

OR, the missing link in Data Science



Any other Data Science people?

Merwin de Jongh



'I have a passion for turning concepts into plans and concrete tasks. The combination with my natural love for added value ensures that we always deliver high quality results in time.'

Founder & CTO

**BUILDING
BLOCKS** 

My education and career start are in Operations Research



BSc Econometrics & OR
MSc Operations Research

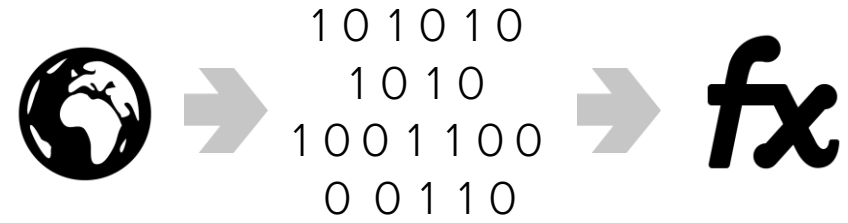


Supply Chain Management

Why not start from the data?



Classic **OR** approach



Data Science approach

The start of Building Blocks...

BUILDING BLOCKS



2013



35

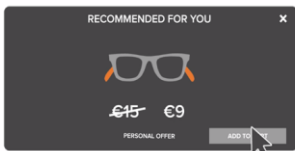


Tilburg
Amsterdam

Consumer predictions for retail and insurance

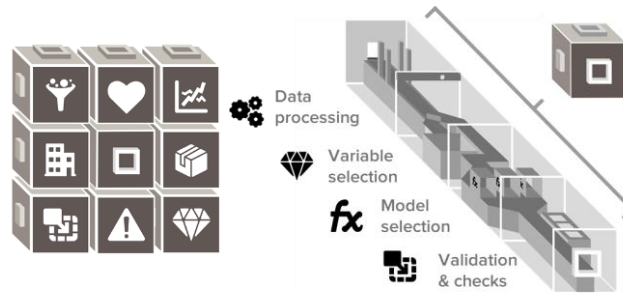


Personal products, promotion ...



...pricing and recommendation

Blocks technology



Market Guide for Data Science and Machine Learning Service Providers **Gartner**

Some clients

corendon.



OTTO



Data driven...



data driven results

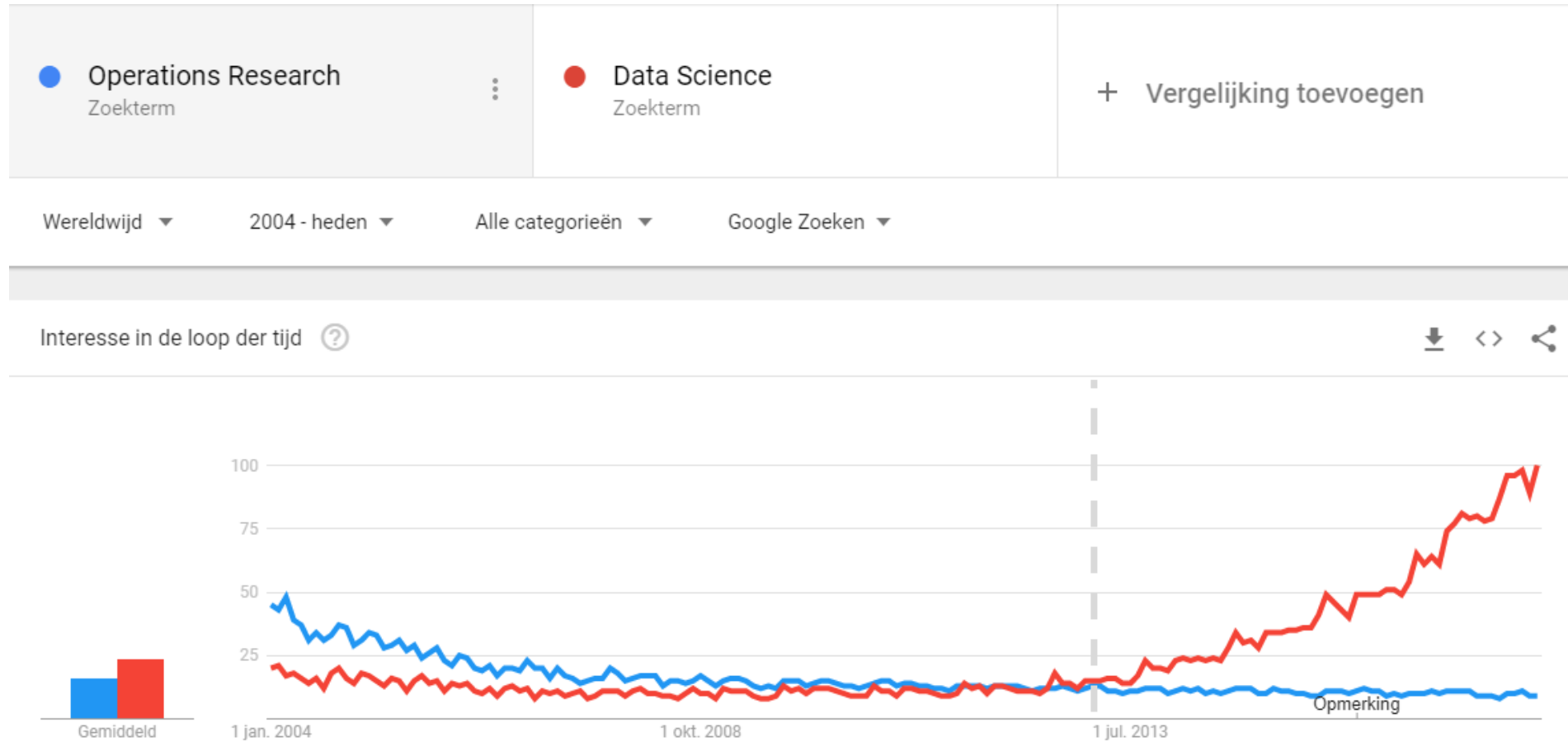
The Google searches for OR drastically decreased...



Source: Google Trends



While Data Science gained a lot of popularity!



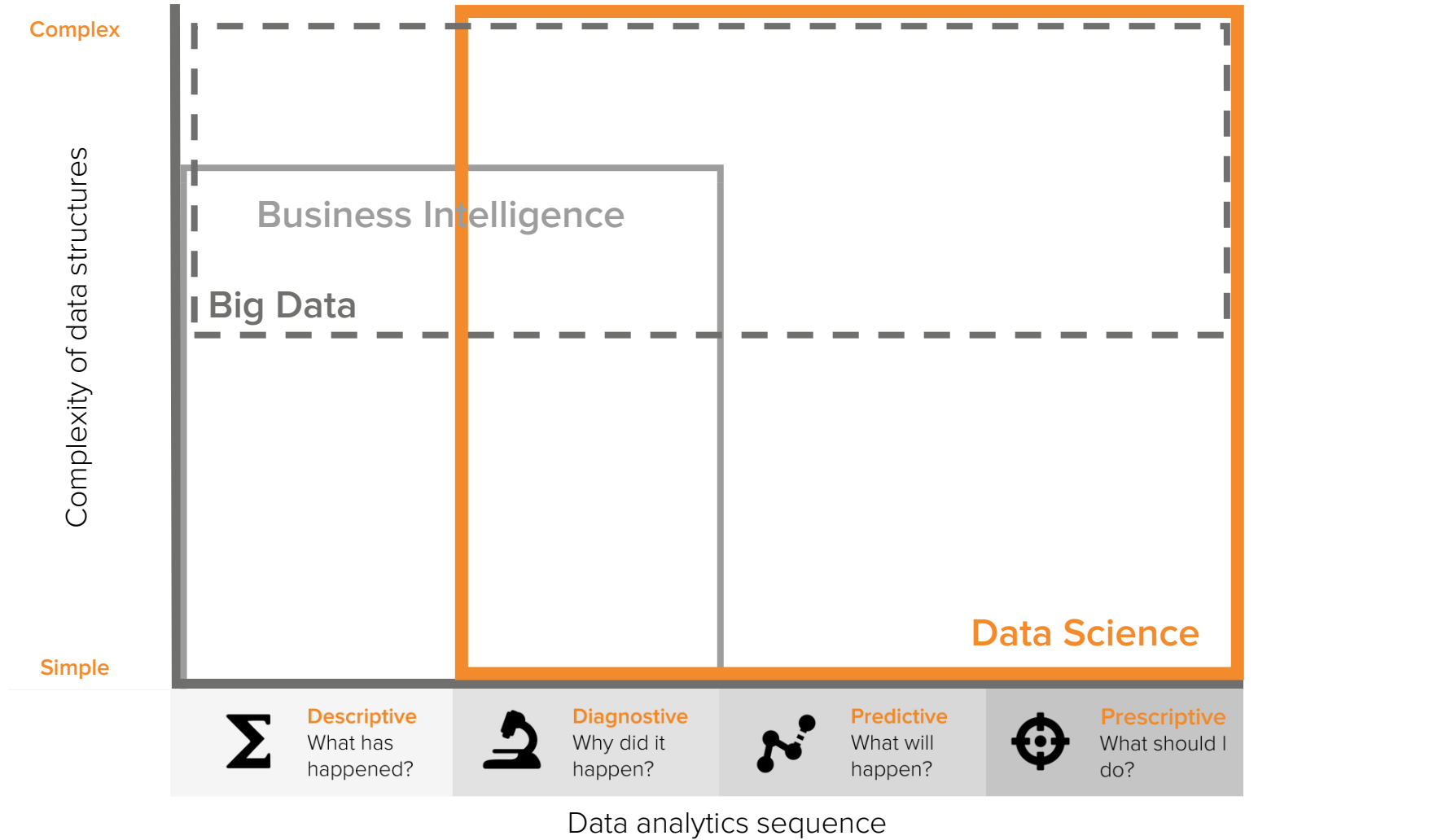
Source: Google Trends

The good news is...

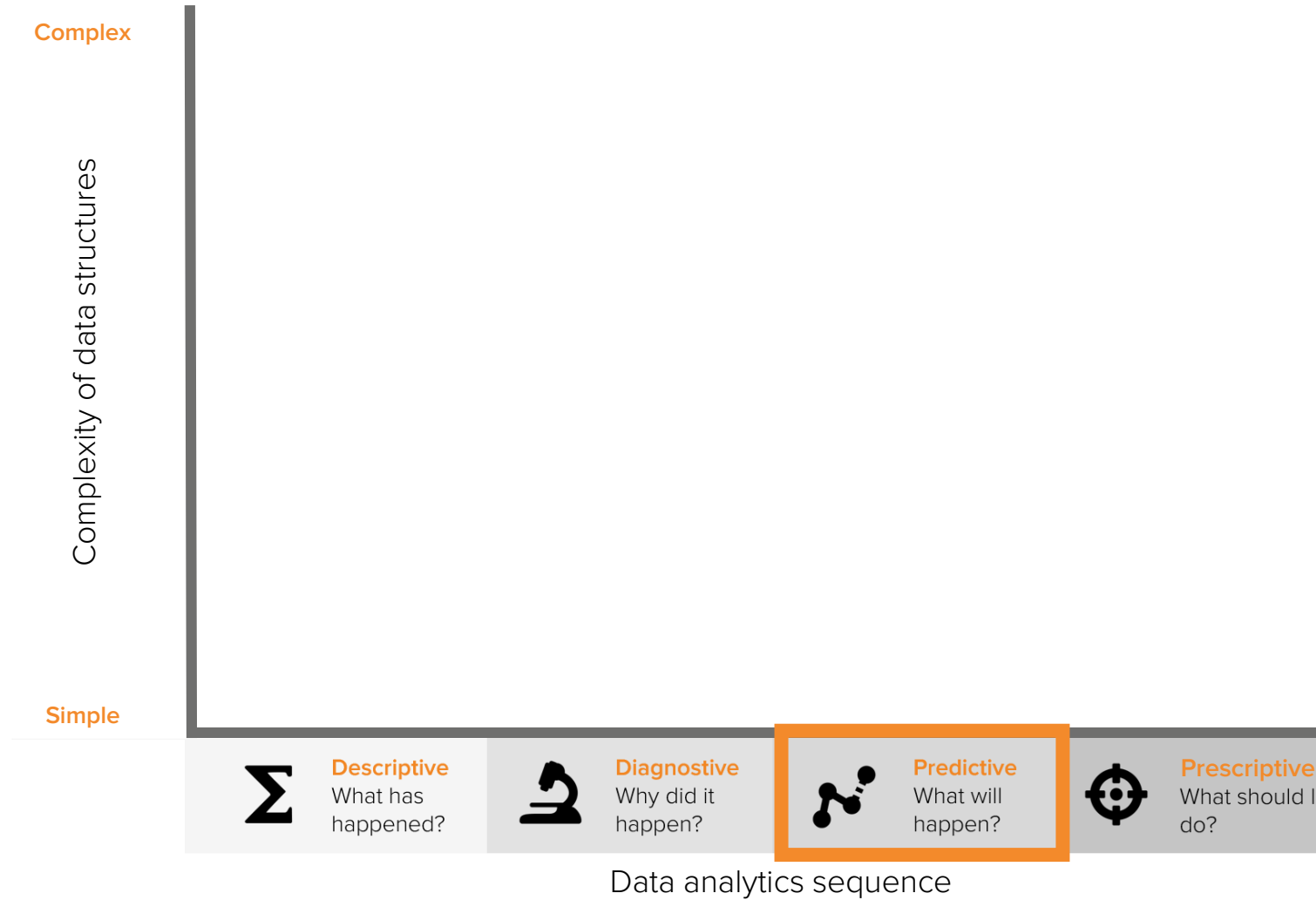
Operations Research

the **missing link** in Data Science

Within Data Science we can split predictive and prescriptive



It often starts with predictive

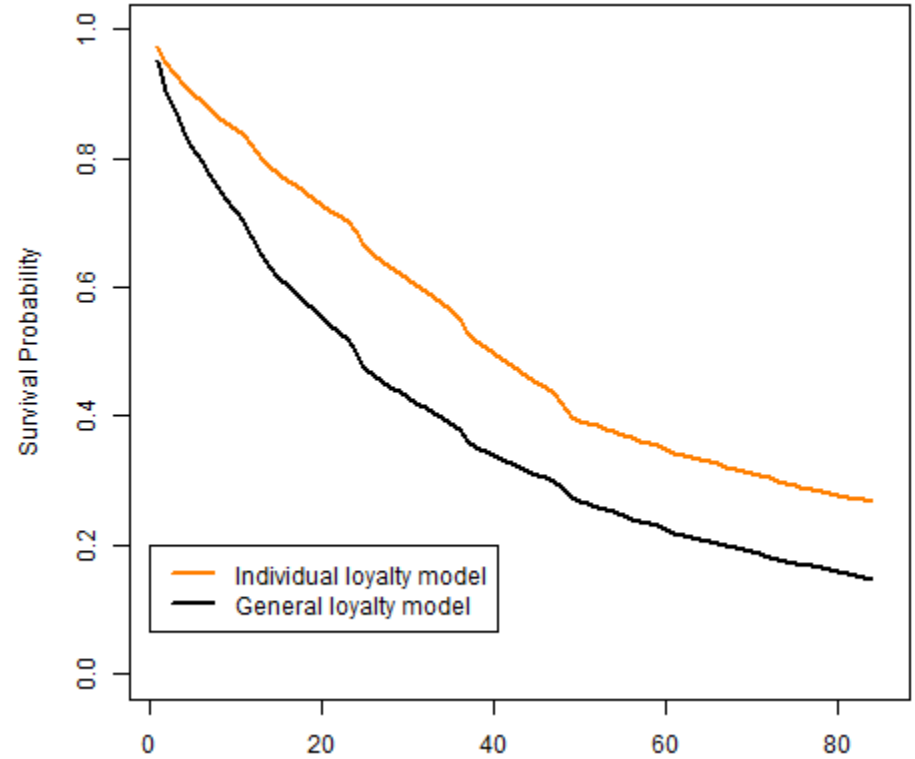


Let's take the example of a car insurer

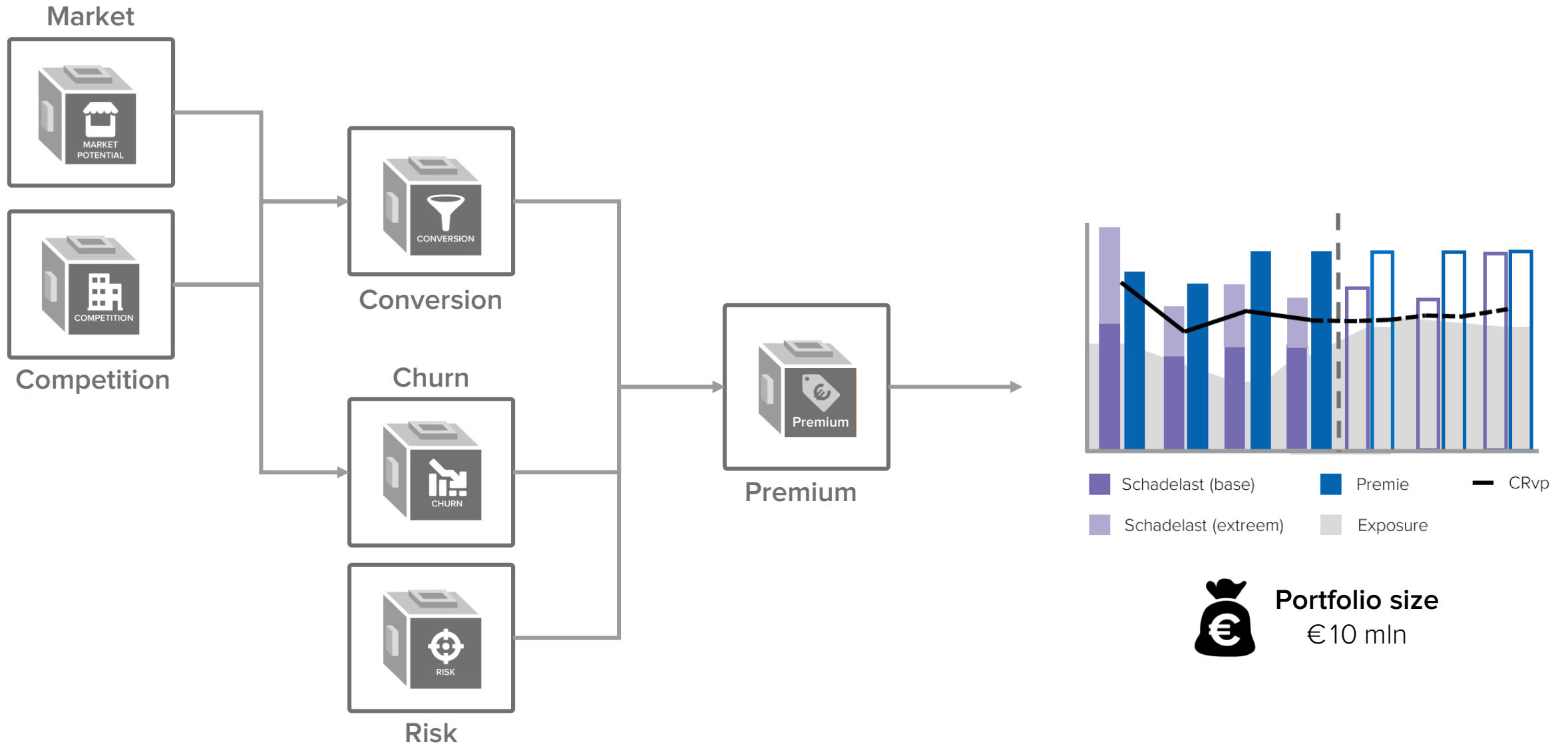


Churn

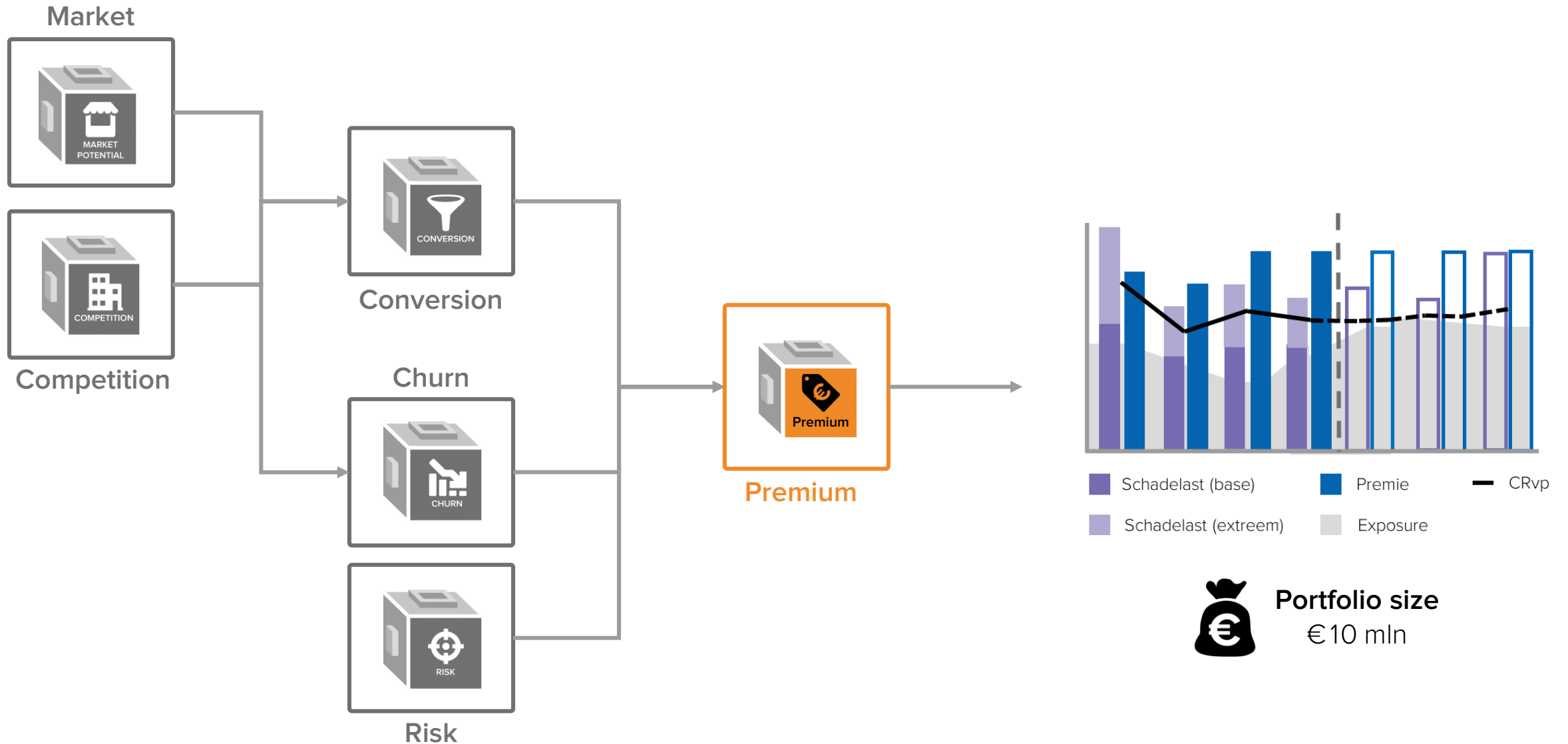
Predict probability of customer staying or churning



Combining the multiple predictive models gives a forecast of your complete portfolio



But you actually want to know the effect of adjusting the prices...



...and find a prescription



...and find a prescription

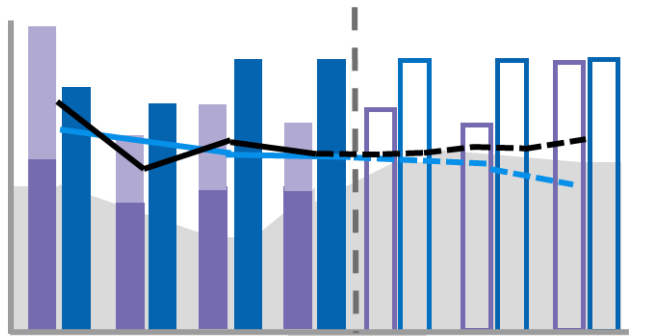


There are lots of possibilities to adjust the premiums



Year < 2005

+10%

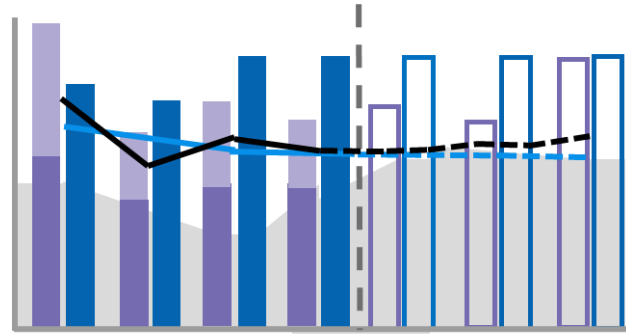


Schadelast (base) Premie CRvp
Schadelast (extrem) Exposure CRvp



Value < €25.000

+10%

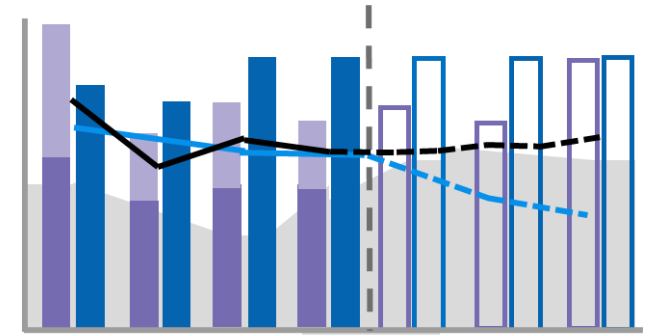


Schadelast (base) Premie CRvp
Schadelast (extrem) Exposure CRvp



Age < 27

+15%



Schadelast (base) Premie CRvp
Schadelast (extrem) Exposure CRvp



Portfolio size

€9 mln



Portfolio size

€10.5 mln



Portfolio size

€8 mln

There are lots of possibilities to adjust the premiums



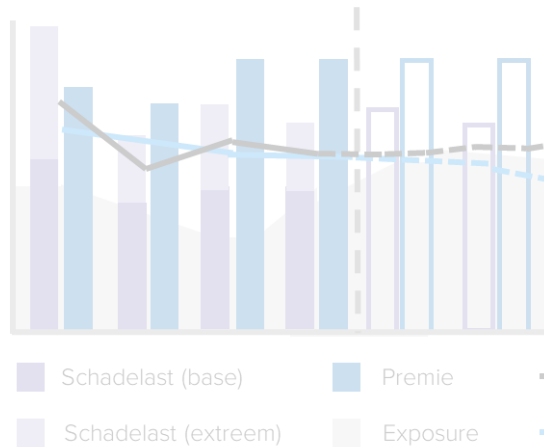
Year < 2005
+10%



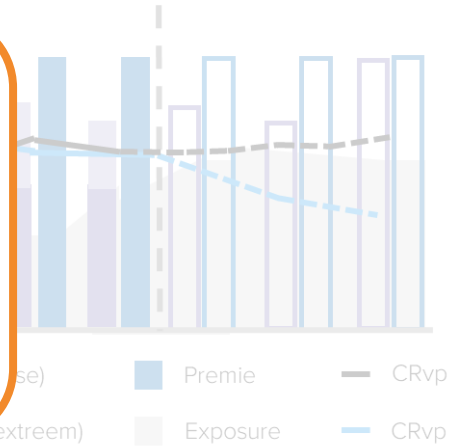
Value < €25.000
+10%



Age < 27
+15%



Many **combinations!**
OR techniques are needed to find the **prescription** for optimal **price change**



Portfolio size
€9 mln



Portfolio size
€10.5 mln



Portfolio size
€8 mln

OR is not always needed to get a prescription



Spanje / Malaga
Torreblanca Hotel
★★★★☆

All Inclusive • april

Het hotel ligt rustig, maar op steenworp afstand van het prachtige zandstrand, de gezellige boulevard van Fuengirola en diverse winkels.

- ✓ Op steenworp afstand van het strand!
- ✓ Ruime comfortabele kamers met (zij)zeezicht
- ✓ Heerlijke tuin met 2 zwembaden
- ✓ Nederlands Kids & Co animatie team



Vanaf €299

Nu bekijken ▶



Ga mee naar Side

va. € 149



Ga mee naar Alanya

va. € 179



Turkije / Cesme

Mi Playa

★★★★☆

All Inclusive • mei

Het 4-sterren All Inclusive hotel Mi Playa ligt in een schitterende baai en direct aan het zandstrand. Het vriendelijke personeel staat voor u klaar om u een fijne vakantie te bezorgen.

Vanaf €349

Nu bekijken ▶

Predictions



Taste

Products that match best with needs of a specific consumer



Timing

Likelihood that a consumer is willing to buy at a given time



Business input



100 seats left for next week to Antalya

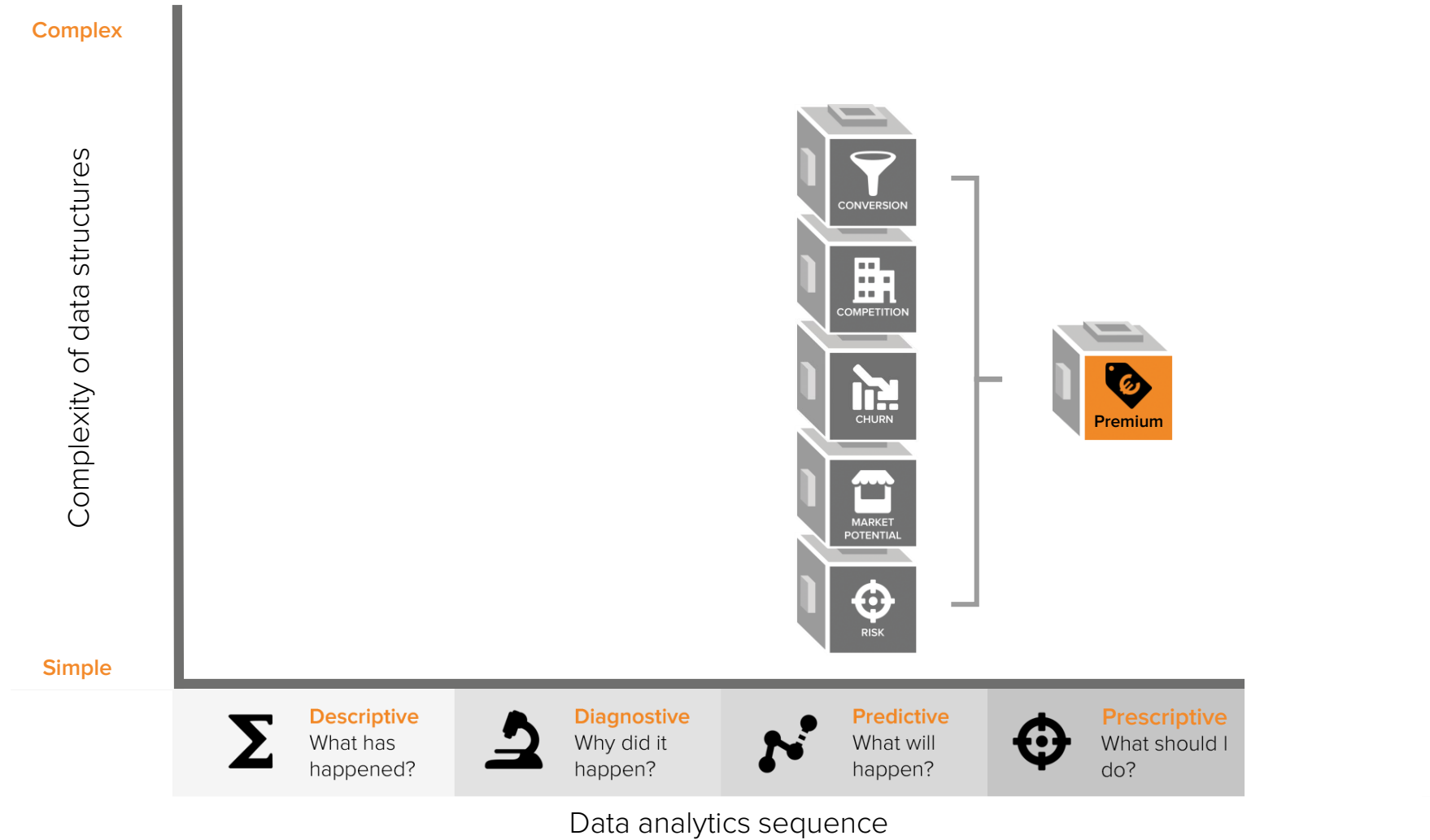


Prescription



Send these 837 customers an email

OR can close the gap between a set of prediction models and a prescription!



This is only the beginning of OR in Data Science

Bridging the gap between predictive and prescriptive analytics - new optimization methodology needed

Dick den Hertog

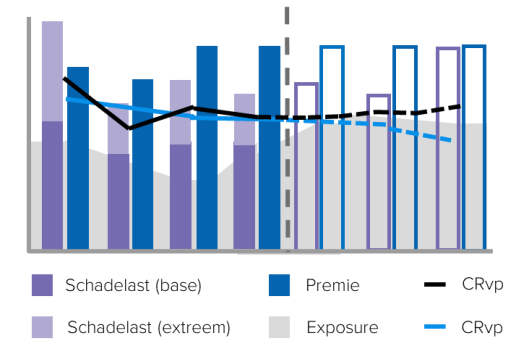
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Business analytics is becoming more and more important nowadays. Up to now predictive analytics appears to be much more applied in practice than prescriptive analytics. We argue that although optimization is used to obtain predictive models, and predictive tools are used to forecast parameters in optimization models, still the deep relation between the predictive and prescriptive analytics is neither well understood nor fully exploited. We describe two opportunities to really exploit the synergy between the predictive and prescriptive part. The first is to perform optimization by directly using the predictive models. Adding optimization functionality in predictive analytics tools could be of huge added value for practice. The second opportunity is to replace manual model building with automated data-driven model building, using modern predictive analytics. The pros and cons for such a way of optimization are also discussed.

Key words: predictive; prescriptive; business analytics; data analytics



A lot of **research** still **needs** to be done!

Thank you! Questions?

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