PREDICTIVE & PRESCRIPTIVE ANALYTICS

Analysis methods | Differences | Possible applications

OPTANO

a KEARNEY company

HOW PREDICTIONS AND DECISION-MAKING GO HAND IN HAND WITH MACHINE LEARNING AND MATHEMATICAL OPTIMIZATION

When it comes to optimizing structures and processes, the terms **predictive** and **prescriptive analytics** come up again and again.

In our factsheet, we want to show what is behind these terms, how they can be distinguished from each other, and what practical use cases there are for them.

For the sake of completeness, we will start with Gartner's overview of the different types of analytics and then focus on the ones mentioned above.

What do we mean by predictive and prescriptive analytics? How do they differ and how are they applied in practice?
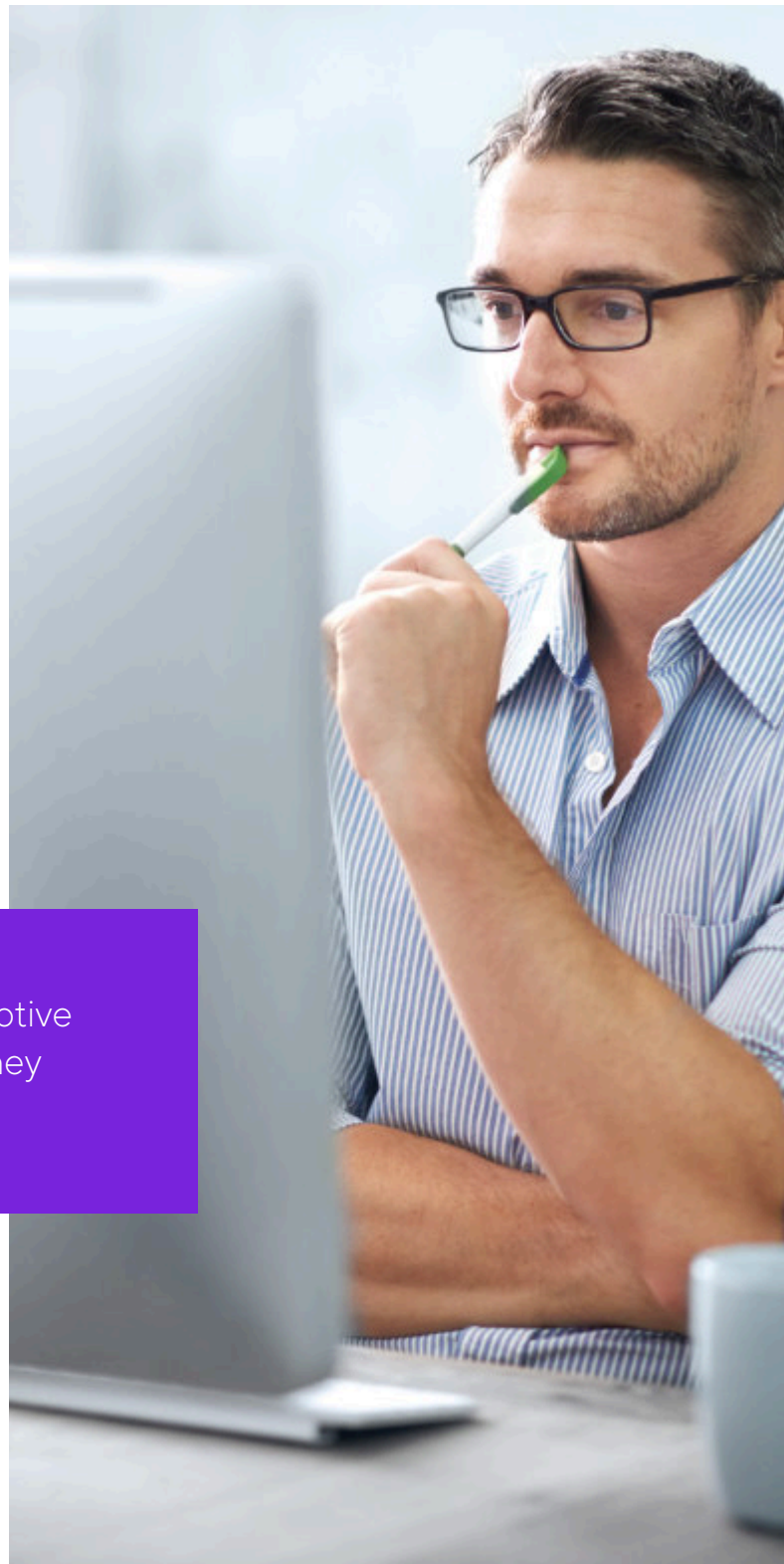
THE FOUR TYPES OF ANALYTICS AS CATEGORIZED BY GARTNER

Gartner differentiates between four fundamental types of data analysis, i.e. Analytics. Each type serves to answer one core question:
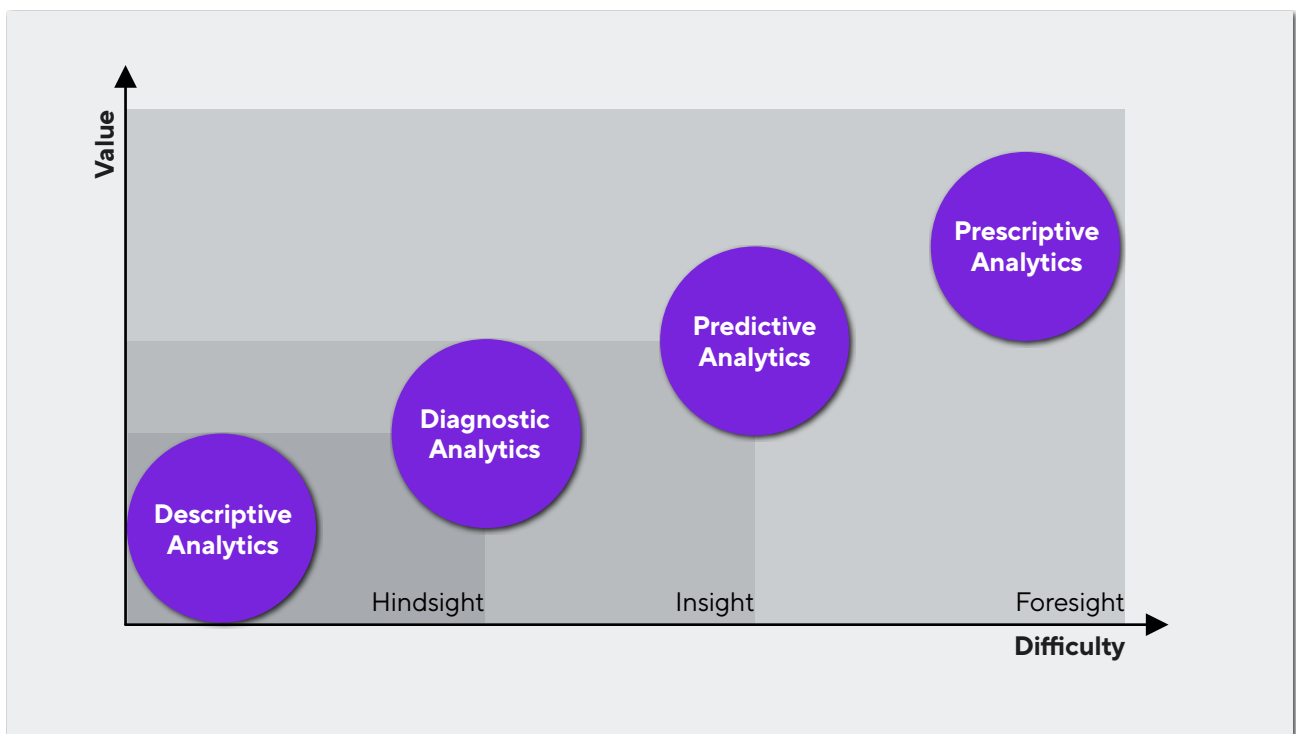

Abb. 001 Analysis types according to Gartner

DESCRIPTIVE ANALYTICS	DIAGNOSTIC ANALYTICS
What has happened?	Why has it happened?
PREDICTIVE ANALYTICS	**PRESCRIPTIVE ANALYTICS**
What is likely to happen?	What should I do to optimally be able to achieve my objective?

On the following pages, we will take a closer look at **predictive analytics** and **prescriptive analytics**.

THE PREDICTION: PREDICTIVE ANALYTICS

Predictive analytics gives us the answers to our question on future developments. For example: by predicting the development of customer behavior or inventories. These predictions are not based on insider knowledge but can be interpolated from the past. Predictive analytics uses **machine learning** procedures to do this. The main procedures here are the different variations of regression analysis.

PROCEDURE

- The largest possible historical datasets form the essential basis. If we look at our example of customer behavior, this could be something like the daily sales volumes of various products over the last few years.

- These datasets are usually broken down into three parts: training data, validation data and test data.

- Machine Learning consists of training a prediction. This is the actual regression analysis. Based on the training data, the prediction will be trained until it can predict the data.

- If the prediction is satisfactory, it will then be tested on validation data. This is to make sure that the prediction is not too closely aligned to the specific training data. If necessary, the training will be refined.

- If the model has been sufficiently well validated, it will again by checked using the test data. Just like before, this is done to prevent the prediction becoming too closely aligned to the specific data.

Only when the prediction can forecast the test data, will it be deployed for the prediction of future data. The idea: behavioral patterns such as seasonal or weekday purchases (in keeping with our example above) now project the prediction into the future.
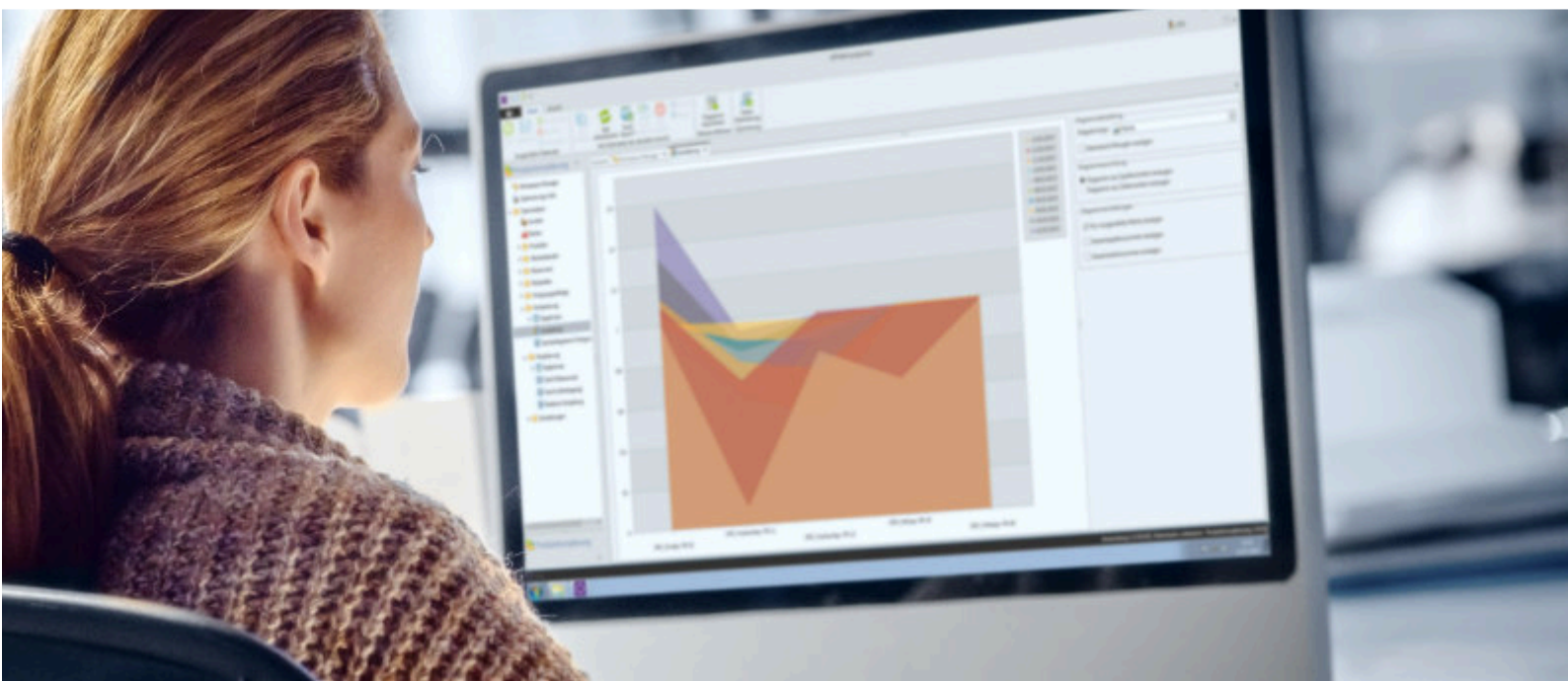
ADVANCED PLANNING: PRESCRIPTIVE ANALYTICS

Prescriptive analytics answers the question: which decisions are the best ones in order to achieve a certain objectivel in the future? Such objectives could be determining storage sizes or delivery cycles in order to satisfy the predicted customer demand as cost-efficiently as possible.

Mathematical optimization is used to do this. The central component of this is the formulation of known correlations such as inventory costs or constraints, delivery and CO_2 costs. Using these correlations as a base, a goal is formulated such as cost reduction while simultaneously meeting customer requirements. The following scheme is applied:

PROCEDURE

- Determining the **decisions** to be made
- Determining the **objectives** to be optimized
- Determining the **constraints** that need to be observed

The formulation is typically done using a **mathematical model**. Specialized software is then able to calculate the best decision in compliance with all the constraints.

THE BEST OF BOTH WORLDS: PREDICTION MEETS PLANNING

Predictive and advanced planning analyses; i.e. predictive and prescriptive analytics, each have their own use cases. Yet, there is often not enough data available for them to make future decisions, such as how customer behavior will develop over the coming years. This is why reasonable assumptions are often made instead.

OPTANO has now combined the best of both worlds. The Predictive Blueprint enables predictions to be trained and regressions analyses to be conducted without requiring any prior knowledge of programming. In this way, we can learn from the past and extrapolate the future.

With OPTANO we can now directly use the results of our predictive analytics in prescriptive analytics, that is, in the implementation of optimization models to plan the best decision. Thus, optimal planning is based on the best possible prediction of the future using our knowledge of the past.

WOULD YOU LIKE TO LEARN MORE?

Are you interested in a free-of-charge OPTANO demonstration or would you like to have an informal meeting about the possibilities mathematical optimization has to offer in your company? We're here to help!

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OPTANO provides innovative solutions, enabling businesses to plan faster, better and more easily. Thanks to mathematical optimization, OPTANO finds the optimal solution to any problem.

.OPTANO is customized to suit your specific needs. Whether you want to optimize your supply chain, your entire network or your production plans, OPTANO makes your planning process efficient, clear and flexible.

 And that's not all: OPTANO supports you in your strategic decisions using Prescriptive Analytics. This means that you can consider various options in what-if scenarios and get sound recommendations for action - based on the sound analysis of your data and targets.

Visit us at **www.optano.com** and find out how we can take your planning to the next level together.

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