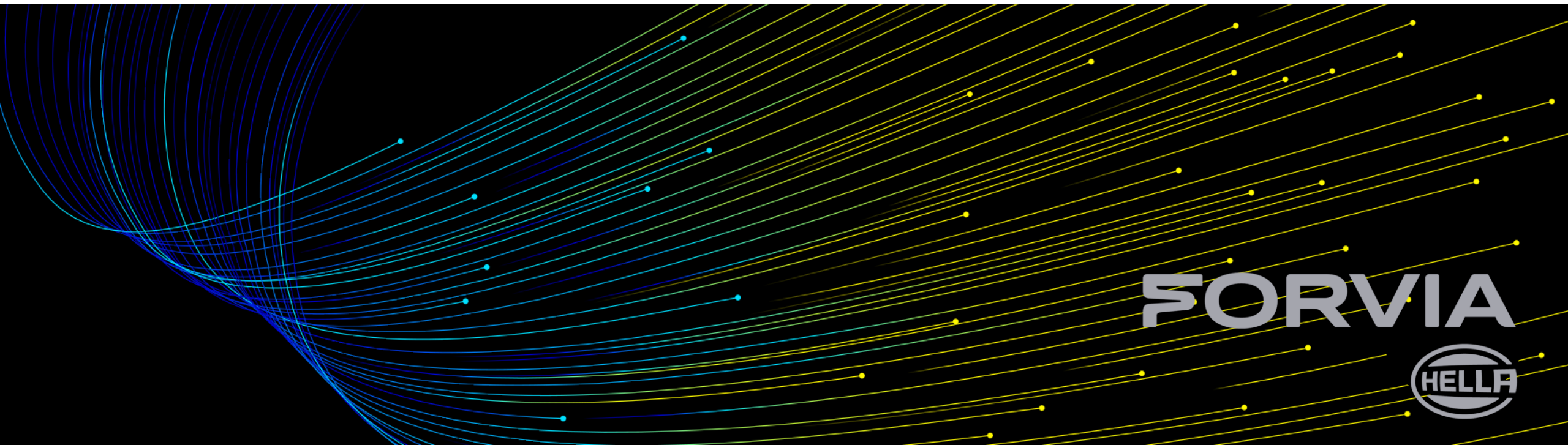


# Risk Management Congress 2022

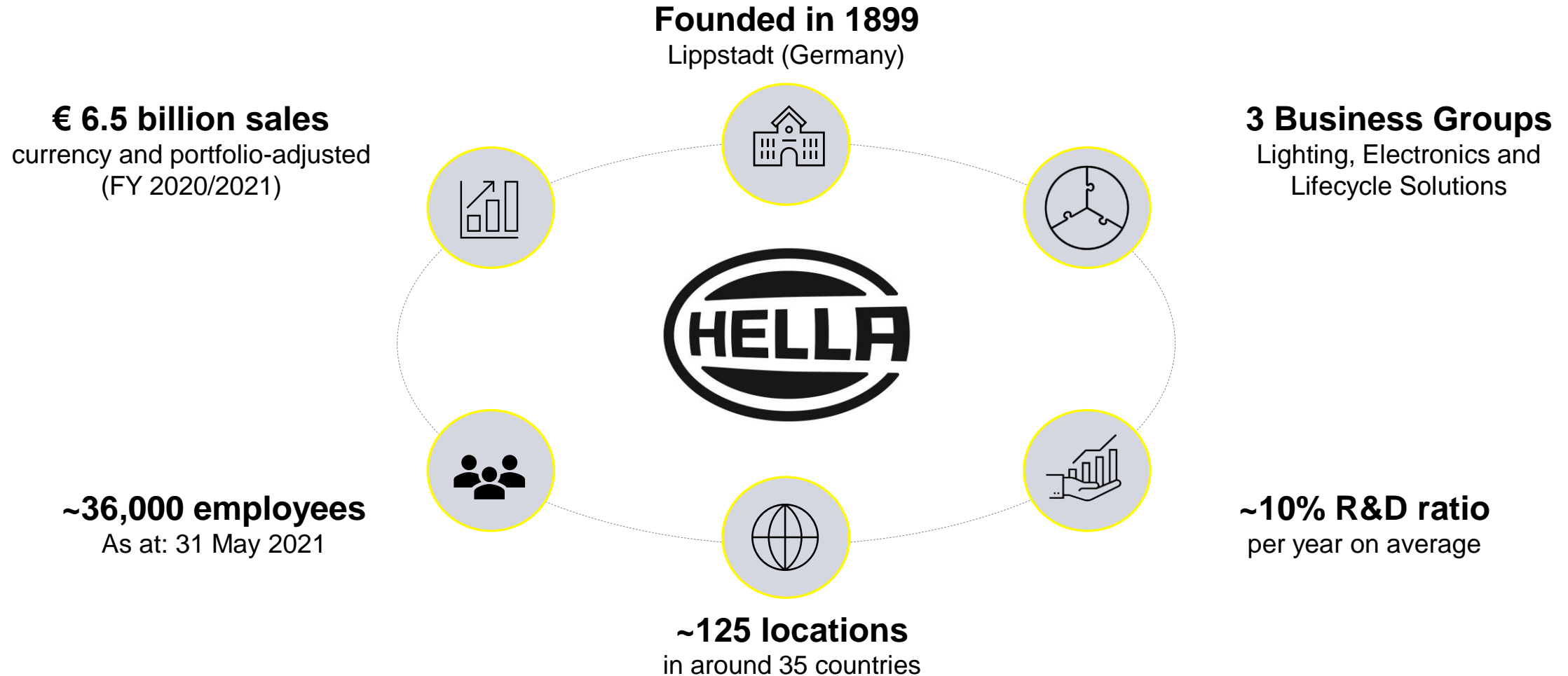
## Risikoquantifizierung im Enterprise Risk Management bei HELLA

*(Vortrag in deutscher Sprache, Powerpoint in Englisch)*

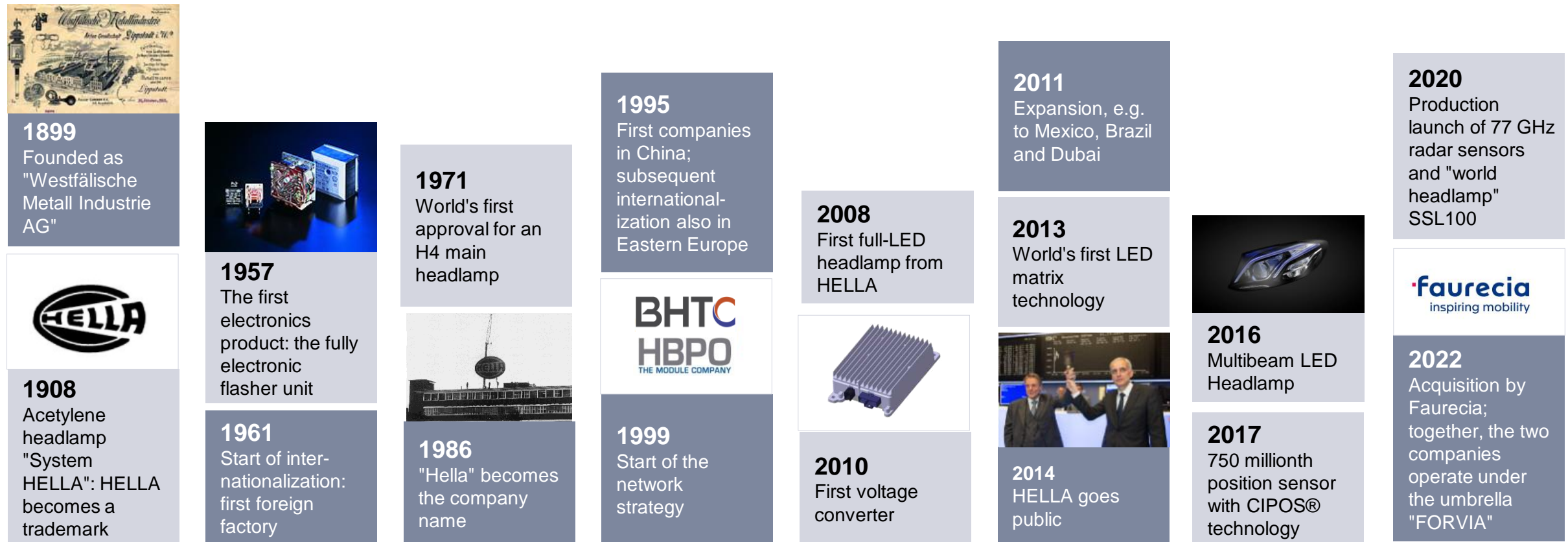
Dr. Daniel Röhrig, München, 16. Mai 2022



# HELLA has been a close and reliable partner to the automotive industry and the aftermarket for over 120 years



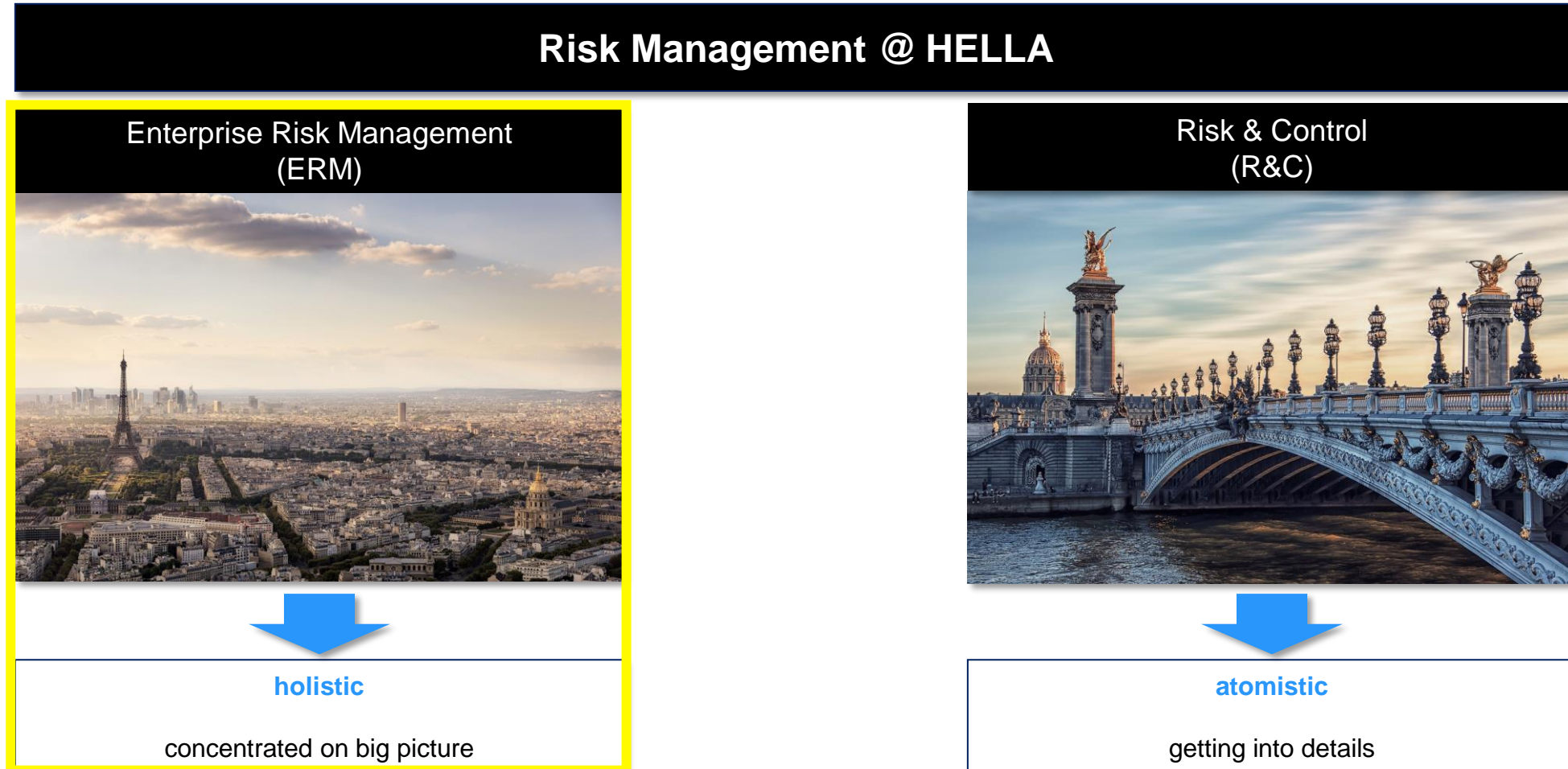
# From the founding to the Faurecia takeover, from the first acetylene lamp to the chip-based headlamp: the history of HELLA



Company Highlights

Product Highlights

# Risk management structure



# Risk management targets



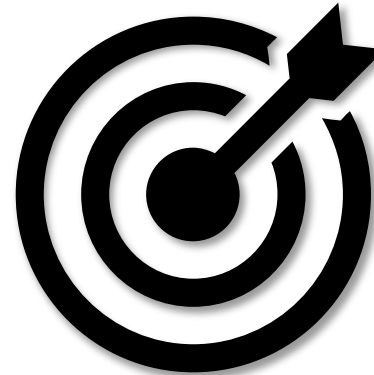
**Compliance** to standards (IATF / ISO) and **legal obligations** to detect risk at an early stage



establishing a basis for **risk-based prioritization** of activities, e.g. **allocation of resources** or audits by internal audit



**quantifying** the company's **risk** to achieve a **conscious balancing** of opportunities and risks



holistic

atomistic



Creating an **efficient unified basic structure** enabling the **integration** of further **management systems** e.g., Sustainability, Compliance



Design and implement a **uniform, group-wide methodology** and terminology for risks and the resulting measures and controls

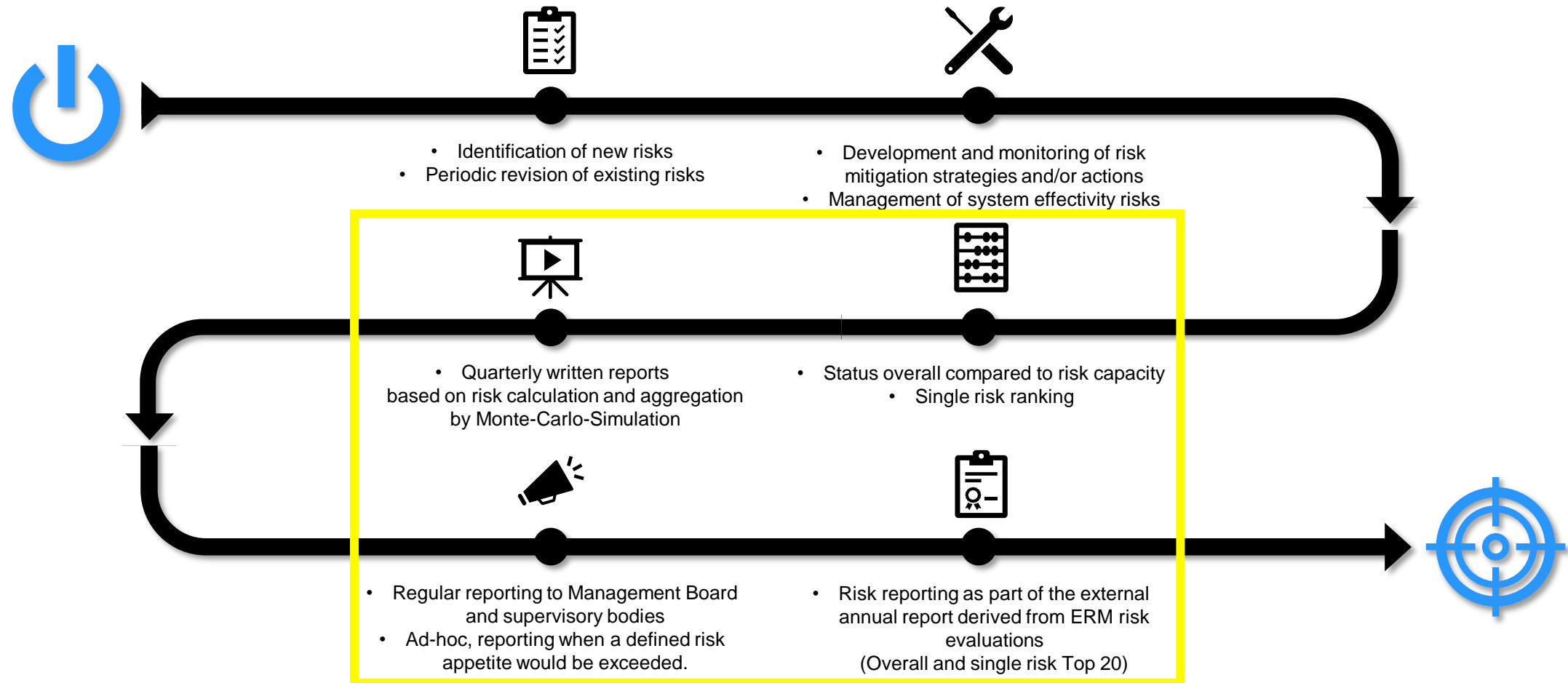


**Strengthen the departments** in the **implementation** of this methodology providing a **global risk catalogue**



**Promote a risk-oriented culture** for the Group and contribute for more **transparency** from locations up to headquarters (software)

# Enterprise Risk Management Program and work products





# Enterprise Risk Management

## Single risk evaluation and simulation

### Scenario evaluation



What is a potential annual minimum damage?

What is a typical annual damage?

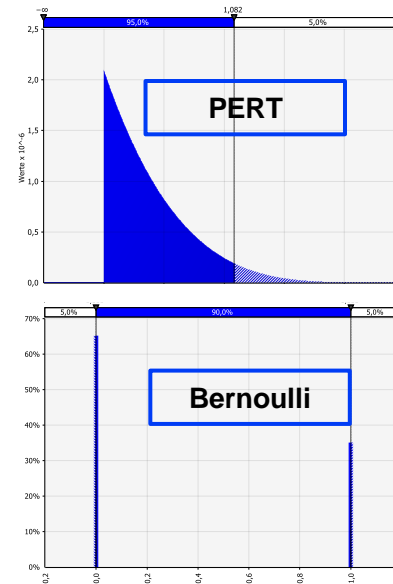
What does a typical (once in a century) worst case annual damage scenario look like?



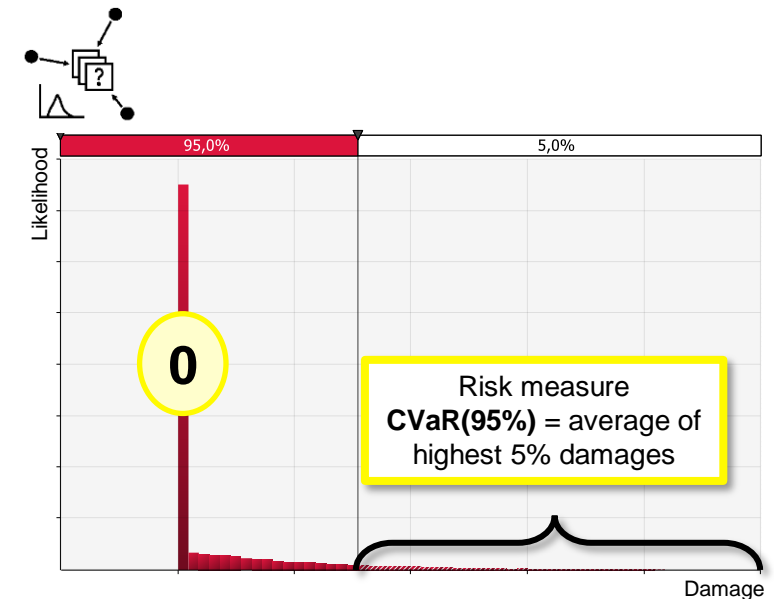
How likely is an annual damage (of minimum or higher)?

**Net evaluations, considering all risk mitigation**

### Probability distributions



### Monte Carlo Simulation



- The derived risk measure reflects a potential extreme damage caused by the single risk, not an average damage/expected value.
- Simple example: 1% likelihood/1 bn. EUR damage – the expected value of 10 Mio. EUR would be a bad risk measure.

# Enterprise Risk Management

## Example on single risk evaluation and simulation

- **Company XYZ wants to evaluate its yearly Sales Risk**
- **All potential reasons should be taken into account. E.g.**
  - Macro-economical causes
  - Customer trouble or denominations
  - Reputational damages
- **In preparation of the risk evaluation, XYZ analyses the last 10 years financial data.** Comparing realized revenue at closing to budgeted revenue at start of each year.

### Scenario evaluation



**What is a potential annual minimum damage?**

**MEUR 0** – Influence on the Income Statement can be compensated by cost management.

**What is a typical annual damage?**

**MEUR 50.** Average deviation in the analyzed negative years was approx. 5%. Currently XYZ sees rising uncertainties, therefore an increase to 7% is assumed for the future. Calculation yields approx. MEUR 50 EBIT net effect

**What does a typical (once in a century) worst case annual damage scenario look like?**

**MEUR 300** XYZ assumes 30% Sales drop for a whole year. Fortunately, this didn't occur in the past for a complete year, but in some bad single months. Nonetheless, such an event seems possible. XYZ calculates a net EBIT effect after cost management of MEUR 300.



**How likely is an annual damage (of minimum or higher)?**

**60%.** Analysis of the last 10 years financial data shows that in 40% of the years the Revenue of XYZ at year closing was below budget. Currently XYZ sees rising uncertainties, therefore an increased likelihood is assumed for the future.

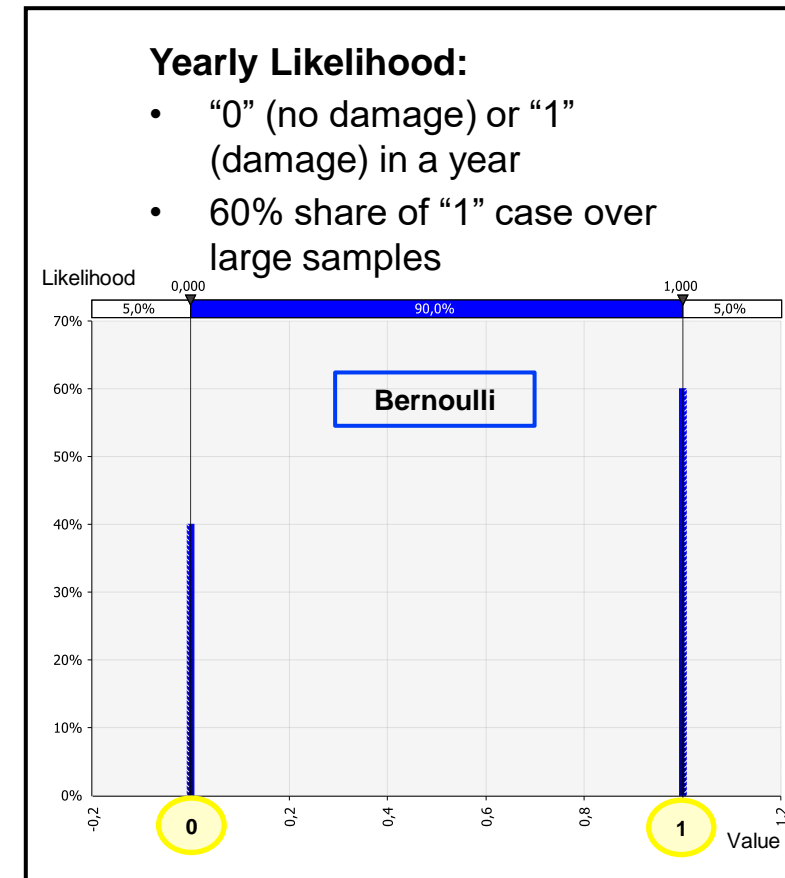
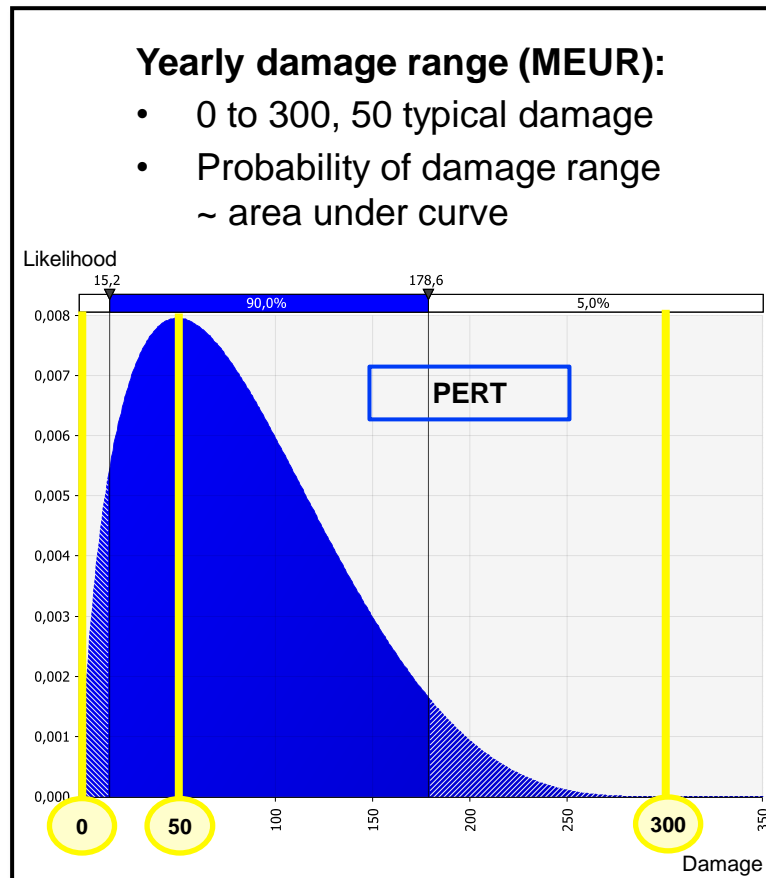


# Enterprise Risk Management

## Example on single risk evaluation and simulation

### Probability distributions

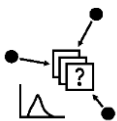
“In probability theory and statistics, a probability distribution is the mathematical function that gives the probabilities of occurrence of different possible outcomes for an experiment.”  
(Wikipedia)



# Enterprise Risk Management

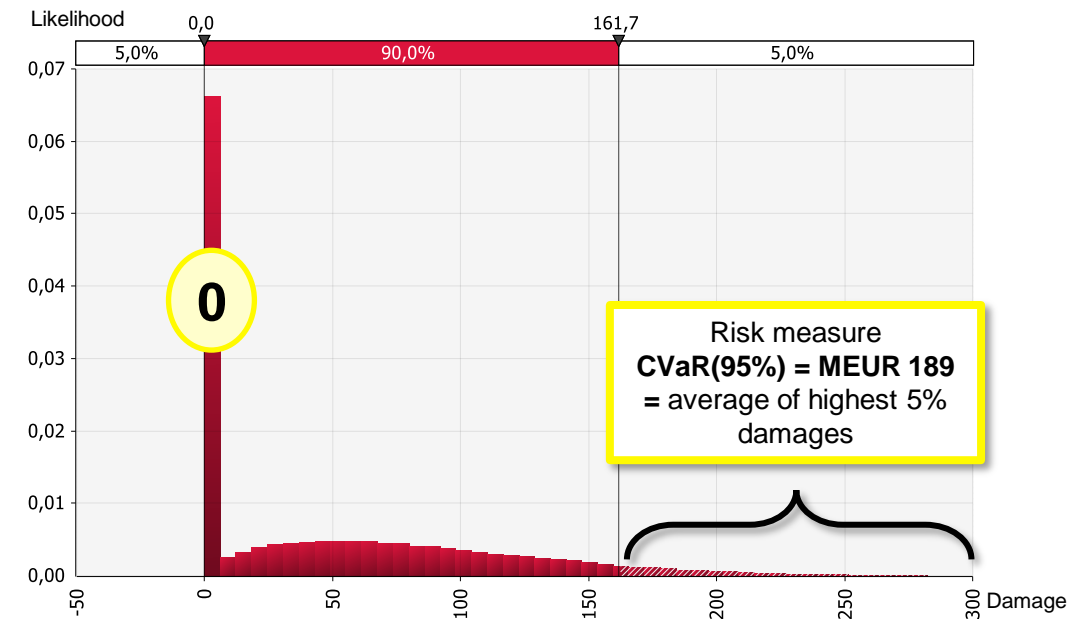
## Example on single risk evaluation and simulation

### Monte Carlo Simulation



- Simulation of for example 50.000 years
- **For each simulated year  $n$**  a random result from the risk is calculated:
  - Bernoulli( $n$ ) as Likelihood representation
    - “0” (no damage) or “1” (damage) in the simulated year
  - PERT( $n$ ) as damage representation
    - A random damage in the range 0 to 300 MEUR, fitting PERT over large samples
- **Damage\_Sales( $n$ ) := Bernoulli( $n$ ) \* PERT( $n$ )** is the damage value in the simulated year  $n$ .

### Distribution/Histogram of Damage\_Sales( $n$ )



- Calculated Sales risk of MEUR 189
- Interpreted as a realistic extreme damage from the single risk, an average 20-years damage

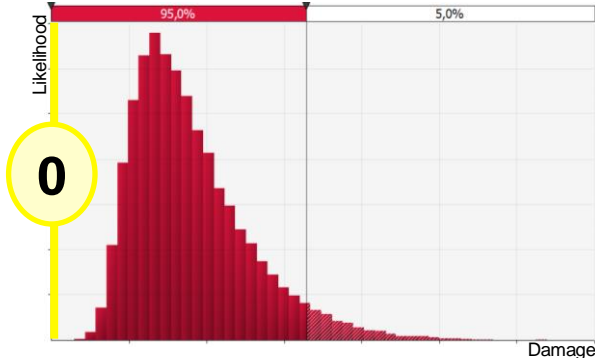
# Enterprise Risk Management

## Risk aggregation, generic consideration of opportunities



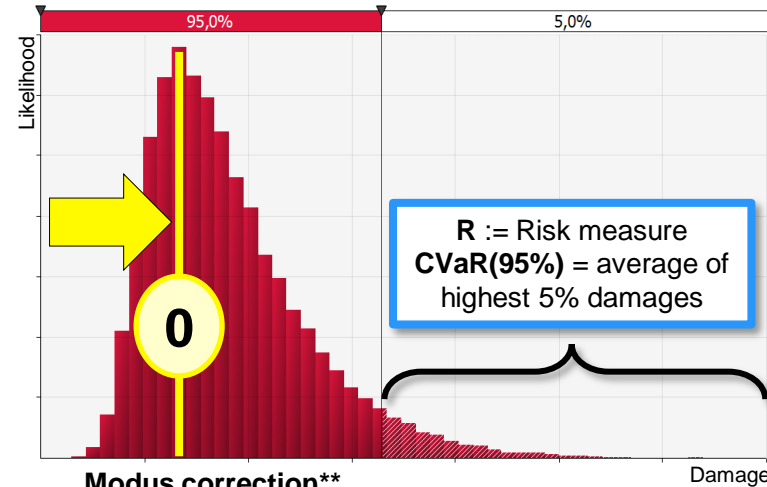
### Monte Carlo Simulation

Sum effects of all entries in the risk register considered in each simulated year\*



Damage ~ deviation from EBIT budget  
According to this distribution **high negative deviations from EBIT budget would be expected typically every year.**

### Lump-sum correction



**Modus correction\*\***  
Most likely yearly result = Damage 0  
= No deviation from EBIT budget

- **Result:** One risk figure **R** in Mio. EUR (EBIT), which **reflects the entire risk register.**
- **Interpretation:** A **realistic extreme damage** for the HELLA group. An average 20-year damage.
- **There's no forecast possible, when this damage might occur.**

**Questions:** Now that we derived the figure R, what does it mean for the company? What happens if the damage R occurs in a fiscal year? Can HELLA survive? If yes, how big is the distance to a situation in which a continuation seems no longer likely?

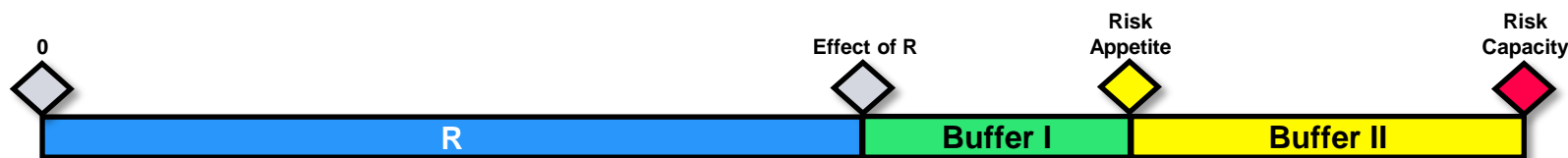
\*That would assume stochastic independence. In some cases, we model explicit dependence though.

\*\* That assumes a unique (smallest) Modus of the distribution

# Enterprise Risk Management

## Risk capacity

The potential impact of R is analyzed in relation to the current financial structure – What would happen if R hits us this year?



### Explanations

- As simplification, R is assumed to be short-term Cashflow relevant, e.g. due to a recall of products that HELLA must pay for. The top risks and the majority of all risks in the risk register affect Cashflow. Cashflow impact is generally seen as more critical by the Financial department than pure Earnings/depreciation impact.
- **Risk Appetite** is a warning threshold. Ad hoc reporting to the Management Board would be pursued, in case this level is exceeded.
- **Risk Capacity** is defined as the (rounded) maximum value, such that in case of a damage at this level a continuation of the HELLA group is assumed more likely than not. The value is derived by simulation of cash risk effect on the Balance sheet, under the assumption that Shareholders' Equity share must stay at or above a certain threshold. At or above the assumed threshold, a continued acceptable rating and (re-)financing capability is expected, even if Covenants of existing debt contracts would be triggered by risk effects.

This is the (lean) HELLA concept, for example in relation to

- §91 AktG – Early warning, threshold “Risk Appetite”
- IDW PS 340 n.F. – Risk aggregation and Risk Capacity

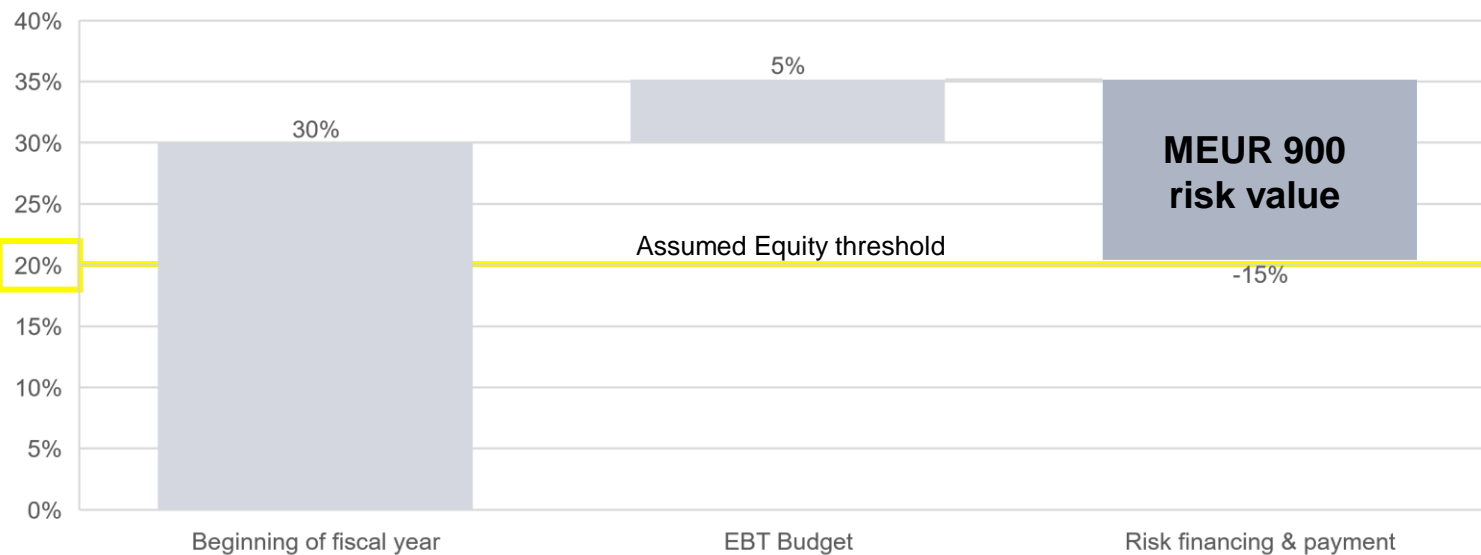
# Enterprise Risk Management

## Example company XYZ – Risk Capacity calculation

### Simulation of risk effect on Balance sheet and Equity ratio

Target value search: Find risk value, such that Equity ratio after simulation  $\approx$  Equity threshold (Year-end value)

#### Equity ratio development:



### Assumptions:

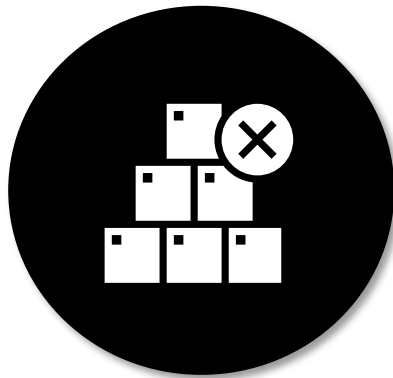
- Risk occurrence near closure of the fiscal year, as unplanned cash payment.
- Isolated consideration of the overall risk impact under the assumption that EBT budget otherwise is achieved.
- 50% share of equity and external financing assumed as feasible.
- No consideration of tax payments – the year will close with a negative Income.
- No consideration of first year Interest on new debt for risk payment.
- XYZ assumes **~20% Equity threshold as lower boundary for an acceptable rating and (re-) financing capability.**

- **MEUR 900 derived Risk Capacity** for company XYZ.
- In case of a risk-based cash one year impact below MEUR 900, it's assumed more likely than not that XYZ continues to exist.

# Enterprise Risk Management

## Discussion of Pros & Cons

Efficiency was an important criterium in defining and implementing the current ERM system



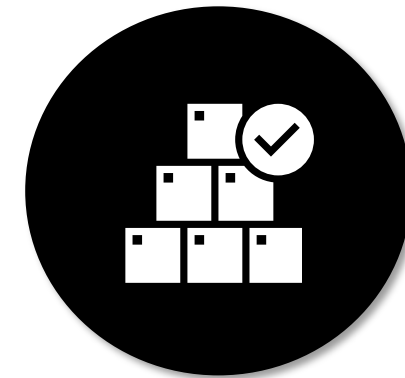
### Cons

- Annual approach not covering specific years or sustainable effects and not suitable for gradually developing (strategic) risk
- The *Modus* used for overall risk correction fluctuates to a higher extent from simulation run to simulation run



### Mixture of Pros & Cons

- One set of probability distributions
- Modelling of risk dependence only in a few special cases
- Lump-sum correction for chances
- CVaR is an abstract risk measure and not additive
- One criterium only to derive Risk Capacity (Equity threshold)
- Risk capacity analysis based on current budget structure only



### Pros

- Scenario discussion as evaluation basis; consideration of seldom but possible extreme damages
- Less and highly aggregated risk entries for more efficiency
- Condensed graphical view of risk status in relation to risk capacity
- Risk ranking in relation to potential extreme damages, not to an average damage (Expected value)

The system can be implemented and maintained by a small team



# Thank you

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