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All roads lead to...prescriptive analytics

Technology › Prescriptive Analytics

What can Prescriptive Analytics do?

Prescriptive analytics optimizes decision-making to show companies what actions to take to maximize profitable growth, given their business constraints.

Business Analytics is critical to managing and optimizing enterprise performance – whether it's the ability to quickly spot new trends, predict the behavior of key variables or support critical operational, tactical and strategic decisions.

Business Analytics includes:

- **Traditional business intelligence (BI) technology**, which is used to understand the past

- **Predictive Analytics**, which leverages statistics to help understand what might happen

- **Prescriptive Analytics**, which helps business managers translate

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What is Prescriptive?

Business Intelligence (BI)

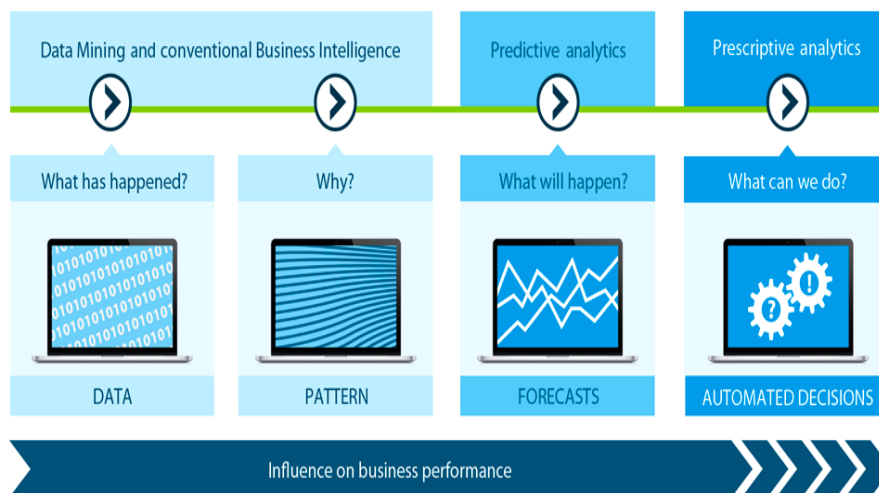Predictive Analytics

Prescriptive Analytics

As companies progress their use of Business Analytics, they derive exponentially more value – especially as their orientation shifts from historical to forward-looking. With this frame of mind, they are able to leverage Prescriptive Analytics to translate data into actionable, optimal plans.
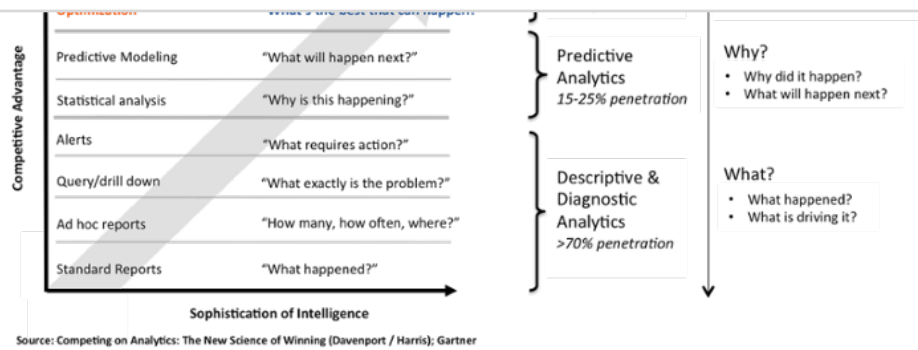
The increased level of sophistication requires advanced planning processes and performance management policies to properly identify the opportunities, as well as cross-functional collaboration to implement decisions.

The figure below illustrates the different types of analytics capabilities available:

Note that it is not required to start from the left (data mining and convventional BI) – in fact, a best practice is to work backwards from use cases/decisions that need to be supported, and then build Prescriptive Analytics models around these decisions. The models can then be used to identify data management, predictive and reporting capabilities required to support a full planning and performance management process.

What do these analytics categories represent in more detail? It's helpful to understand the evolution of Business Analytics as it relates to the impact of each category.

Source: Competing on Analytics: The New Science of Winning (Davenport / Harris); Gartner

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Business Intelligence (BI)

In the context of business analytics, BI's primary use is to aggregate transactional - historical - data into meaningful pieces, which can be used to track performance, identify issues that need attention and deliver clean and timely information for planning and decision-making. In this way, BI serves as the calculation engine to measure "actual" performance.

BI also includes other pieces of information, such as master data about the business, forecasts for known variables (e.g., headcount, capacity, salaries) and targets that drive performance scorecards.

There are two primary types of BI uses - Descriptive and Diagnostic Analytics:

1. **Descriptive Analytics**

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data, descriptive analytics supports standardized and ad-hoc reports, scorecards, alerts and basic "slice and dice" tasks. In combination with workflow and business process management, descriptive analytics technology can also be used to aggregate and roll-up information from multiple inputs in planning scenarios, such as budgeting.

2. **Diagnostic Analytics**

   These technologies help business users understand why something is happening in a user-friendly manner. Business users can quickly group information in multiple ways and visualize it in various charts and graphs. This helps uncover root causes (e.g. deviations from target, outliers) that may result in unment performance expectations. It is typically supported by in-memory visualization technologies.

When used for their intended purposes, BI models are excellent at helping users understand what has happened and why. Nevertheless, a BI model (descriptive or diagnostic) should not be used as the calculation engine for forward-looking scenarios, as it is sure to provide infeasible or suboptimal plans, as well as incorrect information about potential upsides and risk.

Furthermore, users will likely miss important insights that would have otherwise led to additional performance improvement opportunities.

Predictive Analytics

Through a variety of statistical modeling approaches, Predictive Analytics helps businesses predict the behavior of key variables that are unknown, yet have significant impact on the performance of the business. The most obvious case is predicting demand (including volume and prices) in various forms, and additional factors such as:

- Input prices
- Currency movements
- Risk (via weather or other variables)

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marketing.

Predictive modeling yields useful results when causal drivers are identified, and when the past behavior of the drivers, as well as their relationship to the main variable forecasted, are stable. Predicting the future is more challenging when there are a lot of random elements (e.g., when there are multiple causal drivers, and they behave unpredictably), and/or when there are significant discrete events (e.g., a market disruption or a significant equipment failure) that happen very infrequently.

Prescriptive Analytics

Prescriptive Analytics translates a forecast into a feasible plan for the business, and helps users identify the best steps to implement. There are two primary approaches – simulation and optimization.

Simulation is best used in design situations, where it helps users identify system behaviors under different configurations, and ensures all key performance metrics are met (e.g. wait times, queue length, etc.). **Optimization** supports ongoing operational, tactical and strategic business planning; it leverages linear programming to identify the best outcome for a business, given constraints and objective function.

When applied to broader tactical (e.g. S&OP or Integrated Business Planning) or strategy planning scenarios, the optimization model is used to calculate the impact of various forecasts (some from predictive analytics engines) on the business. It does so while also taking into account operational realities in the form of constraints. Constraints include:

- Capacities in the form of headcount or production
- Regulatory requirements
- Emissions
- Financial limitations; borrowing or working capital).

Advanced optimization models combine the value chain (including key constraints) with financials, to provide much

infeasible outcomes. In addition, they support unique analyses, such as contribution margin, activity based costing and pro-forma financial statements, which help users find and execute optimal decisions.

The speed of change is increasing. Prescriptive analytics helps finance leaders and their companies react quickly to proactively shape desired outcomes.

Philip Higginbotham, National Director of Analytic Solutions, Grant Thornton

See how prescriptive analytics is

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