This is the third year that I have had the privilege of reflecting on the accomplishments of the Analytics and Data Science Institute at Kennesaw State University. At the time we were established within The Graduate College in 2017, our stated mission was to “…bring together faculty and students from across the university, in collaboration with partners from both the private and public sector, to engage in applied research to contribute to our understanding of our world through the translation of data into information.” These themes of impactful, relevant research and interdisciplinary collaboration continue to be the foundations of everything we do, every day. In 2020, we transitioned into the College of Computing and Software Engineering with the hope and expectation that this new environment will enable and elevate our mission.

As you will read in this report, the past academic year was one of great accomplishment. A few of our highlights include:

- Graduating Ph.D. students from our first and second cohorts. We saw eight of our students successfully complete their degrees and transition into successful careers in both academia as well as the private sector.
- High Research Productivity. Students and faculty affiliated with the Institute produced over 20 peer-reviewed research products that were published and presented in national and international conferences and journals.
- Sponsored Research Funding through our Center for Statistics and Analytical Research of $400,000. The Center for Statistics and Analytical Research engaged faculty from six colleges from across the university in research products across multiple domains including healthcare, finance, public policy, engineering and manufacturing.

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- Acceptance of our sixth cohort of Ph.D. students. Although the number of Ph.D. programs in data science continues to increase across the country, our program continues to maintain an acceptance rate of approximately 10% – making it one of the most competitive graduate programs in the country. The sixth cohort will include nine students – our largest cohort to-date.
- Data Science 7900. The Institute offers graduate students across the university – regardless of major – an opportunity to work in an applied data science project course, giving all graduate students an opportunity to develop data literacy skills.

As an interdisciplinary research unit, the Analytics and Data Science Institute continues to serve the university as a hub for collaborative research. Under the leadership team of Dr. Sherrell Hayes and Dr. Herman (Gene) Ray, and our administrative associate Mrs. Cara Reeve, our primary objectives for the upcoming year include:

1. Integrate the sixth cohort of doctoral students
2. Support the successful completion of program requirements for students in Cohorts one, two, and three
3. Maintain and increase the number of corporate sponsored research labs
4. Increase the number of federally funded grant submissions
5. Formalize a process for integrating affiliated faculty into the Institute
In 2020 “unprecedented” typically referred to the horrific impact the COVID-19 pandemic has had on the health, safety, and economic prosperity of people around globe. The students, faculty, and staff helped to create an “unprecedented” (used positively) 2019-20 year for the Ph.D. program in Analytics and Data Science.

In Summer 2019, we held the largest iteration of comprehensive exams for the program with 6 faculty providing questions in three subjects for 10 students who wrote for 12 hours over three days. On that Friday, students presented the results of a 48 hours analytics project to a faculty panel. It was a grueling week for students and faculty who assessed their performance. The effort required for comprehensive exams every summer often goes unnoticed, but is a crucial element to maintain the quality of program. Summer finished on a high note with the graduation of the second and third Ph.D. students, Dr. Jie Hao and Dr. Bogdan Gadidov, who were featured on the KSU homepage for their success.

In Fall 2019, we welcomed six students into Cohort 5 bringing the program to 24 students. We also hosted our annual student awards, presented by KSU President Dr. Pam Whitten. All students took a course on the “Ethics of Data Science”, which resulted in a collaborative document on the Guiding Ethical Principles for Data Science, which can be found on the ADSI homepage, and are now integrated into the research initiatives of the Institute. Fall semester was capped off in December when Bob Vanderheyden became our fourth graduate. Dr. Vanderheyden, the recipient of the program’s first NSF’s Dissertation Completion fellowship, was sponsored by IBM while in the program.

Although COVID-19 curtailed our face-to-face instruction in Spring 2020, it did little to slow the efforts of our students and faculty. In March 2020, Eileen Baiddoo, already a tenure-track Assistant Professor at Tennessee Tech, became the first Ph.D. student in our program (and KSU) to successfully defend his dissertation virtually. He was followed by three additional virtual dissertation defenses (Yan Wang, Lili Zhang, and Yiyun Zhou)! These would not have been possible without the hard work and determination of 10 KSU faculty and two external reviewers who served as chairs and members of these committees.

Despite the cancellation of many spring conferences, the Ph.D. students retained a high level of productivity for 2019-20, publishing 11 journal articles, two book chapters, 16 papers in conference proceedings, and five posters. The vast majority of these were co-authored with other students in the program and with faculty advisors from multiple colleges across KSU. Our Ph.D. students also won three first-place awards for their research at regional, national, and international conferences.

All 2020-21 is already looking brighter. We joined the College of Computing and Software Engineering in the Spring of 2020 and thanks to the generosity of Dean Jon Preston and the hard work of the admissions committee we admitted nice students for Fall 2020. This will be our largest class to date. We also finalized some curriculum changes that will allow our students to have more opportunities to develop “concentrations” and “cognates” within their curriculum. In 2020-21 we plan to:

1. Integrate our new Ph.D. students into the program
2. Implement our new curriculum
3. Work with CCSE faculty to develop at least one cognate
4. Grow the number of faculty involved with Ph.D. student supervision
5. Develop a process for mentoring faculty who are mentoring Ph.D. students

Program Director’s Letter

INSTITUTE BY THE NUMBERS

Almost 50% of Ph.D. students are female
Less than 10% acceptance rate
Over $2 MILLION in external research funding in three years

14 Affiliated faculty from 6 colleges

Ph.D. graduates

8 in Data Science in the country

21 Ph.D. students

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The Center for Statistics and Analytical Research (CSAR, pronounced "Caesar") has concluded its third year of operation. CSAR is the research component of the Analytics and Data Science Institute that brings together faculty and students from across the campus to investigate data-centric research questions. CSAR is designed to provide practical research experiences for the Ph.D. students in the Analytics and Data Science program by connecting them with research partners from within the Kennesaw State University community as well as from the external business community. Many of the business research relationships (the Data Science Research Labs) are multi-year engagements that include a faculty member as the lead investigator, subject matter experts from the research sponsor, at least one Ph.D. student, and frequently master’s-level students from other degree programs on campus. For the first time this year, CSAR began integrating undergraduate students into our research labs. In the last fiscal year, CSAR received over $400,000 in external funding.

This year there was a large push to secure grants from federal agencies. CSAR supported six grant submissions to the NIH and the NSF.

While external research funding and grant submissions are an important part of the research output of CSAR, high impact, peer-reviewed research publications are a high priority for our Ph.D. students and for our affiliated faculty. As with every progressive year of operation for CSAR and for the Institute, the number and impact of our publications continues to increase. This past year, our Ph.D. students, under the supervision of their faculty advisors, published or presented over 20 papers in conference proceedings at national and international conferences.

Next year, CSAR will be dedicated to reviving the research infrastructure following the COVID-19 pandemic. KSU switched to an online format in March, resulting in education and research being done remotely. At the end of the fiscal year, nearly three months later, the University is operating in a virtual environment. The impact on CSAR has been minimal, but the upcoming fiscal year will see a renewed dedication to the goals established last year. Specifically, the following objectives will carry forward into the next year:

1. Increase the number of research partners within each of the industry sectors.
2. Increase the number of faculty and associated colleges working with CSAR.
3. Increase the number of federally funded grant applications associated with CSAR by developing partnerships with faculty members submitting externally funded grants.
4. Establish an inclusive research culture with faculty who are mentoring students and leading research labs, and the students executing the research.

The upcoming year will be one of discovery, innovation, and interdisciplinary collaboration for CSAR.

The Advisory Board for the Analytics and Data Science Institute includes business and thought leaders from analytics and data science. This Board meets multiple times a year with the leadership of the Institute to provide insights related to the relevancy and the quality of the contributions of the Institute. The Board supports the academic program accountability of the Institute by providing guidance and feedback and serving as partners in research and in community collaborations.

Khalifeh AlJadda, Southern Data Science
Vickey Chang, Equifax
Bill Franks, The International Institute for Analytics
Will Hakes, ScoresMatter
Girish Modgil, Travelers
Eric Schmidt, Coca-Cola
Murray Webb, Huge

The upcoming year will be one of discovery, innovation, and interdisciplinary collaboration for CSAR.
**Dollar Amount and Sector**

**FY 2019 - 2020**

- Government and Public Policy: 12%
- Healthcare: 24%
- Finance and Technology: 36%
- Manufacturing and Supply Chain: 28%

**Projects 2019-2020 in Numbers**

For the fiscal year period of July 1, 2019 to June 30, 2020

**Research Grants & Projects**

<table>
<thead>
<tr>
<th>Sector Funding</th>
<th>Awards</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare</td>
<td>2</td>
<td>$94,500</td>
</tr>
<tr>
<td>Finance and Technology</td>
<td>1</td>
<td>$110,000</td>
</tr>
<tr>
<td>Manufacturing and Supply Chain</td>
<td>2</td>
<td>$145,000</td>
</tr>
<tr>
<td>Government and Public Policy</td>
<td>1</td>
<td>$46,000</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>$395,500</td>
</tr>
</tbody>
</table>

**Direct Expenses**

- Average: $26,870
- Median: $26,489
- Minimum: $18,905

**Indirect Expenses**

- Average: $17,269
- Median: $17,029
- Minimum: $13,599

**Institute Operational Costs**

- Average: $22,578
- Median: $21,129
- Minimum: $13,599

**Funded Research**

- Healthcare: $94,500
- Finance and Technology: $110,000
- Manufacturing and Supply Chain: $145,000
- Government and Public Policy: $46,000

**Total**

- $395,500

**Institute Operational Costs as %**

- Direct Expenses: 26%
- Indirect Expenses: 24%
- Total: 40%

**Research Grants**

- Average: $395,500
- Median: $336,418
- Minimum: $135,467

**Funded Instruction**

- Average: $1,028
- Median: $413
- Minimum: $359

**Total**

- $400,500

**Cohort 2**

- Jessica Rudd
- Lili Zhang

**Cohort 3**

- Yuko Ito
- Mohammad Rezaei
- Sarjesh Dhabne

**Cohort 4**

- Jonathan Sykes
- Michelle Dole

**Cohort 5**

- Tony Tan
- Kaye Bingham

**Ph.D. Students**

- The P.D. Students funded research