



IBM Decision Optimization on Cloud

Prescriptive Analytics is the fastest path to value from data. Indeed, organizations that are successful in leveraging big data and analytics are those who are ready to act on whatever insights are found in data. Such organizations transform the way they operate to benefit from actionable insights derived from their data. Unfortunately, many organizations fail to recognize this, and focus their investment in Big Data alone, i.e. data acquisition, data storage, data management, and data analysis. While these are useful and necessary steps, they miss a key part: the need to act on insight found in data. This is well stated by Seth Godin¹:

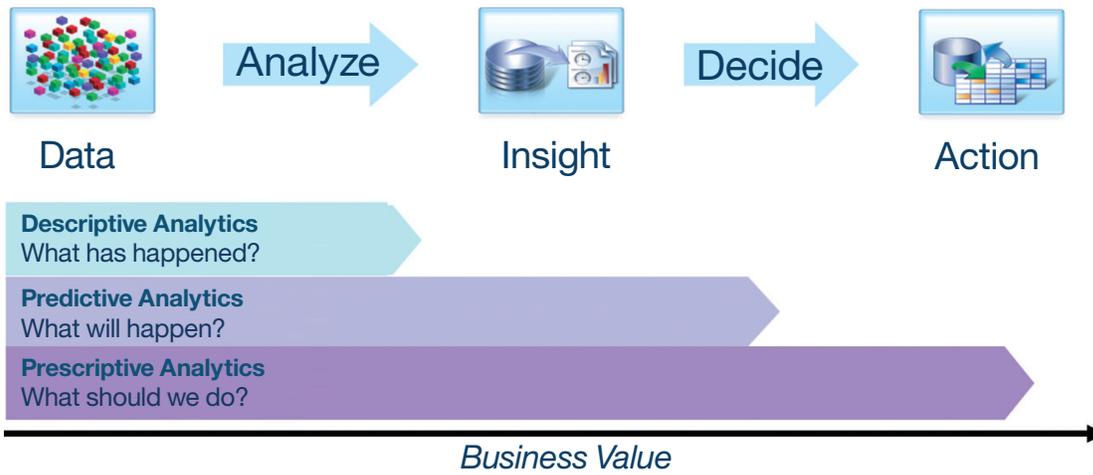
Don't measure anything unless the data helps you make a better decision or change your actions.

On the other hand, if the insights point to changes in the organization, such as business processes, and these insights are not put to action, then what is the point of the analysis? Indeed as Godin said:

If you're not prepared to change your diet or your workouts, don't get on the scale.

Therefore, any Big Data investment should consider the end-to-end process from data to business actions. This is called the *analytics journey*.





The Analytics Journey²

Over the years, many tools and technologies have been developed to support this analytics journey. It first started with tools aiming at understanding data via dashboards and query/drill-down tools. These tools include Business Intelligence tools (BI), as well as OnLine Analytical Processing (OLAP), and are grouped in the *Descriptive Analytics* category. They help answer questions about the past and current state of the business. For instance, a regional sales manager might study reports on sales for the week, then zoom in on a particular store or study a specific product (SKU) sale.

A second category of tools aim at analyzing data to discover patterns and trends. These tools are rooted in statistics and machine learning technology and are grouped under the name of *Predictive Analytics*. To continue with the sales manager

example, predictive analytics could be used to automatically find sales drivers, which in turn are used predict future sales. The sales manager can then adjust his actions to take the predicted sales levels into account. More generally, predictive analytics help decision makers understand what will happen in the future (hence “predictive”).

A third category of tools focuses on the action part. These tools are rooted in operations research and decision management technologies, and are grouped in the *Prescriptive Analytics* category. In the sales example, prescriptive analytics could be used to plan replenishment for all stores and all products in order to meet forecast demand while minimizing inventory costs. More generally, prescriptive analytics helps answer questions about what action should be taken.

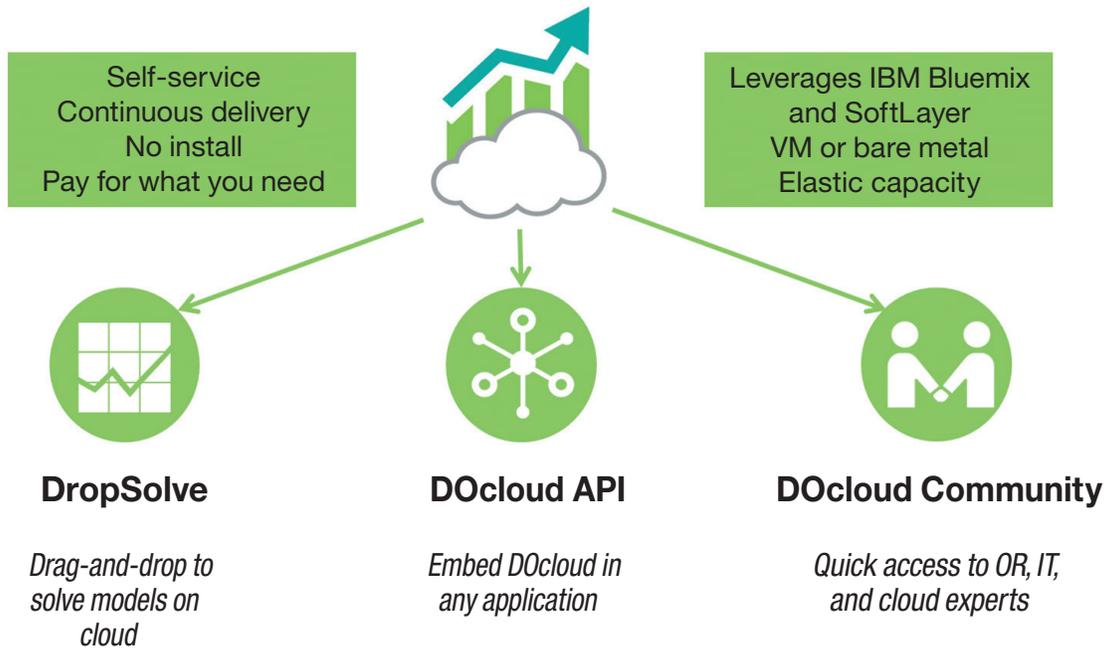
In summary, each of the three analytics categories address a different piece of the analytics journey, and they complement each other.

IBM Decision Optimization is one of IBM’s Prescriptive Analytics offerings. It includes the market leading IBM CPLEX Optimization Studio product, and is designed to make the most out of your Big Data investments by helping find the best actions to take, given a current state of the business and, optionally, predicted data.

IBM Decision Optimization is a proven technology with over 25 years of successful use in mission critical applications across all industries and activity sectors. Examples of common business applications can be seen in Table 1. Most of these applications produce plans or schedules. Some produce optimal prices, store layouts, stock trades or other sets of decisions. These business problems can be thought about using a three-category framework — long-term economic planning, short-term production/delivery planning, and detailed scheduling. This framework is often used when discussing problem types and requirements.

Manufacturing	Transportation and Logistics	Financial Services	Utilities and Natural Resources	Telecom	Multiple and Other
<ul style="list-style-type: none"> • Inventory optimization • Supply chain network design • Production planning • Detailed scheduling • Shipment planning • Truck loading • Maintenance scheduling 	<ul style="list-style-type: none"> • Depot/warehouse location • Fleet assignment • Network design • Vehicle and container loading • Vehicle routing and delivery scheduling • Yard, crew, driver and maintenance scheduling • Inventory optimization 	<ul style="list-style-type: none"> • Portfolio optimization and rebalancing • Portfolio in-kinding • Trade crossing • Loan pooling • Product/price recommendations 	<ul style="list-style-type: none"> • Supply portfolio planning • Power generation scheduling • Distribution planning • Water reservoir management • Mine operations • Timber harvesting 	<ul style="list-style-type: none"> • Network capacity planning • Routing • Adaptive network configuration • Antenna and concentrator location • Equipment and service configuration 	<ul style="list-style-type: none"> • Workforce scheduling • Advertising scheduling • Marketing campaign optimization • Revenue/Yield Management • Appointment and field service scheduling • Combinatorial auctions for procurement

Common business applications for decision optimization



Overview of IBM Decision Optimization on Cloud

Prescriptive Analytics as a Service

Prescriptive analytics, unlike other analytics technologies, requires significant computing power. That computing power depends on the size of the business problem: the larger the problem, the more computing resources are required to solve (aka optimize) it. This can lead to poor utilization of computing resources in some cases.

Let us look at a real example for the sake of clarity. One of our customers in the parcel shipping business leverages IBM prescriptive analytics to optimize their logistics. One

issue this customer faces is that there are many more parcels to ship in December than in other months because of the spike in e-commerce around Christmas. Therefore, the logistics become much more challenging in December compared to the rest of the year. This means that their prescriptive analytics application needs larger IT infrastructure in December than in other months. The flipside is that the infrastructure is sized for the December need, and is underused the rest of the year, leading to an inefficient use of capital.

One way to address this poor capital utilization is to shift to a Software as a Service (SaaS) model where one can adjust the computing resource on demand. By using a SaaS offering, our customer could pay for a large computing infrastructure for its December needs, and pay for a much smaller infrastructure (or use its own) for the rest of the year. More generally, Prescriptive Analytics as a Service has many compelling advantages for business organizations, including, but not limited to, the following:

- **Opex.** Costs become operations expense instead of a capital expense (Capex). It is easier to adjust cost to return on investment in that case.
- **Managed Operations.** No need to hire people to install, maintain, and upgrade software, as this is managed by the service provider.
- **Continuous delivery.** Always benefit from the latest version of the technology, instead of having to plan for painful software updates.
- **Elastic Capacity.** This is the ability to quickly scale up or scale down computing infrastructure on demand. This way, infrequent spikes in computational requirements are handled at minimal cost. Indeed, one only needs to pay for a large computing infrastructure when it is actually needed.

IBM Decision Optimization on Cloud (DOcloud) is IBM's Prescriptive Analytics as a Service. It provides unprecedented ease of use for leveraging prescriptive analytics on the cloud via unique self-serve, drag and drop operations as well as powerful APIs to embed DOcloud in any application. It allows users to try, buy, and deploy an optimization service that is tailored to their business needs. It also supports the modern way of developing applications by tying together various web services, where each service provides one piece of the final application. Developers can use the language of their choice (Python, PHP, Java, Ruby, Javascript) to call the service and integrate it in their application thanks to REST APIs.

DOcloud advantages can be summarized as follow:

- **Try, Buy, & Collaborate.** Discover, try, and buy optimization services without any IBM help. Participate in a global user community, with access to Operations Research, IT, and cloud experts.
- **No Install.** Solve optimization models without any local software install or setup.
- **Extend Business Applications.** Use the DOcloud API to include an optimization solve service within applications without the need for IBM support.

For more information

To learn more about IBM Decision Optimization on Cloud, please contact your IBM representative or IBM Business Partner, or visit the following website: <http://ibm.biz/ibmdocloud>

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¹ Source: http://sethgodin.typepad.com/seths_blog/2014/08/analytics-without-action.html

² Source: <http://www.analytics-magazine.org/november-december-2010/54-the-analytics-journey> and ibm.com/developerworks/community/blogs/jfp/entry/the_analytics_maturity_model?lang=en



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