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A PUBLICATION OF HUMAN RESOURCES MANAGEMENT ASSOCIATION OF C

Big Data Analytics

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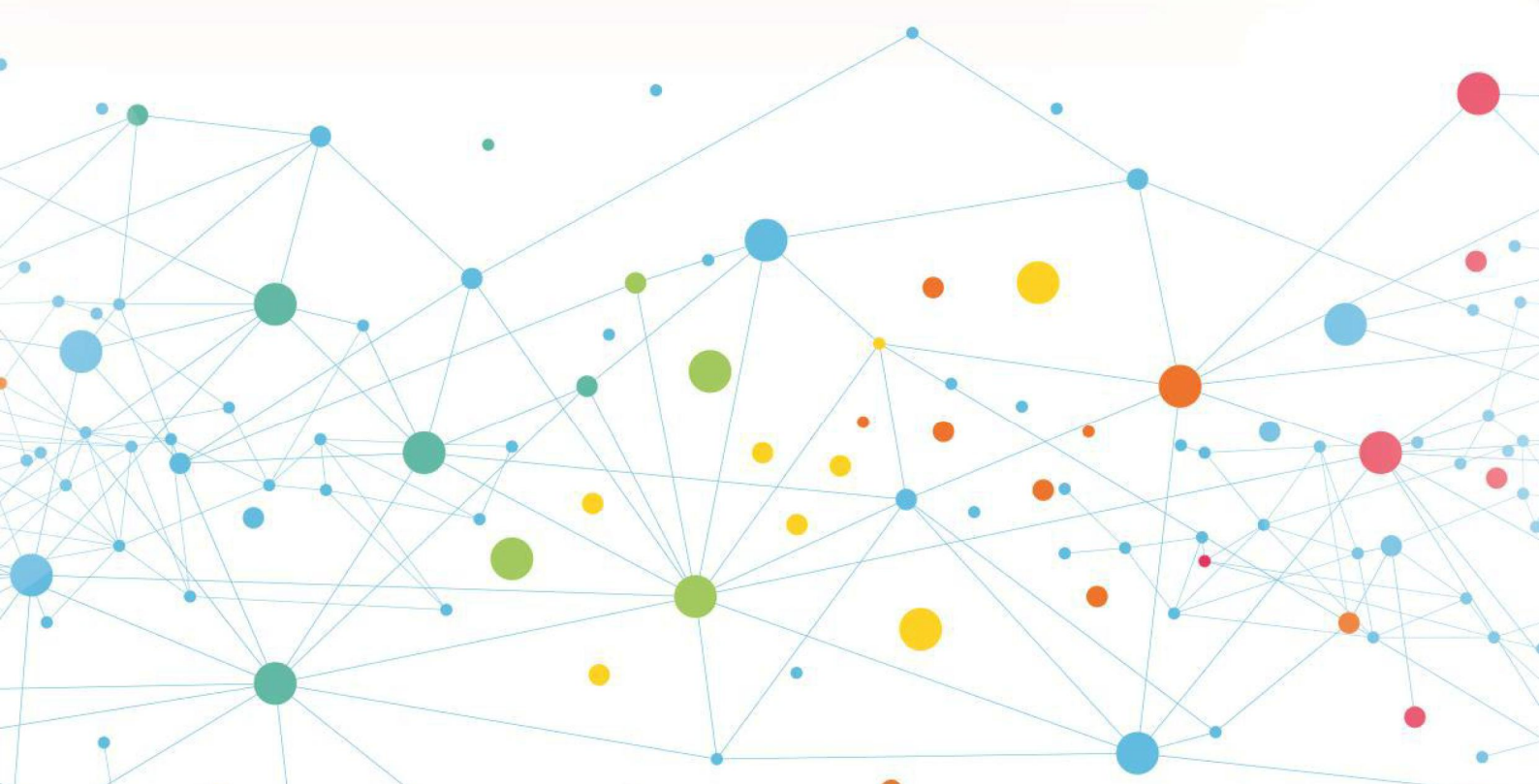
Big Data & Analytics
What it means for HR

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WHAT IS BIG DATA ANALYTICS (BD&A, and how is it impacting the management of talent in organizations? BD&A is not a new concept, but recent advances in technology, including how data is captured and managed and the statistical methods available for analyzing the data have accelerated the breadth and depth of analytical capabilities in the HR function. BD&A have provided useful insight in fields such as Marketing and Consumer Research and Investment Management for several years. What is new is that HR is now entering the playing field of BD&A, and this is arguably one of the biggest advancements in HR in many years.

What is Big Data all about? It's primarily about three elements:

1 The amount of information available: "90 percent of all the data in the world has been generated over the last two years" (*sciencedaily.com*)

2 How data is analyzed: New forms of analysis are being driven by wildly increasing amounts of data

3 The new convergence of capabilities: Big Data is very interdisciplinary, including business, information technology, statistics, behavioral sciences, and marketing to name a few

We use the four V's to describe what Big Data is and what it is not:

VOLUME: The number of records, or the frequency of measured events

VARIETY: Data comes in structured and unstructured forms, such as documents, emails, text messages, videos, sounds, traffic, point-of-sale transactions, location, movement, weather, images, demographics, clicks, etc.

VELOCITY:
- **Latency**—the length of the interval between new data points, as in milliseconds to years
- **Speed**—how quickly data travels from one point to another

VERACITY: Correctness, accuracy and credibility of data

Within the HR world, there is more data available than ever before, but much of this data has been untouched over the past several years. The primary reasons for this have been difficulties in integrating data from different sources, cleaning and validating data to ensure accuracy, and the inability to analyze the data due to a lack of proper statistical tools and/or the lack of technical expertise to run the statistics. For HR, the typical data found in a Human Resource Information System (HRIS) are displayed in Table 1. Reviewing this table, we can't help but conclude that "Okay, so HR data really isn't that big, at least in comparisons to other fields."

We looked at the amount of data in one company's HRIS, a company that had more than 100,000 employees, and found 200 million records of weekly events over an 11 year period. In comparison, a wireless provider with 100 million customers creates over five billion records per day. The gist of this is that HR does not have Big Data by other disciplines' standards, but it is big for HR and will continue to grow. Imagine if all of the employees in a company wore sensors and had all of their interactions and communications tracked. We would then be working with much bigger data to understand interaction patterns and how employees create and work within their

TABLE 1. TYPICAL DATA IN AN HRIS SYSTEM

Category	Data Elements
Hiring	Hiring source, scores at time of hire, new/rehire
Compensation	Current pay, pay growth, pay relative to market, work group variability in pay
Benefits	Eligibility for, enrollment in, number / type of dependents, value of
Career dynamics	Time since last promo, internal mobility, tenure, time in position, leaves
Work status	Part-time / full-time, on-site/remote, contract
Performance	Performance ratings, productivity indicators
Workplace	Division, department, size of work unit, unit chum, work group demography
Leadership	Tenure of leaders, leader performance, distance from leader, span of control
Cognitive / affective	Employee engagement, intent to quit, trust in management
Demographics	Age, tenure with employer, ethnicity, gender
Location	Home address, work address serve as gateways to extensive context data
Training	Courses taken, types of courses, degrees / credentials earned since hire
Job attributes	Competencies, position in career ladder, links to O*NET data

interpersonal networks. Believe it or not, these types of data collection activities are already happening, albeit on a small scale.

Even today, with the HR data that is available, advanced analytics are being performed to guide decisions on the management of talent in organizations. Many organizations are building their own HR Analytics teams and investing in the tools and resources, including human resources, to leverage the ever-increasing amount of HR data. In many instances, HR data is being supplemented with important business data that is housed outside of the HRIS, including productivity, sales, financial performance and customer satisfaction and loyalty. Together, analytics on these data can provide important insights for HR interventions that can impact key business outcomes. Armed with this information, HR is now being brought to the table to determine how to improve business performance.

THE "TALENT ANALYTICS MATURITY CURVE"

The type and amount of data that is available is one element of BD&A, but just as important are the methods used to analyze the data. There is a continuum of sophistication and complexity in the methods that can be used, ranging from purely anecdotal information that is subjectively analyzed, to complex statistical procedures applied to historical data that can determine cause and effect relationships. We refer to this range of approaches as the "Talent Analytics Maturity Curse," which is depicted in Figure 1.

Most organizations today operate as high as the middle of the maturity curve, analyzing data with descriptive statistics that describe the what has already taken place, comparing data with benchmarks, and/or running correlations between different variables to identify relationships. Increasingly more organization are beginning to do more advanced analytics, which can include a variety of "predictive" methods, including multiple regression analysis, time-series analysis, machine learning, and data mining. These methods analyze current

FIGURE 2. MAKING THE CASE FOR BUSINESS IMPACT
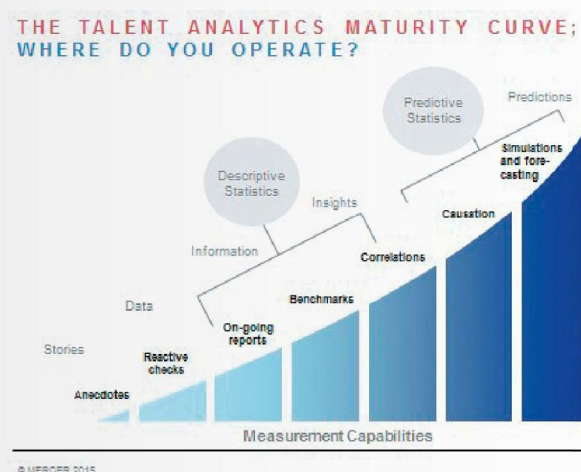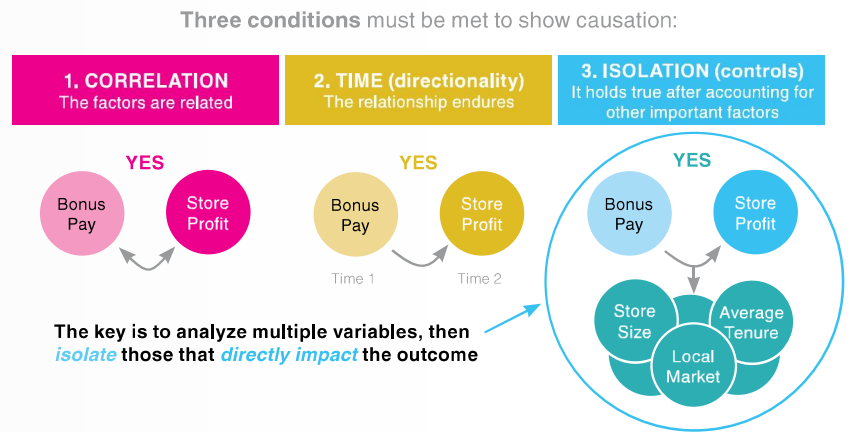
Three conditions must be met to show causation:

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and historical data to make predictions about future or otherwise unknown events. However, operating at the upper end of the curve does not suggest that the other types of analyses are not still valuable. The most value can be gained by operating across the continuum.

One example of how interdisciplinary data, along with advanced statistical methods, can be analyzed to provide insights on business performance involves the impact of pay practices on profitability. As an executive, let's assume you believe that your company's bonus allocation scheme contributes to greater profitability in your stores. However, you know that other things can affect store profitability as well—things like location, size of store, mix of products, marketing spend, etc. How can you know for sure what impact the bonus scheme has on profitability, separate from the impact of these other factors? A statistical technique called multiple regression analysis is one method that can be used to address this question. As Figure 2 shows, three conditions must be met in order to determine a cause and effect relationship and to isolate the unique impact of one variable on an outcome. Multiple regression analysis controls for the effect of each predictor variable, which in this case are all of the variable we believe influence store profitability, so that the unique predictive value of each variable on the outcome can be identified. The "Time (directionality)" sequence of the data can identify which variable comes first in the relationship, or which variable predicts the other. Figure 2 conceptually depicts how we can test whether the bonus scheme does in fact predict or "cause" improved profitability, and what portion of improved profitability is driven by the bonus scheme versus the other factors.

ILLUSTRATIONS OF ADVANCED ANALYTICS IN HR

- A hospitality firm that operates different brands was interested in understanding how best to use compensation—specifically, base and bonus pay—to enhance the profitability of its properties. The company analyzed, through predictive modeling, how the differences in property profitability related to expenditures for base and bonus pay by property. In the analysis many

FIGURE 1. THE TALENT ANALYTICS MATURITY CURVE

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other factors known to influence the profitability of a property were accounted for, such as location (e.g., city center versus suburban), years since the property was last refurbished, distance to a competitor establishment, and characteristics of the workforce such as the average tenure of employees at a property. The company found that for certain brands higher base pay contributed more to profitability than did larger bonus payouts. For other brands, however, bonus pay influenced profitability more than did base. These findings made sense because the different brands offer different levels of customer service and compete for talent in different local markets. As a result, the company was able to tailor its compensation practices to maximize business results across brands.

- There is more to workforce management than pay, of course. A national restaurant chain used a predictive modeling approach to gain insights into how workplace conditions and events affected profitability and customer experiences. After accounting for important factors such as size of a restaurant and location, for example, the company found that employee turnover drove down restaurant profitability and customer satisfaction scores.

Timely completion of the employer's training programs were shown to increase profits and raise customer satisfaction. The analytics established more than the direction of the relationship. The analytics also established value—that is, how much profits would be expected to rise for each percentage-point reduction in turnover, for example, and how much profits would be expected to rise if all employees completed their post-hire training programs. This was critical information that the company used to properly scale its investments in training and retention relative to expected returns.

BD&A is here to stay in the HR world. It can be applied to a wide range of workforce management issues. Above all, it is an approach that empowers HR executives with insights and strong businesses cases for action. •

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