

Controlling

Accounting & Finance

Unternehmensführung

Information Management

Soziale Kompetenzen



Zukunftsorientiert!

Risk Management & Advanced Analytics From Mean to Probability Distribution

Dirk Radsziwill

„Information is the oil of the 21st century, and analytics is the combustion engine.“

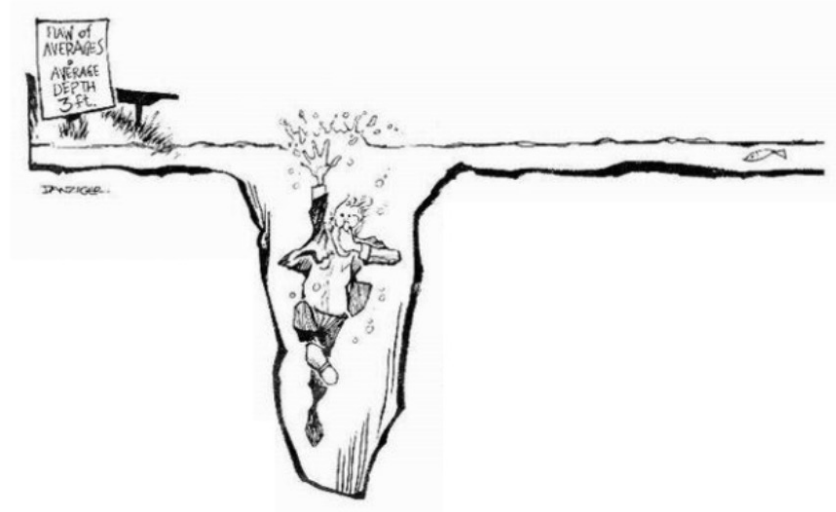
P. Sondergaard

Beware of averages

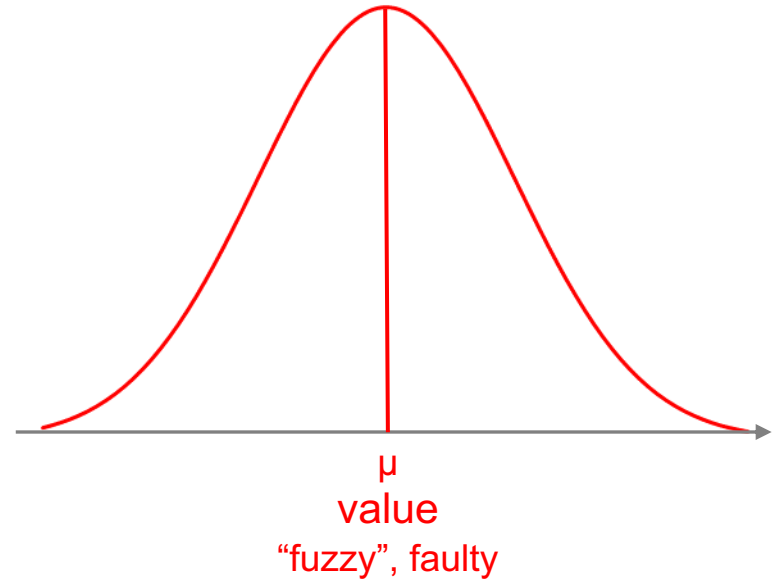
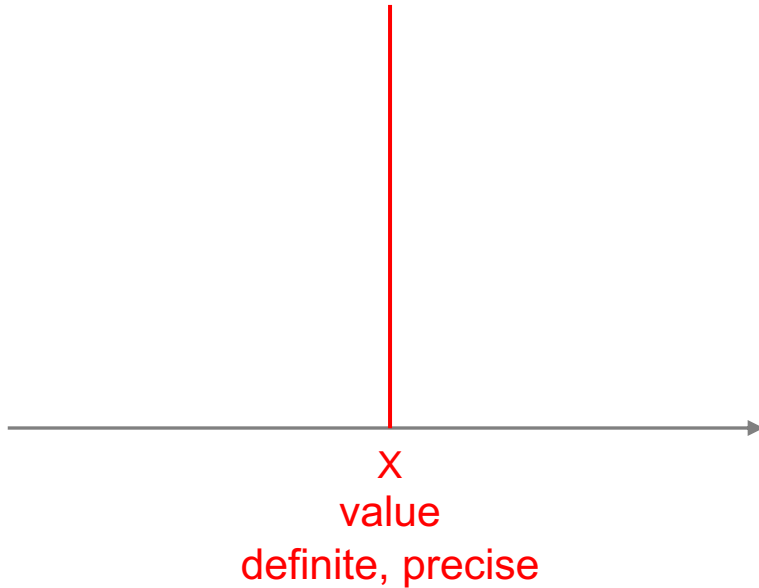


Averages conceal risk.

Range estimates address hidden risk.



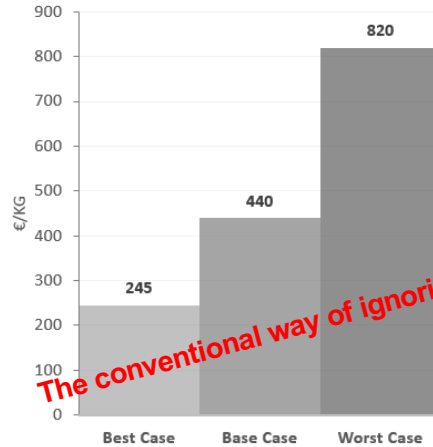
Statistics - the initial situation



Old school vs. new school

„The language of the risk are probability distributions.“

W. Gleißner

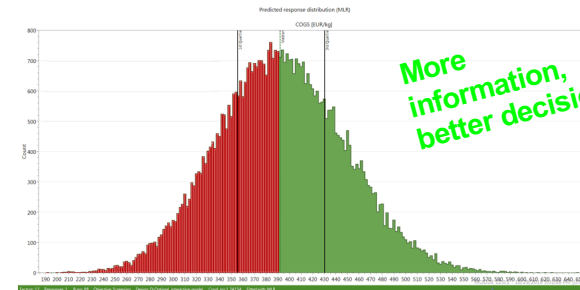


The conventional way of ignoring risk ...

The old way - guesswork

3 possibilities ...

No probabilities ...



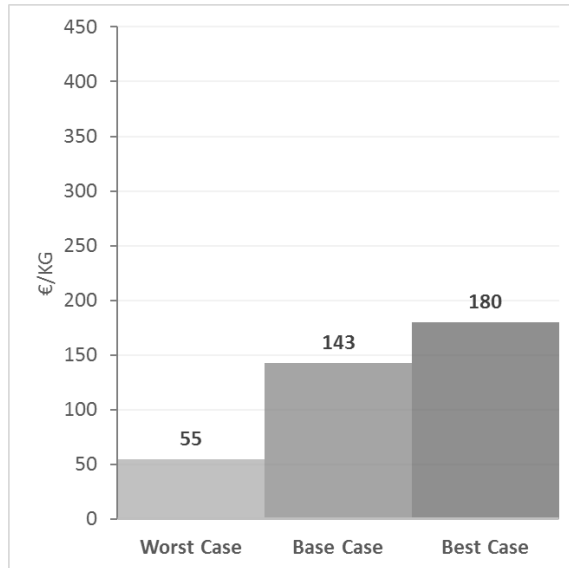
The new way – quantify risk and uncertainty

All possibilities ...

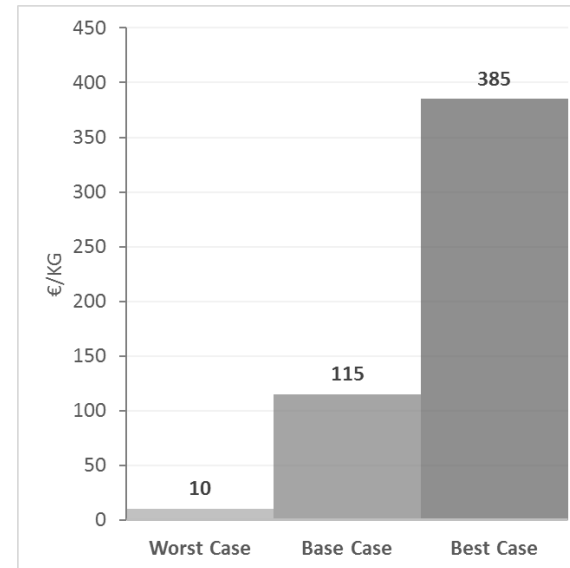
Clear probabilities ...

What if a winner has to be picked?

Business Case 1



Business Case 2

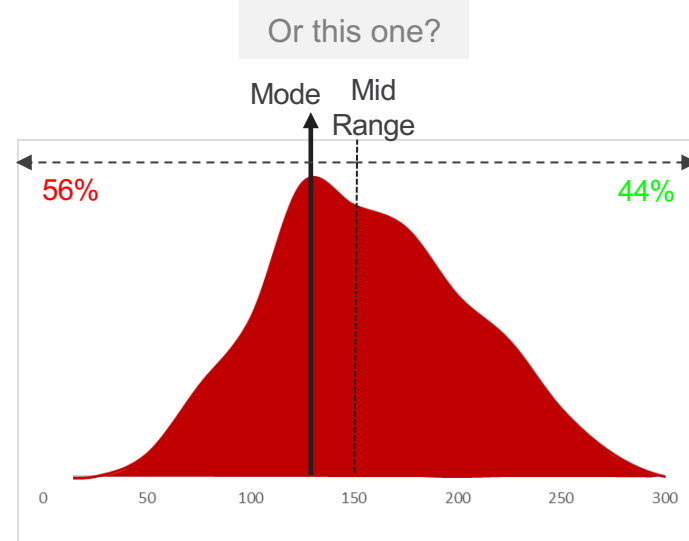
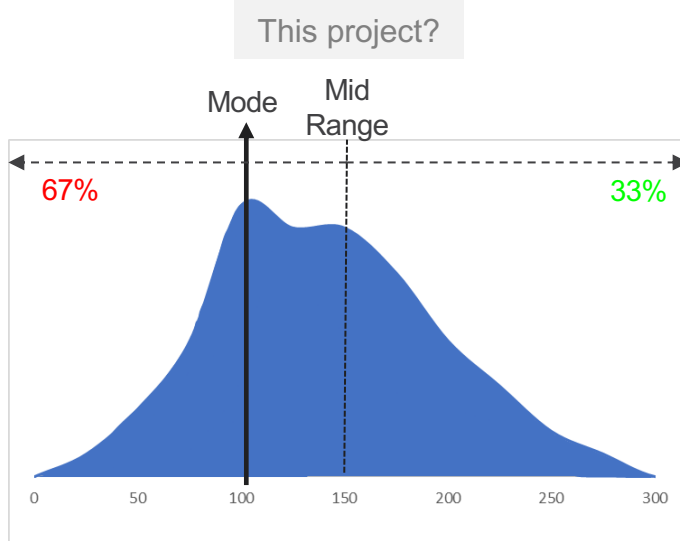


„My particular technique is to say to people, ‘Let’s stop guessing. Instead, let’s find clues—sources of knowledge that you just would not have otherwise.

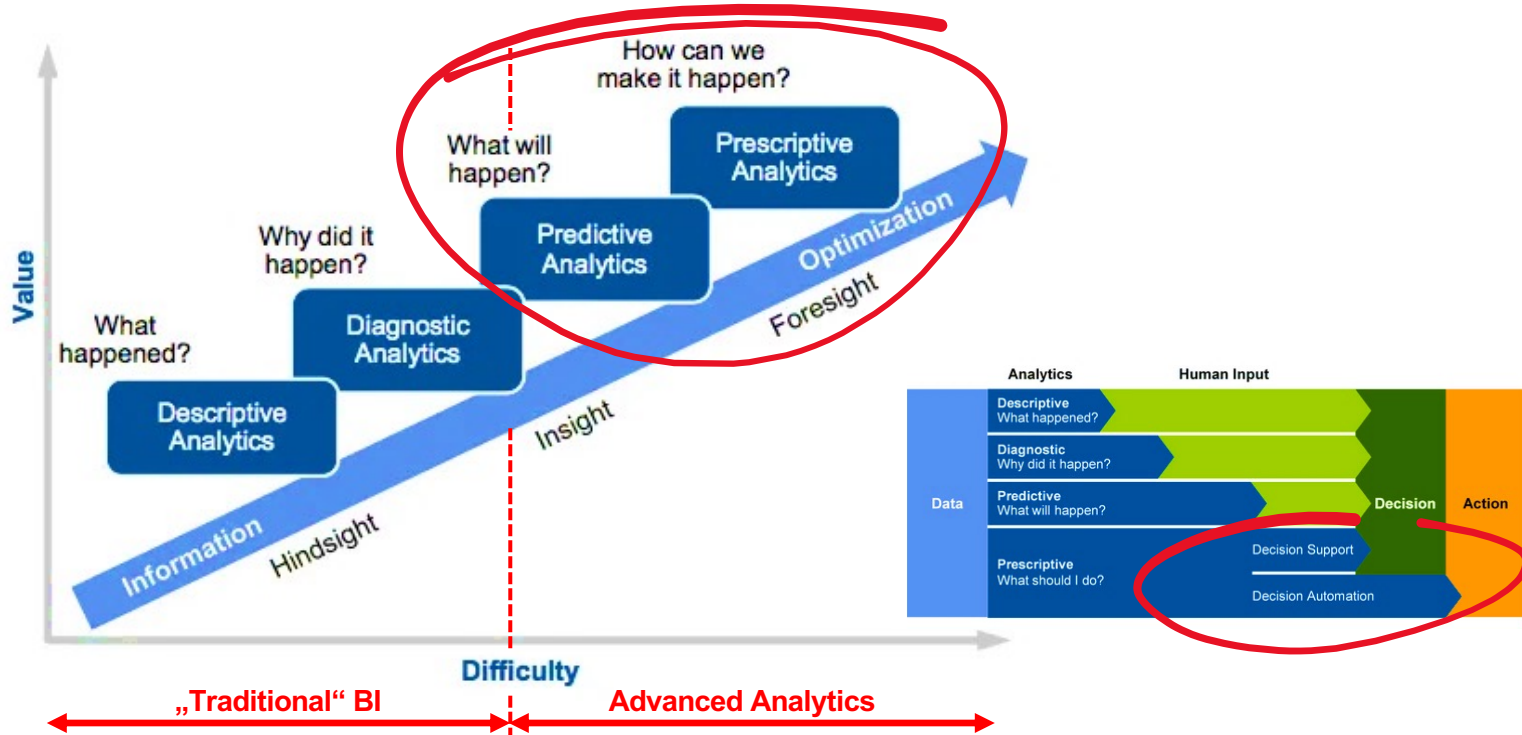
Dorian Shainin, consultant, engineer and pioneer of a new quality paradigm

Ranges show the full spectrum of possibilities ...

Probability of occurrence



Analytic Ascendancy Model – Four Types of Analytical Capability



Ref.: Gartner Inc., 2012, 2016

Analytics – where?

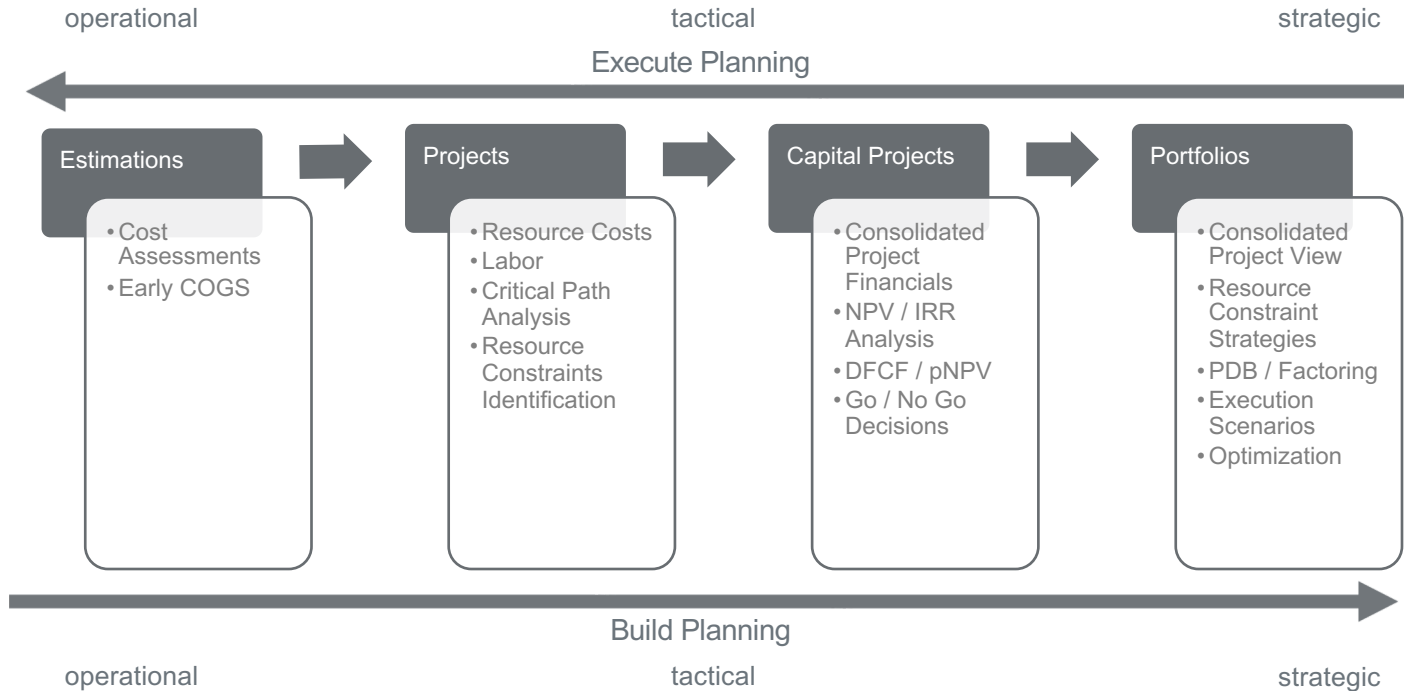
More than 50% of projects fail to meet expectations!

*“Initial cost and schedule estimates for major projects have invariably been overoptimistic. The risk that costs and schedule constraints will not be met and cannot be determined **if cost and schedule estimates are given in terms of single points rather than distributions.**”*

Final Report of the USAF Academy Risk Analysis Study Team, August
1971

Simulation and optimization will improve project success.

Addressing risk in the planning process

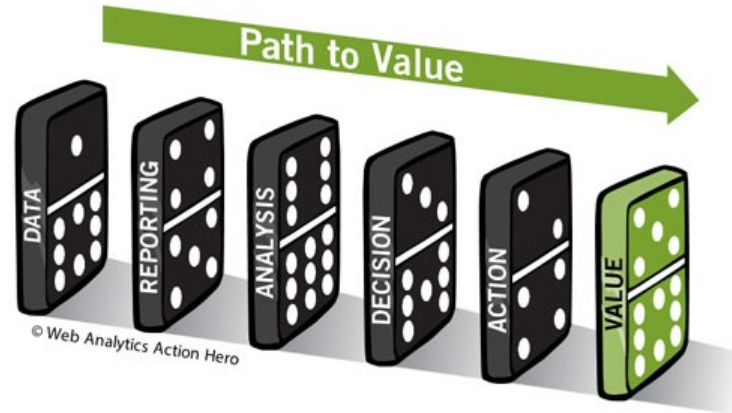


**Leveraging risk analysis opportunities –
in the planning and the execution processes.**

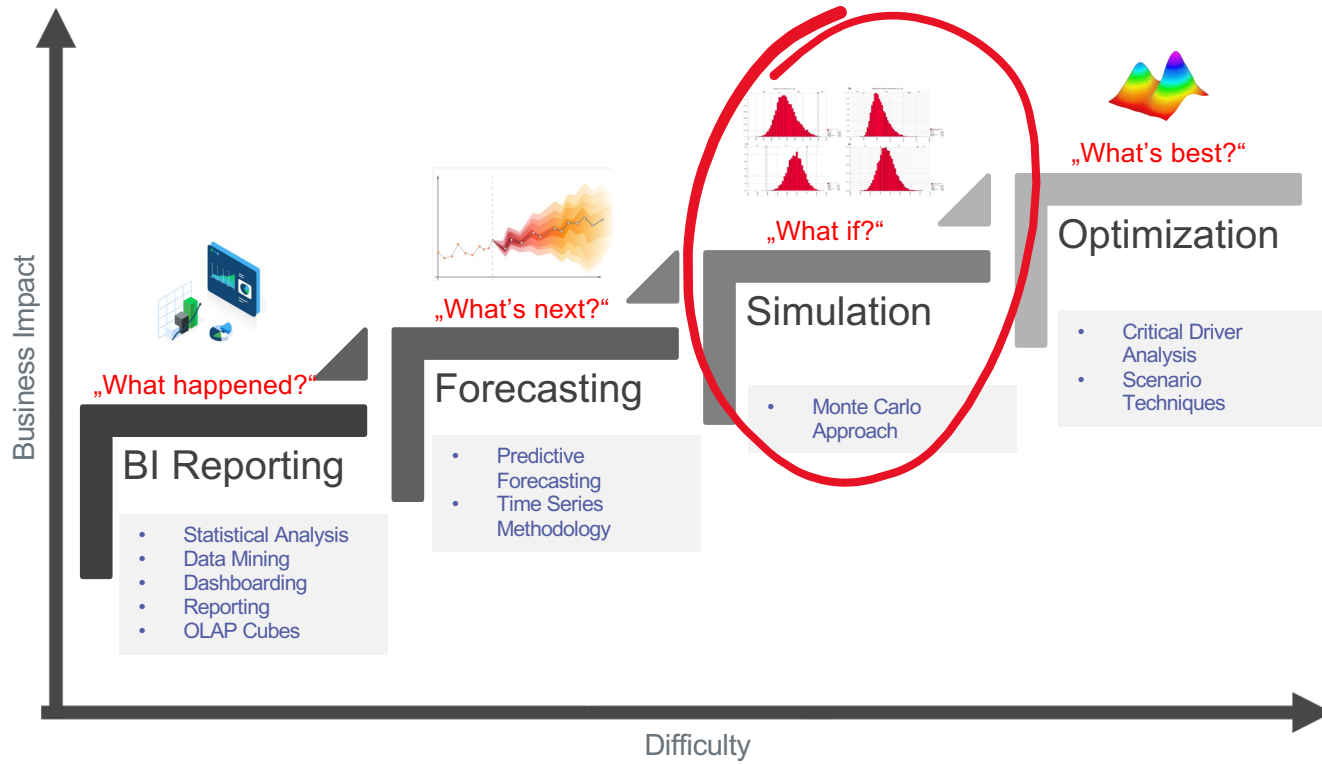
Analytics - How?

*“The goal is to turn data into information,
and information into insight.”*

C. Fiorina



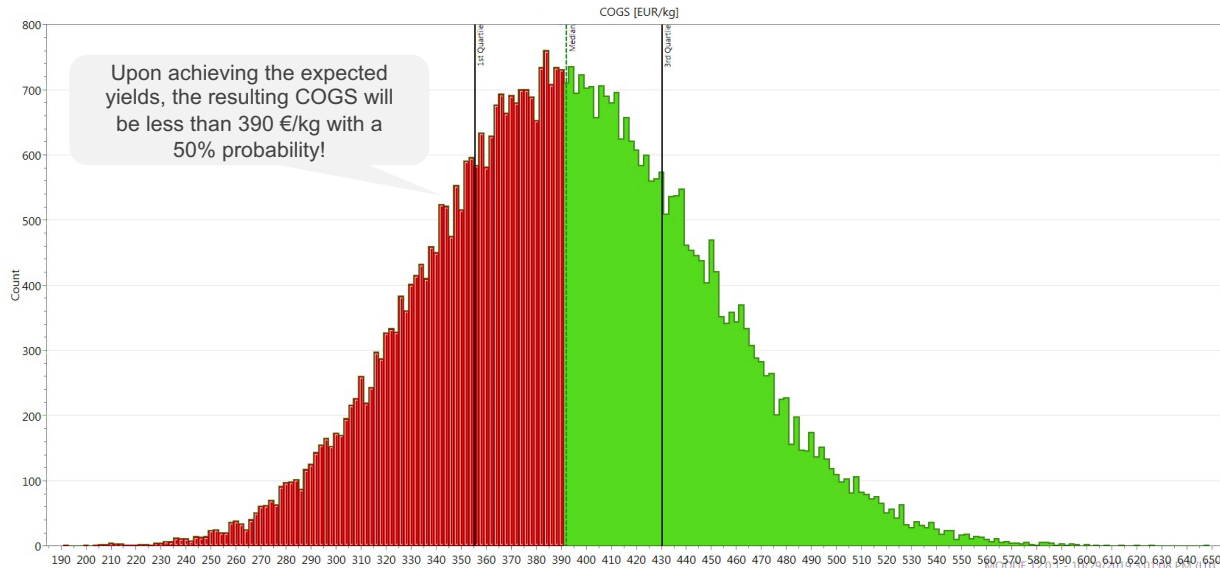
Driving Business Value ...



Predictive Analytics: Monte-Carlo-Simulation

Variable	Bemerkung	Einstellungen		Einheit
		Unterer Wert	Oberer Wert	
Reaktorvolumen		4	6	m ³
Wiederverwendung Katalysator	Häufigkeit	2	6	1
Ausbeute Stufe 1		85	95	%
Ausbeute Stufe 2	konstant, ausgeschlossen	98	98	%
Ausbeute Stufe 3		70	95	%
Ausbeute Stufe 4		85	96	%
Ausbeute Stufe 5		60	77	%
Ausbeute Stufe 6		70	85	%
Recycling Hauptlösungsmittel		0	90	%
Recycling restliche Lösungsmittel		0	70	%
Stundensatz	Westeuropa	300	400	€·h ⁻¹
Arbeitsumfang		12.000	16.000	h
Preis Rohstoff	Marktpreisschwankungen	30	50	€·kg ⁻¹

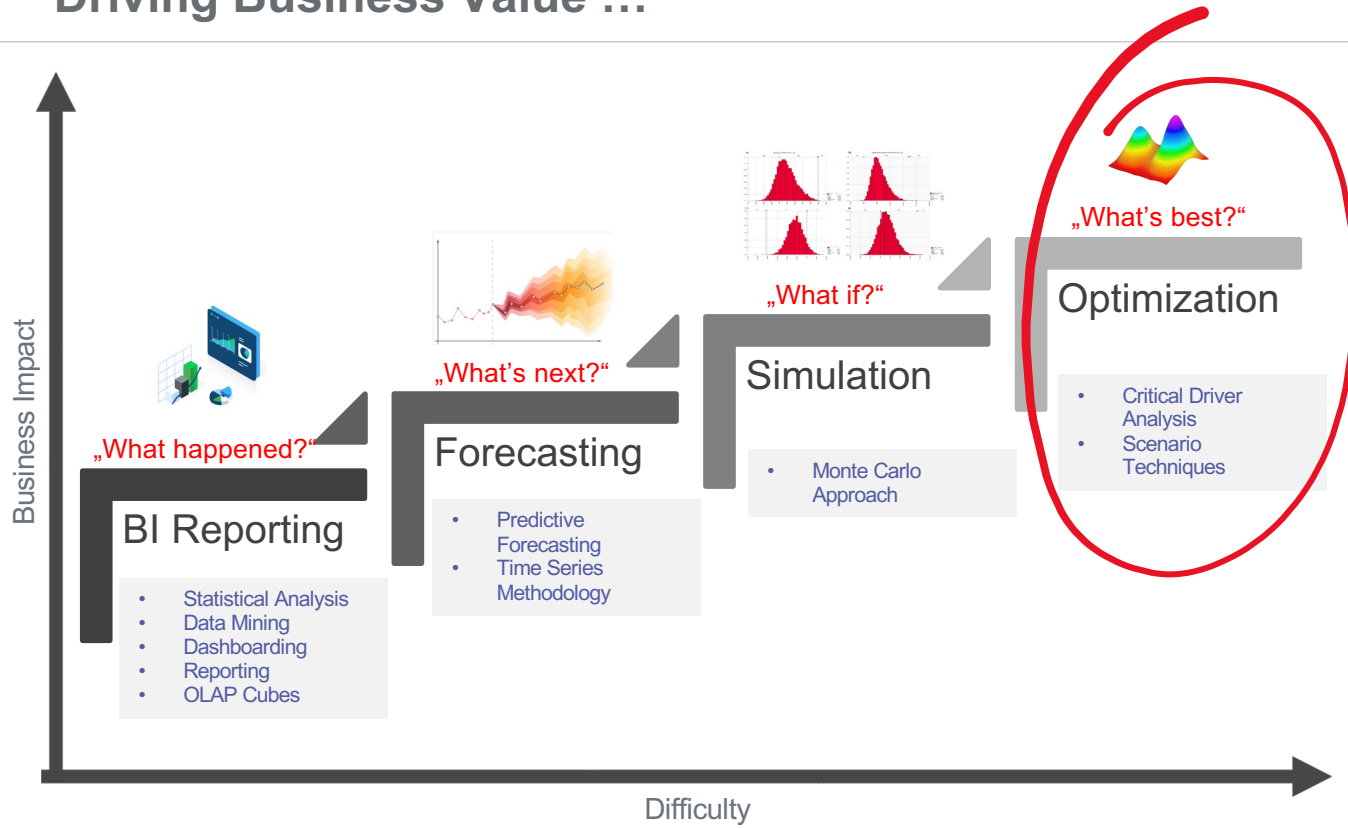
Monte Carlo Simulation - Predicted Response Distribution



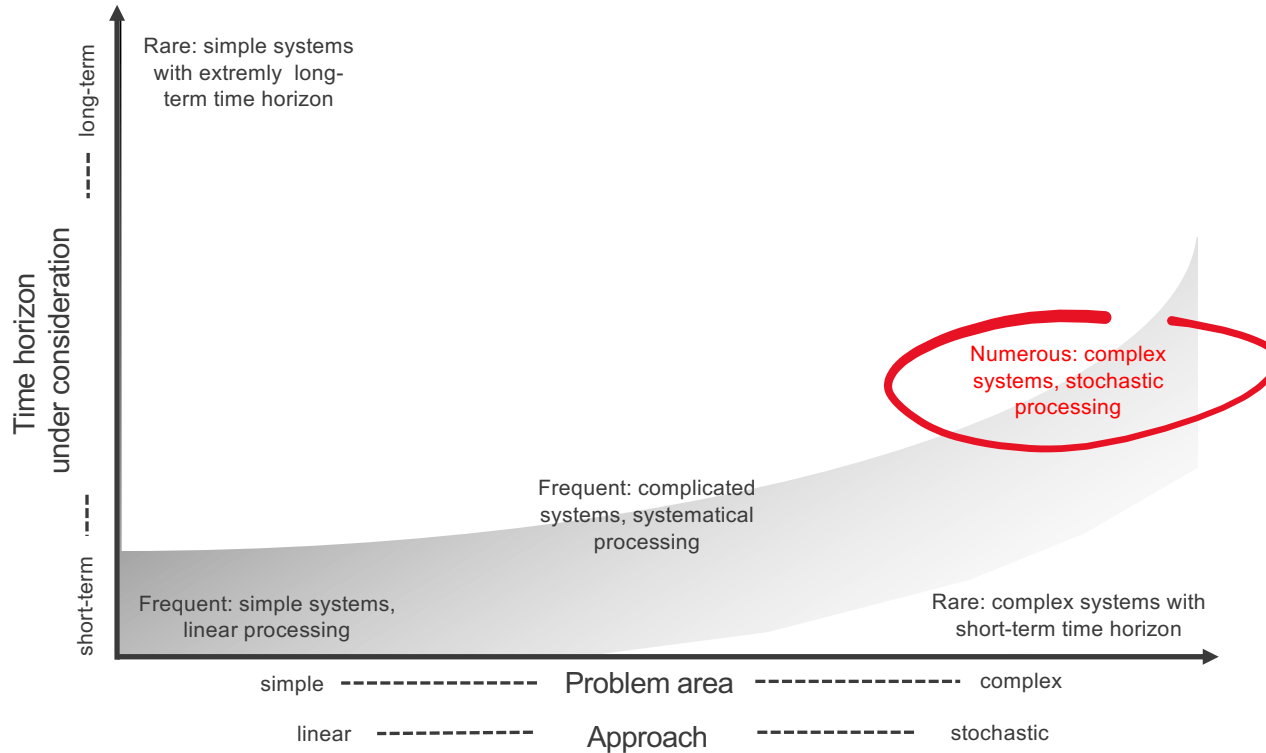
„Forecasts without ranges are information without value.“

W. Gleißner

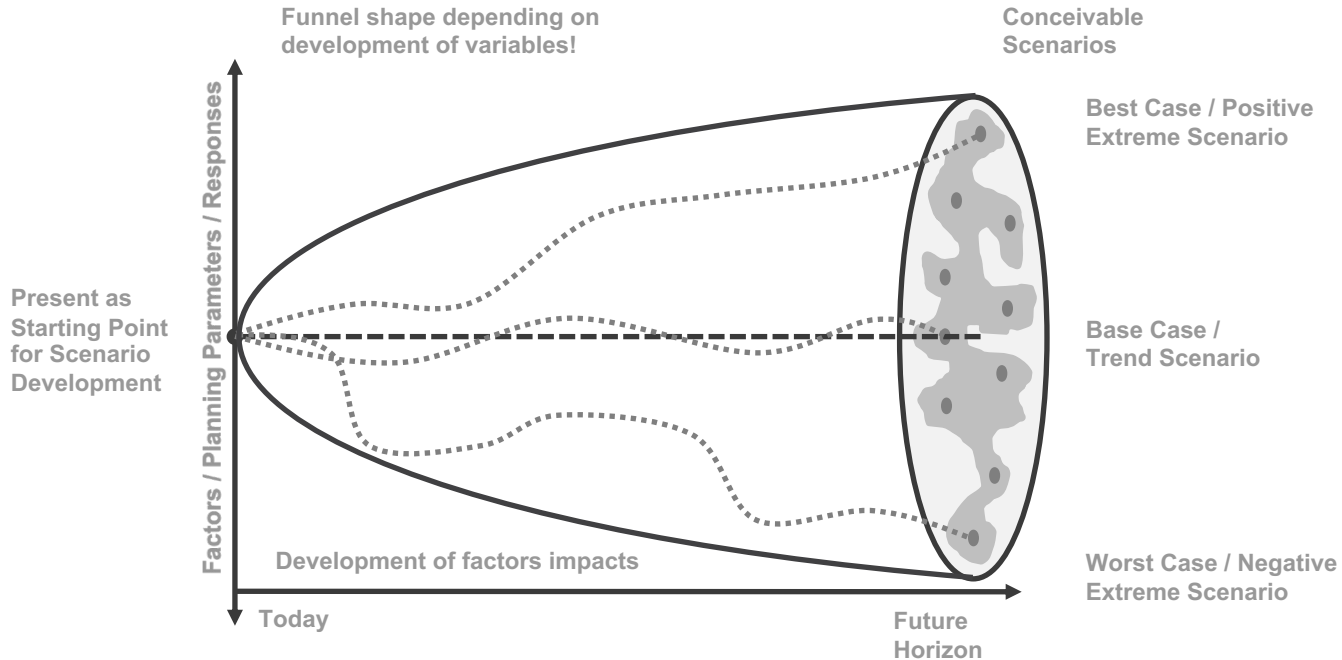
Driving Business Value ...



From problem analysis to scenario funnels ...

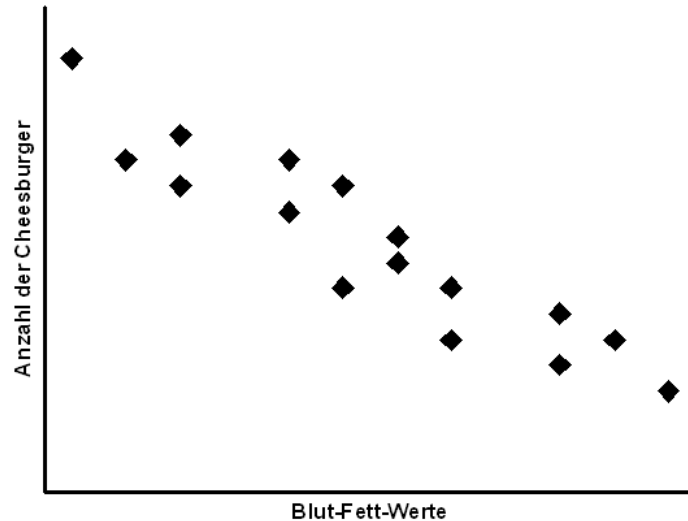


From Scenario Funnel to Design of Scenarios (DoS)



Multivariate Data Analysis Modeling

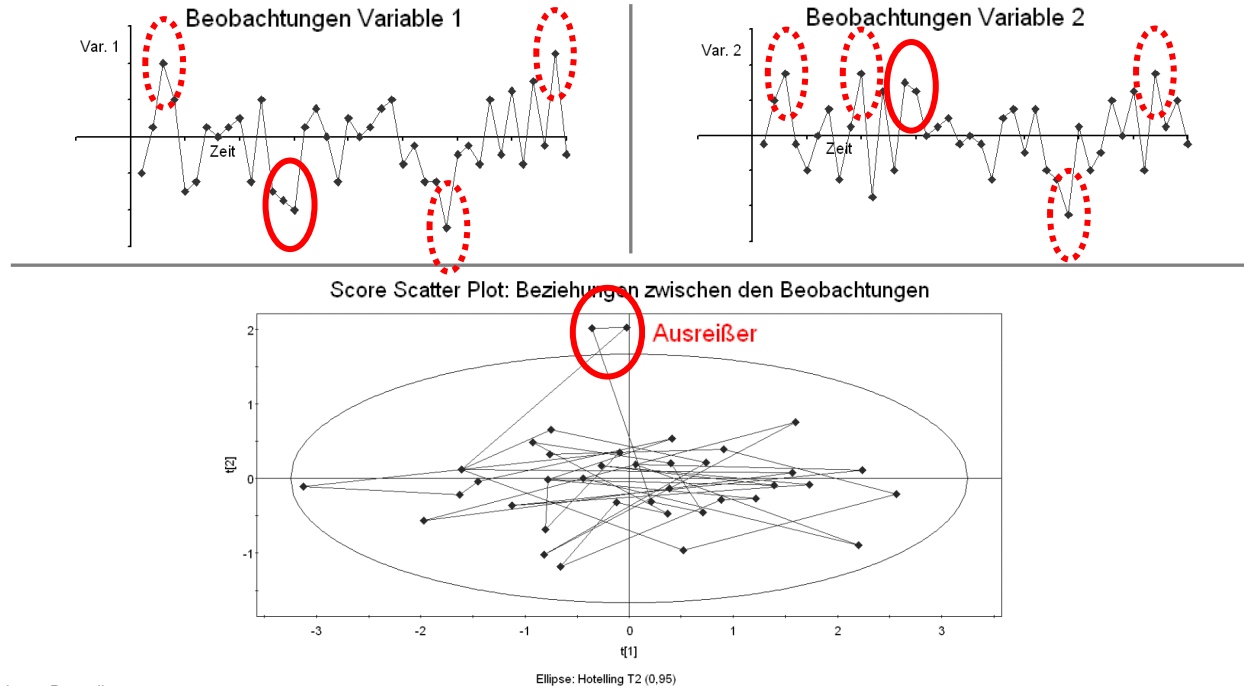
Correlation or causation? Multivariate methods minimize the risk of getting spurious results or not seeing important results!



- Spurious correlation
- Latent variable: age!
- Risk correlation analysis / linear regression
 - False results (spurious correlations)
 - Mixing of information, important connections not recognized
- Information is usually found in the interaction of (measured) values!

Multivariate Data Analysis Modeling

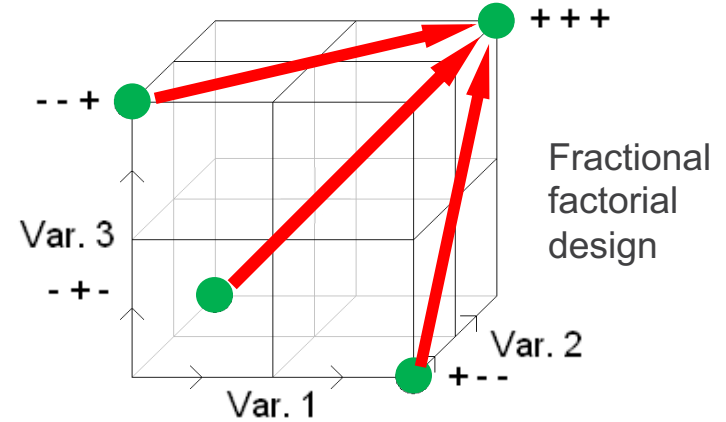
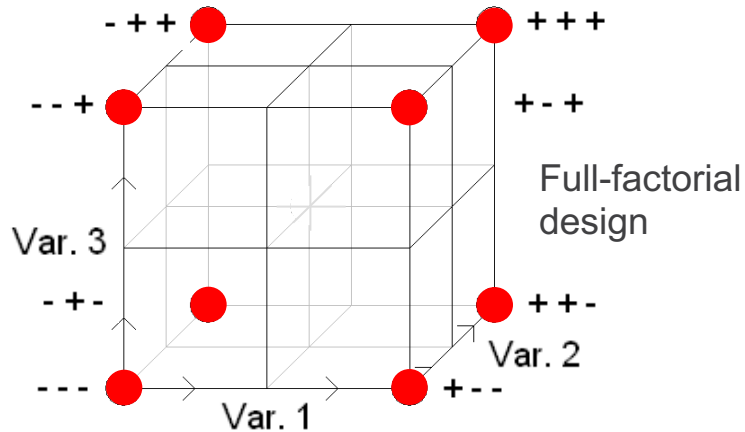
Multivariate data analysis: Information is found in correlation patterns - not in individual series of values.



Quelle: eigene Darstellung

Prescriptive Analytics: Design of Scenarios (based on DoE)

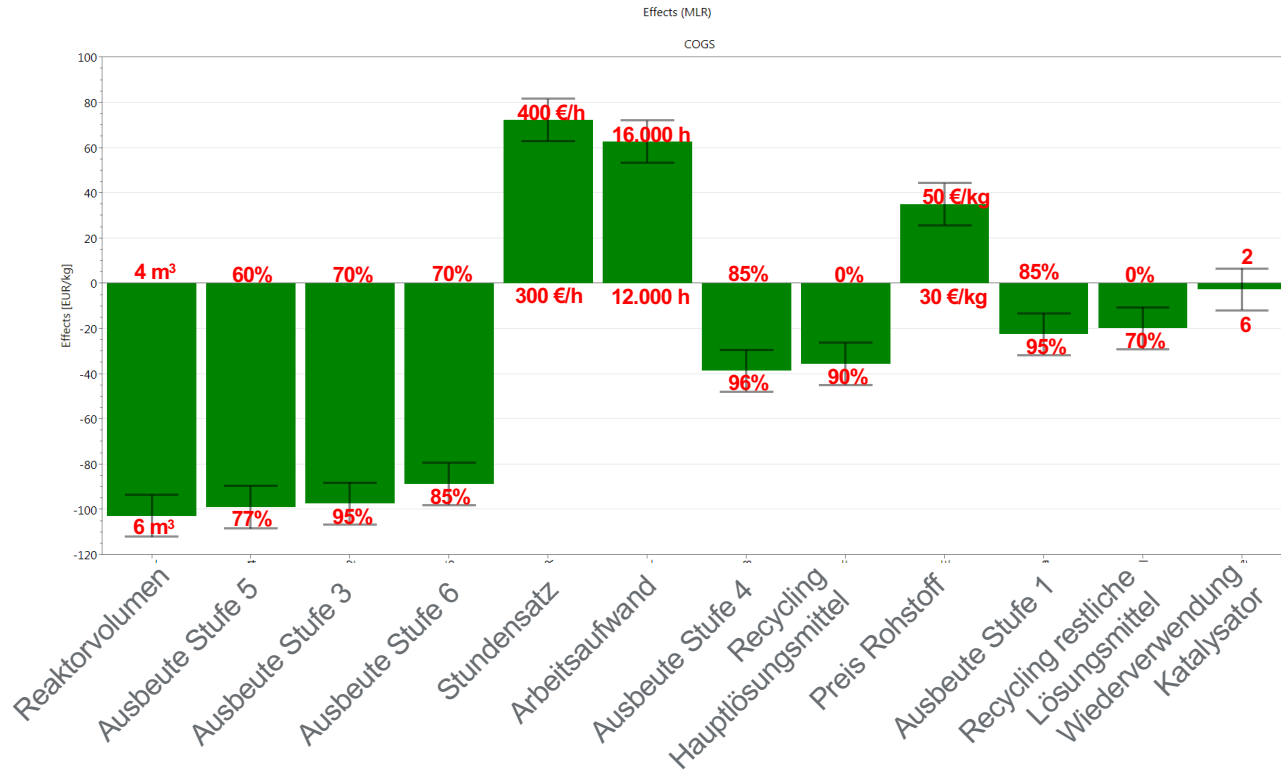
- The Design of Experiments methodology (DoE) achieves an optimal relationship between the number of experiments required and the information content of the results obtained.



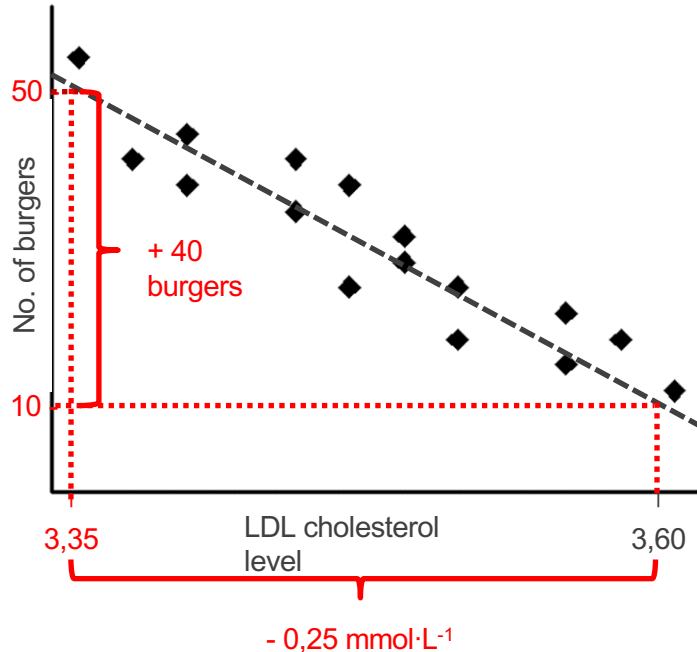
Prescriptive Analytics: Design of Scenarios

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Prescriptive Analytics: Critical Driver Analysis



Prescriptive Analytics: correlation or causality?

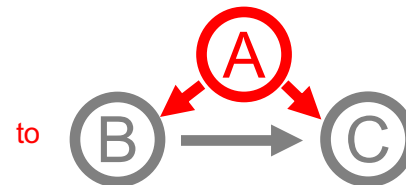


- Who would have thought it? The consumption of burgers (B) is **negatively correlated** with the LDL cholesterol level (C)!

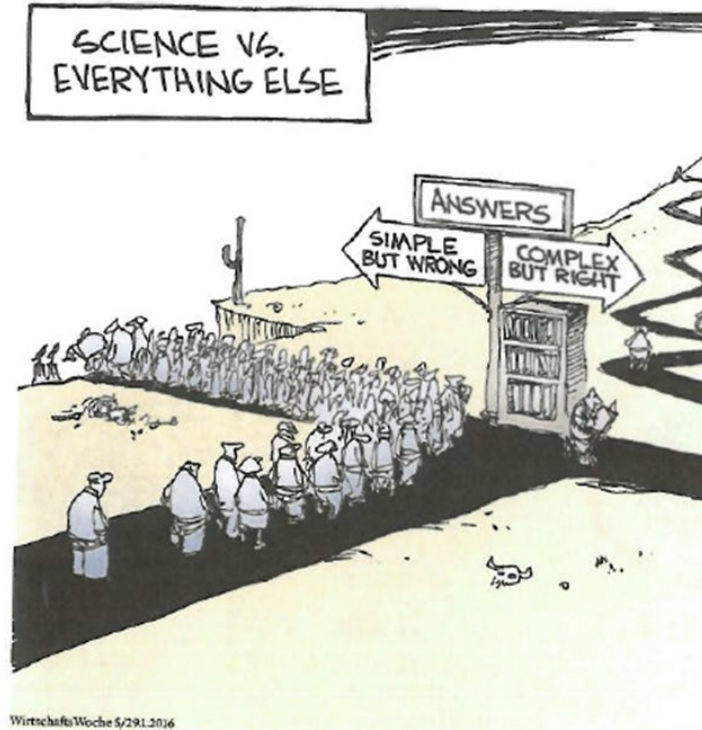
- The **predictive** model is right: Who eats 10 burgers has a LDL-C of approx. 3,60 mmol·L⁻¹. Who eats 50 burgers has a LDL-C of approx. 3,35 mmol·L⁻¹.

- The **prescriptive** model is wrong: Additional consumption of 40 burgers won't reduce the LDL-C by 0,25 mmol·L⁻¹. **What's wrong?**

- A missing additional variable, a so-called **confounder**, the age (A), impacts the consumption of burgers as well as the LDL cholesterol level!



Quo vadis?



Quelle: Theisen, M. (2018): Neue Rechte und Pflichten des Aufsichtsrats, Vortrag Seminar „Der Aufsichtsrat“, ESMT Berlin, Schloss Gracht am 17.05.18, S. 9.