Executive Summary

The Presidential Task Force on Applied Data Science investigated Seattle University's involvement in a relatively new and rapidly evolving technological and collaborative field. One of the central problems that this group faced is a lack of congruent language across the many academic fields that intersect with and impact applied data science. Data analysis, data visualization, data project management, digital marketing, applied statistics, chemometrics, healthcare informatics, database architecture, algorithms, software, machine learning and artificial intelligence (and many others!) all contribute to the intellectual capacity of this new data-smart student Seattle University hopes to serve.

We believe that training in the computational tools of today represents a fundamental skill for students in all fields. While technology and the scope of problems we can investigate are certainly skyrocketing, the central capability of any scientist or decision maker is still the scientific method: the ability to form a testable hypothesis that connects us to an in-depth understanding of our world. We stand at an exciting time where technology and data are accessible to all. However, learning how to glean useful information from data still requires careful training and education.

The successful implementation of data-focused education at Seattle University faces six core challenges as identified by the Task Force.

1. How do we integrate data literacy into undergraduate education?
     (Subcommittee: University Core Curriculum and Data Literacy Education)

2. Are there more opportunities for graduate level education?
     (Subcommittee: Current Graduate Curriculum)

3. With its highly interdisciplinary nature, are there ways to provide students with this training at Seattle University?
     (Subcommittee: Joint Academic Programs in Applied Data Science)

4. What would a University Center of Applied Data Science look like?
     (Subcommittee: Developing a University Center for Applied Data Science)

5. What infrastructure is needed?
     (Subcommittee: Technological Infrastructure)

6. What is the current supply and demand for data-focused education?
     (Subcommittee: Competitive Intelligence)

Each subcommittee sought a meaningful exploration of its charge and a meaningful collection of information that could lead Seattle University to the forefront of undergraduate and graduate education in applied data science. Because of the scope and relative newness of this emerging field, idealism is leading the way with much collegial optimism and excitement; however, there is also a recognition of practical constraints.

Educational options for Seattle University focus on the need for best practices and the appropriate design and timing of data literacy education. Also, delivering engaging content with real world data is a must (multiple employers highlighted this as a primary need). There are possible ways to integrate an undergraduate minor that could add some interdisciplinary data analytics knowledge to a student's degree focus as well as integrating data-literacy into the undergraduate CORE. However, we acknowledge that graduate-level interdisciplinary certificate programs, or a full-fledged graduate degree seem to be the current, most common educational path.

Practically, a physical or virtual collection of resources and experts are required here at Seattle University, the specifics of which will likely be limited by available funding. Some staffing for resource management, training, and facilitating open-collaboration across departments is critical to launch success, as well as the ability to coordinate exciting events such as a data science hackathon. Someone with authority needs to be knocking on doors to bring disciplines together and connect students to projects and resources. Currently, faculty and students are making partial use of cloud resources as best they can, but there is much needed support outside of what is currently in place.

The recommendations contained within this report are preliminary. Each subcommittee has identified key recommendations moving forward, the details of which are contained within the main body of this report. The exact scope and depth of these recommendations is not yet determined.

The **University Core Curriculum and Data Literacy Education** subcommittee recommends integration into the existing University CORE as well as provisioning of data-related courses, additional degree tracks, and an undergraduate minor. Seattle University needs a review of strategies and best practices to identify suitable data literacy education options including, but not limited to: timing of data literacy education, content delivery, pedagogical approaches, utilization of real world data with hands-on learning, and the development of best practices for data literacy assessment and evaluation.

The **Current Graduate Curriculum** subcommittee recommends the development of an interdisciplinary, comprehensive, and stand-alone "Introduction to Data Science" elective graduate course for students without a programming background. There needs to be more awareness of Seattle University's "Programming Boot Camp" and it needs to be available to non-computer science graduate students. Additionally, all graduate students need access and support to required infrastructure needs in large dataset collection, analysis, and dissemination.

The **Joint Academic Programs in Applied Data Science** subcommittee recommends that Seattle University consider the development of additional programs. An undergraduate minor, a graduate-level interdisciplinary certificate program, and a graduate degree all need to be explored. Establishment of best practices for data-literacy education and the degree of depth needed must be balanced with the many synergistic and existing graduate programs already offered. The establishment of dual degree programs, such as data science and business analytics or data science and criminal justice, would not only give students core competencies in data analytics, but would enable them to market themselves more successfully for job opportunities in their field of specialization. More research is needed to investigate whether demand is highest for an online program, a face-to-face program, or a hybrid, and what the pedagogical implications and content demands for each would be.

The **Developing a University Center for Applied Data Science** subcommittee recommends that a Center of Applied Data Science be established to act as a resource hub, a best practices center, contain available staffing concomitant to funding, and provide direction for applied data science events. Overall, the Center should be a vital resource for Seattle University and the broader community. The establishment of a meaningful mission and charge for the applied data science center is paramount. The structure of which should evolve and grow as the technological and pedagogical landscape changes.

The **Technological Infrastructure** subcommittee recommends that Seattle University focus its infrastructure needs towards providing support for faculty and students. The dissemination of platforms for data management and data science tools should reflect the collaborative and hackable nature of this new academic arena. While funding will likely be the limitation that defines what tools are available, collaborative support for storage, communication, engineering, and data analysis is needed. Seattle University needs subject matter experts to further develop, identify and support the many tools available.

The **Competitive Intelligence** subcommittee recommends that the Task Force identify and monitor key graduate, undergraduate, certificate and other programs outside of Seattle University, particularly emphasizing the broad dissemination of materials that include resources outside of traditional Universities, such as bootcamps, online certification programs, and corporate certifications. Additionally, there are a myriad of roles within organizations that require data skills, and these requirements will increase over time. Seattle is at the forefront of these changes and Seattle University's programs must remain competitive. Further research regarding corporate interest in student experiences as an explicit entry point into data science roles is recommended.

Overall, there is growing demand for experts in data from a wide variety of backgrounds. Excitingly, the surrounding industry in Seattle is one of the intellectual centers of this new field and many opportunities exist to develop an exceptional and uniquely customized program here at Seattle University. Our students stand in front of a tremendous amount of data, no matter

what field they choose to enter. Seattle University's consistent commitment to serve the student requires igniting youthful open-collaboration to face this onslaught of data with mathematical precision and social clarity.