitioned into the 12th school at the UVA in Fall 2019 and Phil Bourne was appointed the inaugural dean with the support of an additional gift supplementing the previous DSI Director role. The school sought faculty feedback and acceptance in the process of establishment with the development of a full proposal presented and voted upon by the full University Faculty Senate after feedback, deliberation, and iteration, further solidifying and formalizing the plan. Designed as an interdisciplinary "School without walls" the School of Data Science became the first of its kind in the nation, guided by goals to further discovery, share knowledge, and make a positive impact on society through collaborative, open, and responsible data science research and education. The focus of the school is to create a different kind of structure, prioritizing collaboration, prioritizing and incentivizing open scholarship, modeling the practice of responsible data science, and driving discovery in high impact areas. A gift alone does not make a school, and so the structure of sustainability with a balanced financial portfolio, the interdisciplinary function of joint appointment positions, emphasis on open science and open data, and broad feedback and buy-in were essential to establishment.

Opportunities and Challenges

A proposal requires a plan to implement, and so collaborative development of a 5-year strategic plan provided a roadmap and a mission statement that defines what the school wants to become, and how to build around that idea. The collaborative nature of this development provided the backbone of a shared governance model that was beginning to work, allowing for--in fact insisting upon--collaborative input from all voices on the team - faculty, staff, students. Taken as a single case study, the School must be viewed from a variety of viewpoints. Perhaps the most important viewpoint is that which forces questions of defining concrete goals and responsibilities and maintaining a simple reporting structure that promotes and values high impact work, and appreciates and elevates the

[1] James Jacob, W. Interdisciplinary trends in higher education. *Palgrave Commun* 1, 15001 (2015). https://doi.org/10.1057/palcomms.2015.1

infrastructure needed to support it.[2] As the School continues to grow, the goals become more complex, which leads to a necessary growth in the team, and adjustment to roles as they become more focused.

Building a school is a difficult task which--especially early on--is as much about administration as it is academics, and so the elimination or hierarchy, focus on team development, and recognition of the role all people play in the development and working of the school was an essential part of its initial success. The work of building a school that is unlike others within the University system makes it that much more difficult, as each decision is viewed with a lens of traditional academia. Development of policies and procedures, particularly a promotion and tenure policy that value commitment to collaboration, openness and transparency, and translation leads to the development of a new generation of researchers. However, fitting these kinds of evaluative measures into collaborations with established departments and schools presents its own set of challenges.

Growth of research and development of new research norms presents opportunities and challenges, as does the development and implementation of new educational programs. Though interdisciplinarity has been shown to create greater research impact and collaborative creativity[3], the structure of higher education is not designed to incentivize such work. Siloed departments reward discipline-specific work that meets particular standards and often does not recognize truly interdisciplinary work or non-traditional scholarly products, such as algorithm and software development, and data and code creation and dissemination. Therefore, a new type of organization is being put in place that fundamentally aligns to how we collectively think of data science. Areas of data science provide a significant focus for a fundamental set of scholarly research activities - data systems, analytics, design and value. These Areas provide structure around fundamental areas of data science, but are not rigid, are designed to undergo review every five years, and evolve (and in some cases dissolve) as the field grows. At the intersection are Collaboratories and Centers. Collaboratories focus on discipline-specific activities within a given school, for example, educational analytics, with the School of Education run by faculty with appointments in both Schools. Centers are across schools focusing on research areas of interest to multiple schools, for example cybersecurity and data ethics and justice.[4]

Leadership Preparation for the Future

Success of the School of Data Science relies on the collection and dissemination of data on the school itself. This includes openness and transparency around the research, publication, grant funding, and student success. As a school without walls, it relies on the team actively working together to gather, collate, and utilize this information to make informed decisions moving forward. This will come in the form of implementation of new programs as well as adjustments made to programs, policies and initiatives currently in place. Web presence, as well as presence in other markets will be an important part of marketing the brand of a sustainable school that will continue to tackle data problems. In the current data science world, with seemingly endless demand, it is important for programs and initiatives to provide a unique proposition in what they are going to supply. The result is rapid growth - a start-up within a 200-year old institution. The difficulty of rapidly hiring excellent faculty that are willing to do the work to help build cannot be understated in a world where data science is in demand across all fields. The School of Data Science looks to the research strengths of the institution to match growth and development in collaboration with other schools. Data is no longer limited to science, engineering, statistics, and computation. UVA strength in the liberal arts lends itself to the focus on responsible data science and data ethics. The presence of a strong academic health system, and an NIH funded CTSA institute focused on data to inform health lends itself to strong collaboration in biomedical data science. Strong collaborations with architecture, education, law, and business offer collaborative opportunities to build leveraging existing expertise, without trying to own all data science initiatives--data is everywhere. The future will be built upon identifying and leveraging shared interest and strengths, as data science is a discipline where if nothing else, we do better together.

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[2] Bolman, L. and Deal, T. (2013). *Reframing organizations: Artistry, choice, and leadership* (5th ed.). San Francisco: Jossey-Bass.

[3] Okamura, K. Interdisciplinarity revisited: evidence for research impact and dynamism. *Palgrave Commun* **5,** 141 (2019). https://bit.ly/2Ft8LkC

[4] https://bit.ly/3hlN8zW