BHEF Issue Brief

Data Science Emerges as Essential Tool for Decision Making and Innovation Across Industry Sectors

The Business-Higher Education Forum's (BHEF) National Higher Education and Workforce Initiative (HEWI) has served as a powerful platform for launching innovation in regional workforce projects through strategic collaboration between business and higher education. The success of HEWI since its February 2013 launch provides a foundation for expanding its focus into an additional emerging field — data science.

Data science has emerged as an essential tool for decision making and innovation in a wide range of organizations. The demand for data science experts and data analytics-enabled graduates will grow exponentially to meet the workforce needs of business, government, scientific and research organizations, and cultural institutions.

Emerging Workforce Needs in Data Science

The application of data science is pervasive in both the public and private sectors. Companies of all sizes rely on data science and analytics as key transformational components to their core operations. A 2011 report by the McKinsey Global Institute, *Big Data: the Next Frontier for Innovation, Competition, and Productivity*, noted that "big data" is growing at a rate of 40 percent each year and has the potential to add $300 billion of value to the nation's health care industry alone, with broad application in virtually every sector, including scientific organizations and cultural institutions. Projections by Gartner, Inc., indicate that in less than 12 months, 4.4 million information technology (IT) jobs to support big data will be created globally. About 1.9 million of those jobs will be within the United States, and big data has the potential to create three times that number of jobs outside of IT. Despite this demand, the U.S. faces a significant shortfall in the number of data scientists and "data enabled" professionals. According to the McKinsey report, the United States will need an additional 140,000 to 190,000 data science experts with "deep analytical skills," plus 1.5 million managers capable of using data analytics in decision making.

Data science provides new sources of actionable insights that will improve decision making and stoke innovation. While business is able to collect and store vast amounts of data, most struggle to harness this data for decision making. Data becomes business intelligence — and valuable to decision makers — when data science experts, who also have domain-specific expertise, access, unlock, and interpret the data available to them.

Data analytics-enabled individuals with domain-specific expertise can turn data into information, and they are critical to the ability of businesses to implement data-driven decision-making throughout organizations. While there is considerable need nationally for data scientists, there is an even greater workforce need for the analytics-enabled

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About the Business-Higher Education Forum

Now in its 36th year, BHEF is the nation's oldest membership organization of Fortune 500 CEOs, prominent college and university presidents, and other leaders dedicated to advancing innovative education and workforce solutions and improving U.S. competitiveness. BHEF's business and academic members collaborate in regions across the country to design and deploy education-workforce solutions in the high-demand and emerging fields that are so critical to innovation and national security. BHEF and its members drive change locally, work to influence public policy at the national and state levels, and inspire other leaders to act.

professional who can marry a deep background in a particular field (e.g., engineering, economics, or business) with a strong understanding of the application of analytics and visualization tools.

In addition, the data science "footprint" has expanded from core IT/computer science functions to each business unit and the many functions within these units, including operations, marketing, and communications. Businesses that are able to successfully integrate data analytics-enabled professionals into these functions have gained significant competitive advantages. Yet, this expansion in demand results in a talent gap in the current and future workforce.

The Challenge

While higher education is responding to the demand from businesses for more data science professionals, this demand quickly outstrips the supply. Today, most higher education data science programs are located within the school of engineering and/or the department of computer science. These programs serve as post-baccalaureate training for individuals who already have a strong grasp of analytical thinking, applied mathematics, and competency in computer programming, largely limiting access to graduates from other STEM fields. Consequently, these graduate programs prepare data science experts who often will lack the domain-specific knowledge in health, transportation, economics, business, and public policy that companies need.

To date, very few programs have been developed to offer undergraduates training in data science. Even at higher education institutions with numerous course offerings in data science, undergraduates have limited access to these courses before the final two years of college, and these students will largely be STEM majors. But as a result of high attrition among STEM undergraduates in the first two years, few STEM graduates will actually be exposed to data science. Even fewer non-STEM majors will be exposed to data analytics because data science and analytics courses are not integrated into most undergraduate programs.

To ensure a robust and diverse data science and analytics-enabled workforce, learning opportunities in data science must be integrated into courses across the undergraduate curricula, beginning in the first year.

Data Science and Analytics Workforce Definitions

As the field evolves, definitions are being developed to convey differences in the type and level of skill required across the spectrum of data science and analytics workforce needs.

In-depth skills | Basic skills

Data scientists are defined as those highly skilled and specialized individuals who possess deep analytical skills whose primary role is to gather and analyze raw data.	**Data analytics-enabled individuals** are defined as those who understand the processes and tools of data science and can use domain-specific expertise to turn data into information. These individuals marry a deep background in a particular field (e.g., engineering, economics, or business) with a strong understanding of the application of analytics and visualization tools.	**Data analytics-aware professionals** are defined as those individuals whose primary function is not analysis, but who have a basic level of awareness of analytics and can apply the analytics to their function.

*Further research into these definitions will occur with BHEF industry and academic partners, and they may be updated in the next phase of the project.