

PROFILE OF THE BIG-DATA-ENABLED SPECIALIST

EXECUTIVE SUMMARY

“Basic skills in working with data that every person should have are not being taught in K–16 schools. Thus, they are lacking at the highest levels in the broad array of professions that are becoming increasingly data-driven.”— Juan LaVista, Principal Data Scientist at Bing/Microsoft

The economic demand for professionals with deep analytical skills has never been greater. In a 2011 report, McKinsey & Co. detailed the scope of the need: *“By 2018, the United States alone could face a **shortage of 140,000 to 190,000 people with deep analytical skills** as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.”¹*

Preparing the workforce of tomorrow will require changes in how we teach students today. Education Development Center, Inc.’s Oceans of Data Institute is raising awareness about the skills and knowledge needed to compete in a big data economy through the release of an occupational skills profile for the big-data-enabled specialist.

WHAT IS AN OCCUPATIONAL SKILLS PROFILE?

An occupational skills profile identifies what someone needs to know and to be able to do in order to be successful in an occupation. The profile is created using EDC’s modified DACUM process, which centers on three principles:

- 1) Expert workers can describe and define their jobs more accurately than anyone else.
- 2) An effective way to define a job is to precisely describe the tasks that expert workers perform.
- 3) All tasks, in order to be performed correctly, demand certain knowledge, skills, resources, and behaviors.

HOW WAS THE PROFILE DEVELOPED?

In August of 2014, the Oceans of Data Institute convened a panel of big data experts from leading businesses, government agencies and universities such as Google, Microsoft, Columbia University, George Mason University, and NASA. EDC facilitated this panel through a guided dialogue that produced a profile of a “big-data-enabled specialist.” More than 150 big data professionals reviewed and commented on the profile via a comprehensive online survey. As a result, the profile of the big-data-enabled specialist created by the panel has received national validation.

WHO IS THE PROFILE FOR?

The profile is intended for multiple audiences. It can help **K–12 educators and policymakers** understand the specific skills and behaviors that need to be cultivated and emphasized in elementary, middle, and high school classrooms, so that graduates are prepared to make evidence-based decisions and participate in a data-driven economy. It can help **higher education administrators** develop relevant, meaningful, and rigorous programs that

deliver qualified candidates into big-data-enabled fields. It can help **professionals in big-data-enabled fields** improve mentoring, professional development, and retention programs.

KEY FINDINGS

The profile defines a big-data-enabled specialist as “an individual who wrangles and analyzes large and/or complex data sets to enable new capabilities including discovery, decision support, and improved outcomes.” The expert panel described and reviewers endorsed a broad array of tasks essential to their work, including:

- defining problems and articulating questions;
- developing deep knowledge of data sources;
- developing methods and tools; and
- staying current on emerging technologies, data types, and methods.

They also placed strong emphasis on the following aspects of their work:

- managing data resources by complying with legal obligations, applying ethical standards, and protecting the data and results;
- critically evaluating the results of analyses to determine the level of confidence in the results and estimate the precision and accuracy of answers; and
- telling a “data story” to convey insights, identify limitations, and provide recommendations based on the results of data analyses.

Beyond describing what they do in their work, the expert panel and reviewers also emphasized the skills, knowledge and behaviors most essential to success as a big-data-enabled specialist. The following are a few key findings:

- Unexpectedly, "soft skills" such as analytical thinking, critical thinking, and problem solving dominated the 20+ big data skill and knowledge requirements identified by the panel and endorsed by experts who completed the validation survey.
- Applying statistical methods also ranked among the most important skills, as well as knowledge of algorithms.
- Among other behaviors, experts and reviewers said that a successful big-data-enabled specialist is willing to question, and is a lifelong learner, a seeker of patterns, open minded, and curious.

When discussing trends over the next five years, the experts and reviewers identified data security as one of their largest concerns given the exponential rate of data growth. They were also concerned that the role of the big-data-enabled specialist is not well-defined in organizational culture and that public understanding of data remains low.

CONTACT US

Oceans of Data Institute staff are available for consultation with your organization to help design and implement training, curriculum, and/or assessment programs. For more information, or for printed copies of the profile, please contact us at oceansofdata@edc.org.

¹ 2011: J. Manyika, M. Chui, B. Brown, J. Bughin, R. Dobbs, C. Roxburgh, A. H. Byers “Big data: The next frontier for innovation, competition, and productivity” http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation