

Stop Assuming Your Data Scientist is a Metallurgist or Meteorologist

Why organizations should integrate data analytics with domain expertise for meaningful decision-making

February 4, 2021

Over 40% of companies worldwide use big data analytics¹ to make business and operational decisions. Benefits include more strategic decision-making, improved control of operational processes, reduced uncertainty, and better understanding customers, risks, and costs. Unfortunately, organizations sometimes fail to realize these benefits by relying solely on data analytics without domain-specific insight. Data analytics performed without domain expertise can lead to conclusions or predictions that don't make sense in the real world and drive decisions that may in turn introduce risks to the reliability, integrity, or safety of products or infrastructure. In contrast, organizations who combine data analytics with domain expertise can leverage a cross-disciplinary approach to efficiently collect and analyze data, optimize predictions, and support decision-making.

Bottom line? Stop assuming data scientists are metallurgists, meteorologists, or other domain experts. Instead, prioritize the integration of data science and domain expertise throughout a project to obtain meaningful results that can help you make practical business and operational decisions.

Integrated from the Start

It can be tempting for an organization to offload a data analytics project to a third party and turn its attention to other business until the work is done. While effective data scientists might excel at mathematical modeling, it is critical that the analytical trends and correlations produced make sense in the real world and that insights can be integrated into operational workflow. In our experience, this is best accomplished by integrating data analytics and applications-based domain expertise from the beginning of a project.

Suppose you are interested in understanding consumer behavior and send a survey to your customers. A data scientist can certainly analyze responses and offer insights. However, the integrity of the conclusions they draw will depend critically on how well the survey was designed. Did you bias your customers' answers by asking questions in the wrong order? Did your phrasing encourage the answer you wanted? Are you surveying only your most frequent customers? Drawing meaningful conclusions about consumer behavior, like most data-driven projects, requires a cross-disciplinary team. In this example, that includes experts in statistics, psychology, and human behavior working alongside data scientists.

Leveraging the Right Data

As another example, a utility may employ a third-party partner to provide data-driven recommendations on areas with the highest risks to assets from regional

¹ <http://barc-research.com/research/big-data-use-cases-2015/>

Stop Assuming Your Data Scientist is a Metallurgist or Meteorologist

weather patterns and other outside forces. By including a utilities expert in the initial data collection process, the team can ensure that the most critical input data is leveraged. For example, an advanced algorithm could suggest based on analysis of limited field data that the higher the humidity, the less corrosion a pipeline will incur. A metallurgist closely integrated into this work could determine whether or not this prediction is accurate and, if needed, partner with the data scientist to redirect the model. This type of scientific integration throughout a project can drive more engineering-informed results and help organizations avoid safety, reliability, or quality issues down the line. In this example, the analysis team (data scientist, utilities expert, and metallurgist) contributes expertise while executing an approach grounded in engineering realities. This type of solution development allows for a highly multi-disciplinary approach that incorporates critical considerations from different domains.

Similarly, domain experts can help data scientists ensure that models target the correct variable or issue from the onset. For example, if humidity is a known, unavoidable issue in a given project, it may not be useful to let it dominate a model's analytics. By coupling mathematical modeling with domain expertise, organizations can avoid exclusively focusing on known variables or eliminating secondary variables that may influence a model's outcome in a given population or region.

How Exponent Can Help

Exponent's multi-disciplinary team of engineers and scientists has both data analytics and domain expertise to help organizations across industries obtain the most meaningful results for real-world decision-making. Our data scientists are software agnostic and have the analytical tools to accommodate the cloud service, dashboard, and platform of choice for a given organization. We also have domain experts in a wide variety of disciplines, including but not limited to:

- Corrosion engineers trained in metallurgy
- Environmental scientists who understand both the effects of weather and pollution and environmental regulations across countries
- Electrical engineers who understand battery behavior
- Toxicologists who can speak about consumer safety based on analytical results
- Human factors experts who understand consumer behavior.



Ray K. Huang, Ph.D., P.E., CFEI
Electrical Engineering & Computer Science
Head of Asia Offices & Principal Engineer
Hong Kong & Singapore & Shanghai
+852 5596 7869 | rhuang@exponent.com



Elizabeth Groves, Ph.D.
Data Sciences
Managing Scientist
Menlo Park
(650) 688-7147 | egroves@exponent.com

Alexandria | Atlanta | Austin | Bellevue | Bowie | Chicago | Denver | Detroit | Houston | Irvine | Los Angeles | Maynard | Menlo Park | Miami | Natick | New York | Oakland | Pasadena | Philadelphia | Phoenix | Sacramento | Seattle | Warrenville | Washington D.C. | United Kingdom | Switzerland | China | Singapore