



UNC CHARLOTTE

Office of Academic Affairs

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October 9, 2019

Dr. Joel Avrin
Faculty President
UNC Charlotte

Dear Joel,

To follow up on Doug Hague's October 9, 2019, email to you, I am forwarding a modified version of the proposal to create the School of Data Science for the Faculty Council's review. The following language was added to the Campus and External Engagement section on page 7 of the Proposal:

“SDS will facilitate a discussion with related programs and concentrations to develop an aligned face of data science for students and external stakeholders. This may encompass the development of joint market messages, pathways for students (e.g. a data science website), and even a potential formalization through an affiliate program structure.

The DSI Board of Directors have approved this revision to the Proposal. Again, the deans and I would be pleased to address any questions from the faculty.

Sincerely,

Joan F. Lorden
Provost and Vice Chancellor for Academic Affairs

Attachment

cc: Nancy Gutierrez, Dean, College of Liberal Arts & Sciences
Doug Hague, Interim Executive Director, Data Science Initiative
Fatma Mili, Dean, College of Computing and Informatics
Jennifer Troyer, Interim Dean, Belk College of Business
Catrine Tudor-Locke, Dean, College of Health and Human Services
Matt Wyse, Faculty Governance Assistant
Leslie Zenk, Assistant Provost



Proposal to Create the School of Data Science

October 9, 2019

Background

The Data Science Initiative (DSI) is a university wide initiative that currently includes the College of Computing and Informatics (CCI), the Belk College of Business (BcoB), the College of Health and Human Services (CHHS), and the College of Liberal Arts & Sciences (CLAS). The main components envisioned for the DSI included degree programs, research, and community engagement, including executive education.

DSI started in 2012 with a certificate in Health Informatics (HI), quickly followed by a certificate in Data Science and Business Analytics (DSBA), a Professional Master of Science (PSM) in HI and a PSM in DSBA. Today, over 250 students are enrolled in those four programs. DSI programs are among the most selective and most diverse graduate STEM programs at UNC Charlotte. In support of DSI, the University has added faculty and staff positions to the four participating colleges and made investments in data, computing, storage, network, and office infrastructure.

Since the inception of DSI, the Executive Education component has designed and delivered custom programs for 12 organizations and engaged 140 participants across 40+ organizations in open programs. Research grants and contracts from federal funding agencies, state government, and industry have totaled over \$8.5M. As part of the research infrastructure, the System for Observation of Populous and/or Heterogenous Information (SOPHI) integrated 34 leading open source big data software systems and 15 data streaming and syndication services. Over 180 terabytes of data (structured and unstructured) have been collected thus far.

Recently, DSI faculty embarked on three major initiatives: (1) designing an undergraduate degree in Data Science; (2) designing a Ph.D. in Data Science, and (3) participating in an NSF-funded IUCRC Center for Visual and Decision Informatics.

Proposal: From an Initiative to a School

UNC Charlotte faculty and the Charlotte community have strongly embraced DSI. It has evolved beyond an initiative and is ripe to be grounded in a more robust administrative structure. In considering the further evolution of DSI, we need to ensure that the unique elements that characterize the DSI and make it successful are preserved, and we need to acknowledge the challenges of the current administrative structure. In light of this, we propose that a School of Data Science (SDS) be developed.

Successful features of DSI that will be preserved in SDS:

- Leadership in Data Science: UNC Charlotte embraced this initiative almost a decade before most other institutions, giving UNC Charlotte a head start in this domain that we must nurture and capitalize on;
- Articulation of a comprehensive mission that encompasses research, education, lifelong learning, and full engagement with the community;
- A collaborative transdisciplinary approach involving committed faculty from across the University; and
- High visibility and name recognition in the Charlotte community.

Challenges of DSI as an initiative that SDS will address:

- The Graduate School managed DSI's interdisciplinary academic programs. However, the planned undergraduate degree in Data Science necessitates that a new academic home be found for managing DSI's academic programs.
- Academic research is defined by the faculty. All faculty positions allocated to DSI are located in academic departments, not in the DSI. As a result, there is little sense of community or sense of belonging to DSI from the faculty and little or no sense of a common research agenda. In fact, there is no public roster of DSI faculty.
- Traditionally, an academic program is governed by the faculty of that program who design it, own it, teach it, and vote on changes to it. The diffuse nature of DSI raises issues of governance of data science programs.

To preserve the areas of strength and address the issues raised, we propose the following:

- To ground research and academic programs, an academic unit will be created to house data science programs, degrees, and faculty;
- To distinguish the data science unit from traditional single-discipline departments, we propose to make it a School of Data Science (SDS).
- To preserve its transdisciplinary nature, faculty in data science will have the opportunity to have joint appointments with percentage allocations to the SDS and another department/center within the University (e.g. SDS+Statistics, SDS+Economics, SDS+Computer Science, SDS+Public Health, SDS+Public Policy, SDS+Geography, SDS+Psychology, SDS+Architecture).
- Because the foundation of data science is statistics and computing¹, and to ensure the transdisciplinary nature of SDS, the School will be managed by an Executive Director who will report to a Board of Directors made up of the Provost and the deans of the College of Liberal Arts & Sciences, the College of Computing and Informatics, the Belk College of Business, and the College of Health and Human Services.
- Administrative oversight will reside in the College of Computing and Informatics.

¹ http://sites.nationalacademies.org/cstb/currentprojects/cstb_175246.

- The SDS Board of Directors will hire the Executive Director who, with guidance and oversight from the Board, will establish broad policies, oversee the budget, and provide strategic direction.

The proposal for the School of Data Science is informed by the work of others in defining the type of programming needed to prepare students at all levels and in creating an organizational structure that can best support a highly interdisciplinary and rapidly expanding field. In 2018, The National Academy of Science (NAS) issued a report from the Committee on Envisioning the Data Science Discipline entitled, “Data Science for Undergraduates: Opportunities and Options.”² The report recommends that Data Science degrees provide students with “data acumen” and a wide range of competencies including:

- Mathematical/Computational/Statistical Foundations,
- Data management, visualization, modeling, and assessment,
- Workflow and reproducibility,
- Communication and teamwork,
- Domain-specific considerations, and
- Ethical problem-solving.

On June 13, 2018, the NAS held a workshop on “Programs and Approaches for Data Science Education at the Ph.D. level” in Washington, DC. Dr. Michael Turner, Chair of the Department of Criminal Justice and Criminology and a member of the committee designing the Data Science Ph.D., represented UNC Charlotte. Universities presenting and discussing their models included NYU, Yale, MIT, Penn State, and UC Davis. The approaches presented showed alignment of the following characteristics:

- An interdisciplinary approach with a core of data science and domains with room for customization to needs and requirements.
- A build-and-iterate approach that allows programs to be developed quickly with continuous assessment and refinements.
- The need for a faculty group who owns the program to have a strong sense of community. Most data science programs use a combination of core faculty (most are joint appointments) and affiliate faculty. A shared space is also advocated as a strong unifier. Almost every presenter mentioned this as a key ingredient to develop community, dialog, relationships, etc.
- A distinct organizational structure which has an inclusive (transdisciplinary) mission, but which also has the autonomy to establish core competencies for the degrees.

² http://sites.nationalacademies.org/cstb/currentprojects/cstb_175246.

School of Data Science Overview

Mission

The School of Data Science is UNC Charlotte's transdisciplinary academic unit for knowledge creation, dissemination, and application in data science and analytics. It uses science, technology, education, and engagement to address social, economic, health, and environmental issues.

Goals

- SDS develops and offers exemplary academic programs at all academic levels, including continuing and executive education, rooted in data acumen and applied to diverse knowledge domains.
- SDS serves as a hub of data science research and development for the campus research community and beyond. SDS also serves the research community through a data science research infrastructure.
- SDS nurtures a growing engagement with the community by promoting, facilitating, and utilizing the application of data science to social, economic, educational, health, and environmental issues.

Governance and Administrative Structure

SDS is headed by an Executive Director who sets a vision for the school, manages its resources and programs, and serves as the representative to the UNC Charlotte community and external potential partners. The position is defined in Appendix A. The SDS Executive Director reports to the SDS Board of Directors.

SDS includes core faculty and affiliate faculty as defined below.

Core Faculty

Core faculty are hired as joint appointments between SDS and other units, as applicable. Joint appointments are defined and managed as specified in the *Academic Personnel Procedures Handbook*³. In particular,

- Core faculty appointments are specified in terms of a commitment of at least 30% to the School with the remaining commitment to a disciplinary unit in one of the colleges.
- Current and new position requests for data science faculty are made in coordination with appropriate departments and colleges, with the specific percentage and duties specified in the faculty contract at the time of hiring.
- All core SDS faculty with teaching responsibilities will typically be part of the faculty of one or more interdisciplinary degree programs within SDS.

³ <https://provost.uncc.edu/academic-budget-personnel/handbook/f-policy-statement-joint-appointments>

- Joint search committees make hiring recommendations to the appropriate chair and the SDS executive director, with final approvals by the dean of the college in which the majority joint appointment resides.
- All core faculty have full voting rights in both of their units.

Affiliate Faculty

Faculty desiring to be affiliated with SDS can apply for a three-year renewable term. SDS bylaws establish criteria and procedures for approving such requests. Affiliate faculty are not members of the School level curriculum committee. An exception to this is specified in the section Transitional Period.

Academic Programs

SDS offers bachelor's, master's, and Ph.D. degrees in data science. In particular, the following programs are already in place or in development:

B.S. in Data Science

In August 2018, UNC Charlotte submitted a letter of intent to develop a proposal for a new Bachelor of Science in Data Science. In September 2018, a faculty committee was convened made up of representatives from CCI, CLAS, BCoB, and CHHS. That committee has developed a draft proposal for review through the Faculty Governance process. If approved, the intent is to submit the formal Request to Establish to the UNC System Office by Fall 2019.

Master's Programs

The current M.S. in Data Science and Business Analytics (DSBA) continues to enjoy significant success in recruiting and retaining highly qualified students. For the first time, Spring 2019 enrollment in the DSBA exceeded 200 students (MS + Cert). Admission to the program remains competitive with the overall acceptance rate at roughly 35%. The Academic Program Committee is made up of faculty representatives from BCoB and CCI.

The current M.S. in Health Informatics and Analytics (HIAN) is a smaller program, currently enrolling 50-60 graduate students. The program was recently restructured and closely integrated with related graduate programs in CHHS. A number of courses are available online. The Academic Program Committee is made up of faculty representatives from CHHS and CCI.

The purpose of SDS is in part to manage interdisciplinary academic programs in data science. Students attracted to the data science field and UNC Charlotte can currently choose one of the two MS programs. Both programs limit the breadth of transdisciplinarity to their designed domain of application discipline. Faculty members participating in curriculum committees for these programs are similarly disciplinarily focused. At the same time, there are numerous requests for the creation of diverse concentrations, new applied data science courses, and

“stackable certificates.” Such a diversity of academic offerings would clearly fulfill the interdisciplinary mission and goals of SDS, including the coursework of interest to academic disciplines currently not represented in DSI from the College of Liberal Arts & Sciences and the College of Arts + Architecture. For example, a possible approach that will be explored by SDS is a generic introductory data science course sequence that can be followed with opportunities for a “deeper dive” into more than one knowledge domain (e.g., Statistics, Computing, Public Policy, Urban Studies, Psychology, Computational Design/Architecture).

Ph.D. in Data Science

A cross-college committee is developing an initial proposal for the Ph.D. program. Similar to the proposed undergraduate program, the intent is to create a transdisciplinary model. The degree would be based on a core of data science skills and techniques. Academic partners would have the opportunity to develop specific domain areas to “stack” on the core competencies.

Curricular Governance

SDS core faculty will define a set of bylaws similar to that used by other units and accounting for the fact that SDS reports to a Board of Directors. In particular,

- SDS will have program-level curricular committees (undergraduate and graduate) through which all curricular changes are initiated.
- Members of the program-level curriculum committees are nominated as per the SDS bylaws. The program-level curriculum committee members shall be composed of faculty with close ties to the program, as defined in the bylaws.
- Proposals from program-level curriculum committees will be considered by an SDS curriculum committee, which shall contain a core faculty representative from each program-level curriculum committee.
- Proposals approved by the SDS curriculum committee will be presented for approval to the SDS Executive Director.
- Proposals approved by the SDS Executive Director will be submitted for approval to the SDS Board of Directors.

Transitional Period

A transition plan for governance is recommended for the DSBA and the HIAN degrees, to be reviewed annually. The Executive Director will review the status of the transition on an annual basis and provide a recommendation to the SDS Board of Directors for continuation or termination of the transition period. During the transitional period:

1. The DSBA will have a DSBA Program director. The Program Director must be a core faculty member in SDS.
2. The HIAN will have a HIAN Program Director. The Program Director must be a core faculty member in SDS.

3. The DSBA will have a curriculum committee of faculty composed of 50% from BCoB and 50% from CCI.
4. The HIAN will have a curriculum committee of faculty composed of 50% from CHHS and 50% from CCI.
5. During the transition phase, DSBA faculty can be affiliate faculty and vote on all curriculum proposals for the DSBA program.
6. During the transition phase, HIAN faculty can be affiliate faculty and vote on all curriculum proposals for the HIAN program.

Campus and External Engagement

SDS will maintain capabilities to serve and facilitate campus-wide data science research needs (e.g. data lake service - SOPHI, data curation, access). Understanding that data science has and will continue to have a central role in the economy of Charlotte, the State, and region, SDS will seek opportunities to engage the community in areas such as the organization of conferences and events, participation in local and regional research and development initiatives, and formal and informal initiatives promoting effective use of data science.

SDS will facilitate a discussion with related programs and concentrations to develop an aligned face of data science for students and external stakeholders. This may encompass the development of joint market messages, pathways for students (e.g. a data science website), and even a potential formalization through an affiliate program structure.

Given the emergence of Data Science as a field that revolutionizes science, communities, and industry, SDS external engagement will be central to its mission. External engagement will develop around the opportunities for life-long learning and executive education, cooperative research, and relationships that enhance the community.

Resources

Budget

Currently, DSI is supported by commitments of general funds for faculty, staff, and operations. Funds from the School-Based Tuition Increments (SBTI) associated with the Health Informatics and Analytics (HIAN) and the Data Science and Business Analytics (DSBA) programs support additional staffing, assistantships, program marketing, annual data and software purchases, and faculty travel.

Space

One of the objectives of the creation of SDS is the enabling of a sense of community among core data science faculty. Co-location plays an important role in that. Furthermore, the proximity of SDS faculty to collaborating colleges is also highly desirable. Space is currently provided in the

Bioinformatics building for DSI administrative functions. SDS administration will work with the colleges to develop strategies that enable physical interaction between SDS faculty and staff and those of the colleges.

Faculty and Staff

Through funds from the Chancellor, nine new faculty and staff positions were funded to support the creation of the Data Science Initiative. The positions were placed in the College of Computing and Informatics, the Belk College of Business, and the College of Health and Human Services. Additional DSI positions were created through repurposing existing lines, investment by Academic Affairs, use of SBTI funds, and position requests by the colleges. Today, over forty people at the University are engaged either full or part time in DSI and many more are interested in the field. The creation of SDS will provide a structure for additional participation and collaboration.

Appendix A

Executive Director: School of Data Science

Job Description and Accountabilities

The Executive Director of the School of Data Science provides leadership to the School of Data Science in line with the School's mission to be the University's transdisciplinary academic unit for knowledge creation, dissemination, and application in data science and analytics. It uses science, technology, education, and outreach to address health, social, economic, and environmental issues.

Leadership

- Creating an aspirational vision for the School and rallying faculty, staff, and school partners around the School
- Modeling a collaborative style and personal and professional integrity within the School, and across units in UNC Charlotte, and beyond
- Being open and accessible, listening to faculty and staff views and concerns, and acting on them
- Cultivating a culture conducive to the productivity and well-being of faculty, staff, and students

Resource Management

- Managing staff through assignment and support in a way consistent with the School's values and priorities
- Requesting resources for the School and managing them well
- Monitoring the wellbeing of the School through data collection and assessment
- Playing an active role in fundraising through business partnerships and other external activities

Faculty and Staff Development, and Retention

- Assessing the needs of the School and requesting/raising resources for meeting these needs
- Collaborating with all partner units in recruiting and hiring faculty and staff who contribute to the vision and values of the School
- Ensuring that faculty and staff receive mentoring and development that supports their professional development and growth and that creates a sense of belonging in and ownership of the School
- Conducting formative staff evaluations and contributing to faculty evaluation through a process that inspires and encourages faculty and staff to excel

- Monitoring the well-being of faculty and staff and ensuring adequate retention of talent

Education

- Continuing to develop and grow the School's curricula in a way consistent with the School's mission
- Ensuring that curricula and pedagogy are timely, relevant, and adaptable
- Collaborating with partnering units in scheduling courses that promote students' progress towards graduation, consistent with the school's values and priorities (for example, interdisciplinary)
- Participating in and overseeing the recruitment and advising of students
- Monitoring students' success and wellbeing
- Cultivating an inclusive culture with visible and proactively equitable processes

Research

- Shaping a School-wide and University-wide data-science research and development vision
- Hiring faculty to realize the research vision of SDS
- Initiating and nurturing collaborations with academic, industrial, and governmental partners that enable the research and development agenda of SDS
- Supporting faculty and graduate students in their research

Communication

- Serving as the voice of the School (on behalf of the faculty, staff, and students) to the colleges and University
- Communicating to the School relevant events, decisions, and directions
- Cultivating significant partnerships for the School

Appointment, Review, reappointment

- The Executive Director will be appointed by the SDS Board of Directors.
- The Executive Director will undergo an annual evaluation by the SDS Board of Directors.
- The Executive Director will be reviewed for reappointment every three years following Academic Affairs guidelines for the annual review of administrators.