

VERIFICATION
VALIDATION
METHODS

Final Event 21 / 22 November 2023

The Role of Argumentation – Overview Argumentation Strategies

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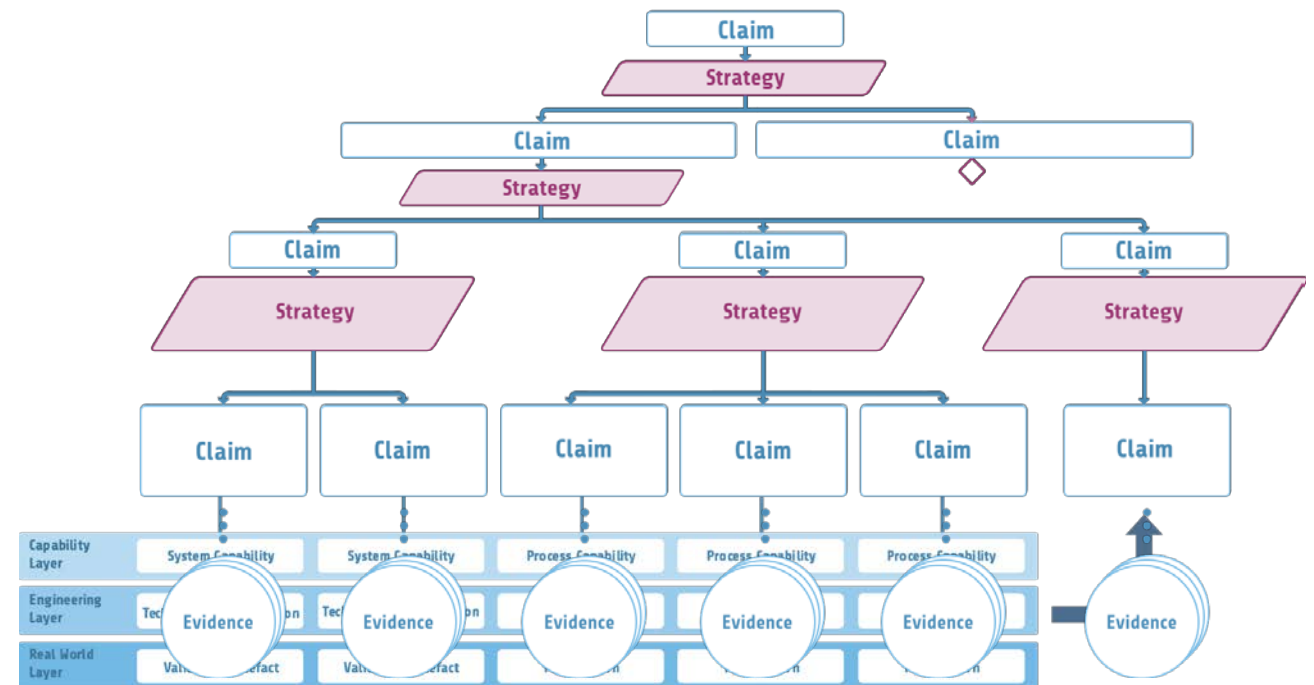
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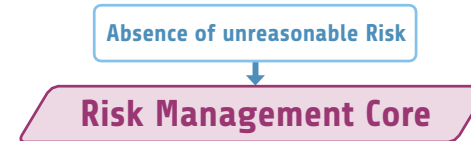
on the basis of a decision
by the German Bundestag

Motivation

- ▶ provide a high level overview of the VVM Safety Case Structure (GSN notation)
- ▶ provide a framework for the following presentation and for the poster exhibition
- ▶ explain the reasoning behind the structure, strategies, and patterns



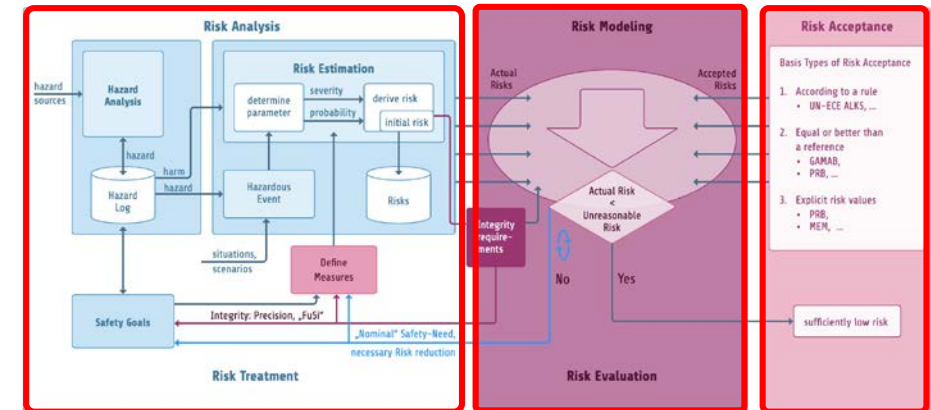
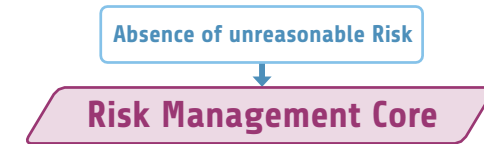
Top-Claim: „The Absence of Unreasonable Risk“



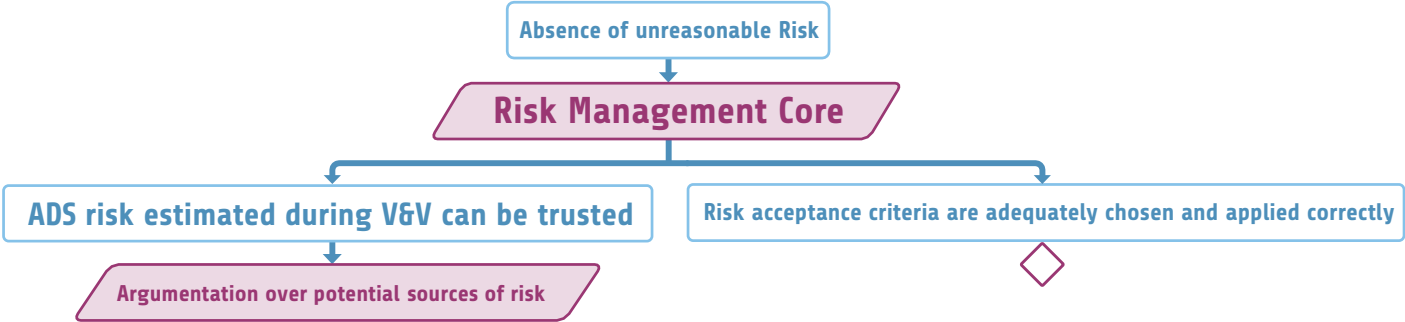
“The risk **exposed by the ADS-EV** is acceptable if this risk remains below a threshold defined by one (or multiple) chosen **risk acceptance criteria.**”

Arguing the Absence of Unreasonable Risk


- ▶ Applying the **Risk Management Core** to formulate a key argumentation strategy allows to argue:
 - ▶ that **valid** risk acceptance criteria have been chosen
 - ▶ that the risk exposed by the ADS-EV has been **identified** and **analyzed**
 - ▶ that the **comparison** between identified and accepted risk **is valid**

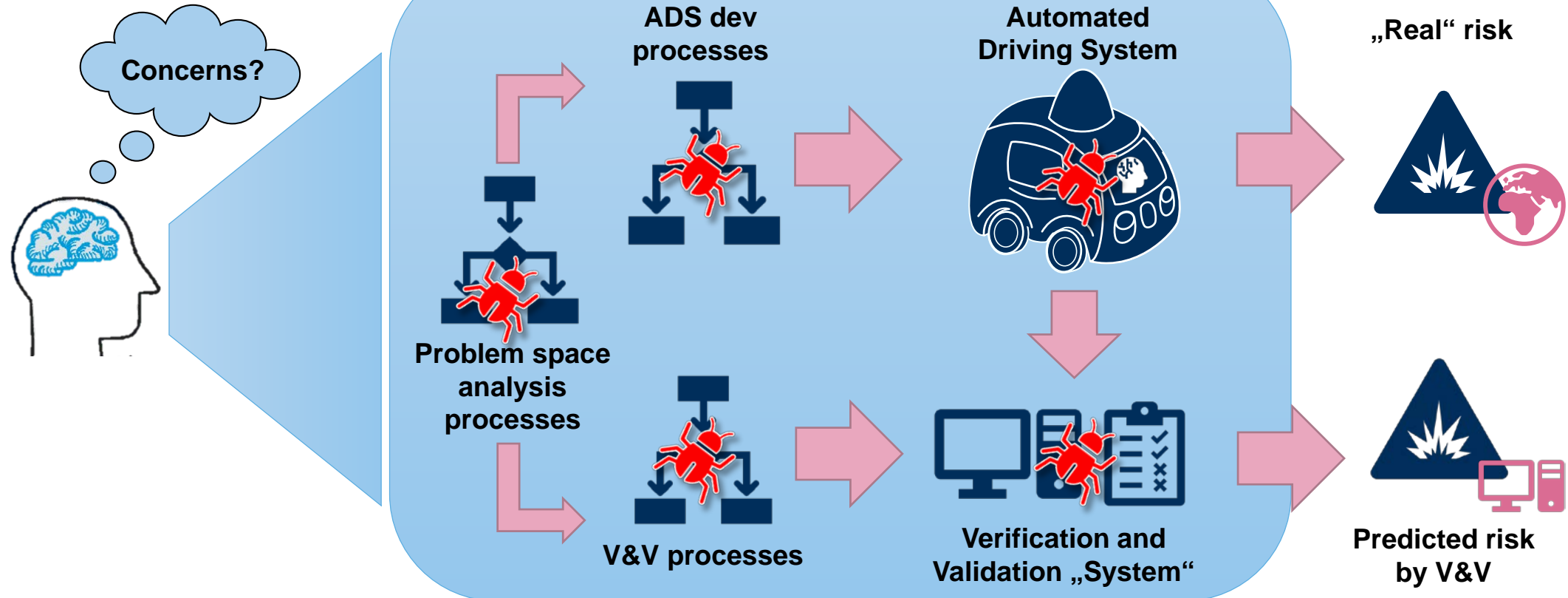


Arguing over Potential Sources of Risk

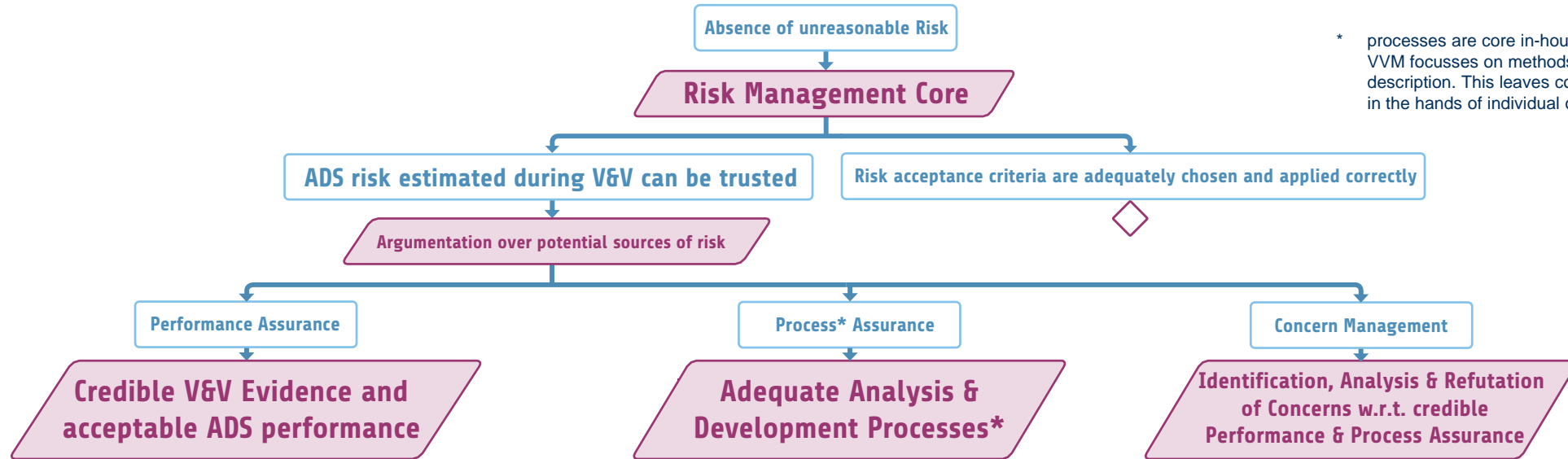


Possible Sources of Risk

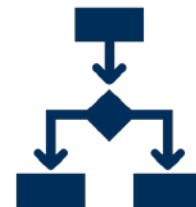
 specification, implementation, or validation gap



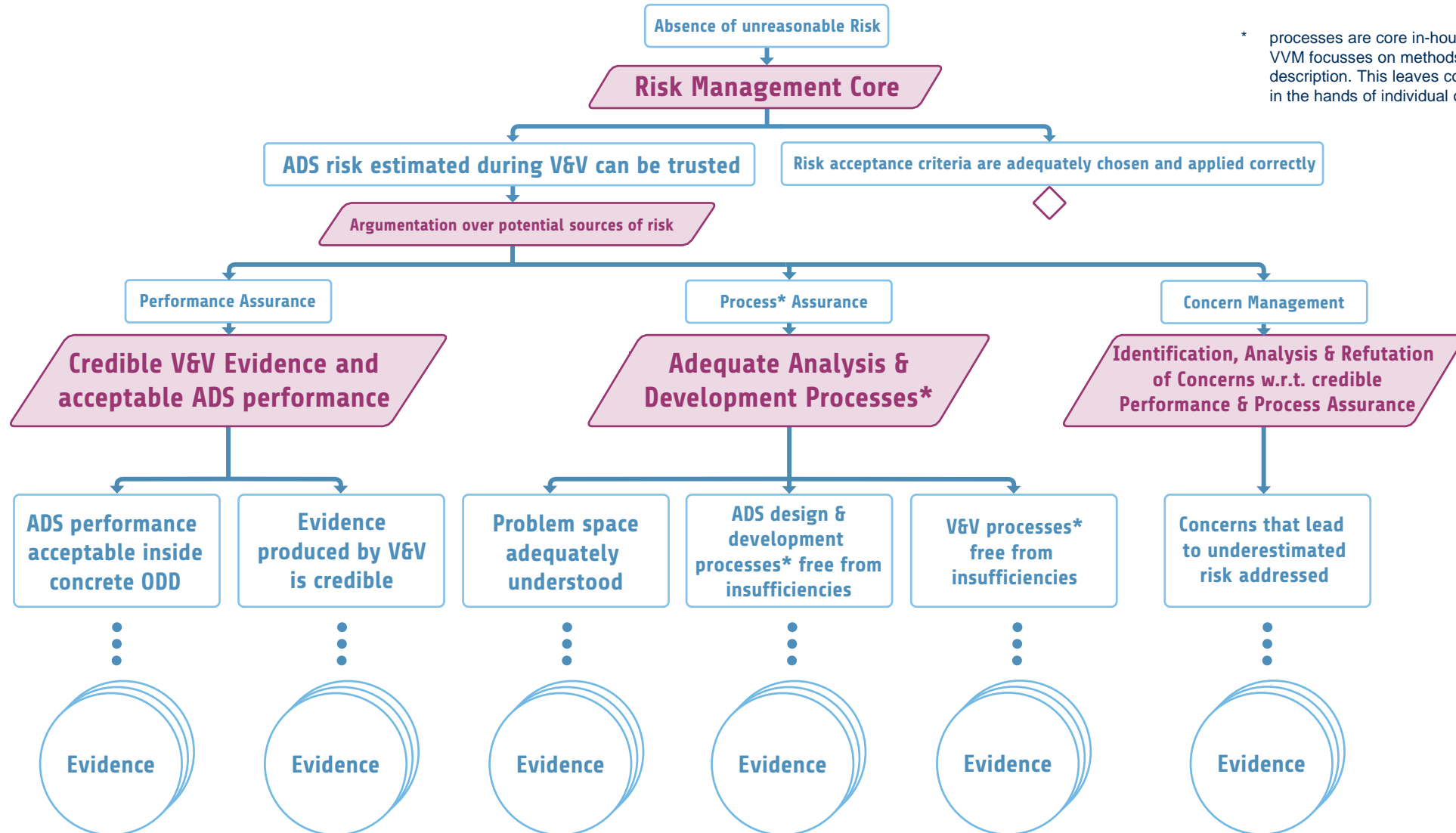
Arguing over Sources of Risk



* processes are core in-house know how, VVM focusses on methods and problem space description. This leaves concrete process argument in the hands of individual organizations.

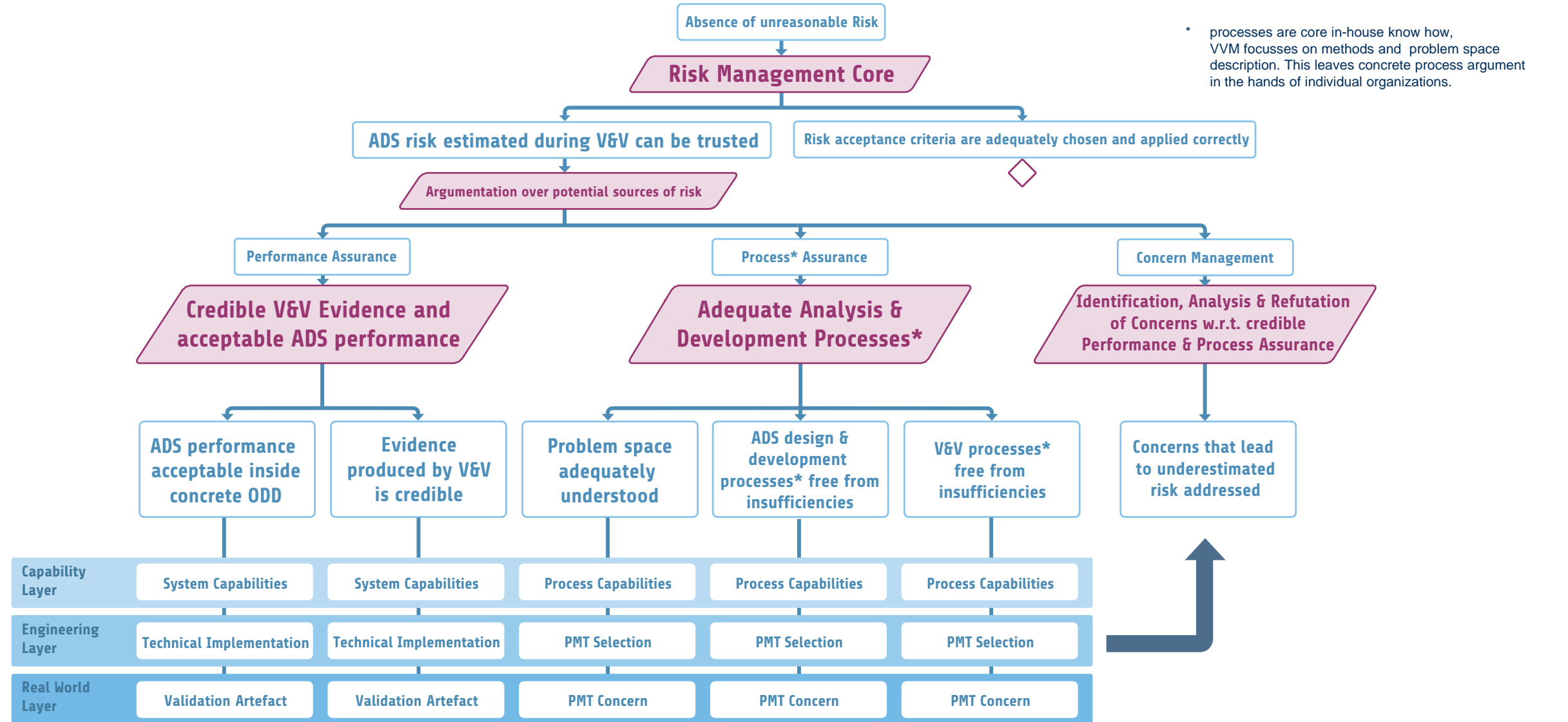


A little more Concrete...



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A Pattern for Argumentation

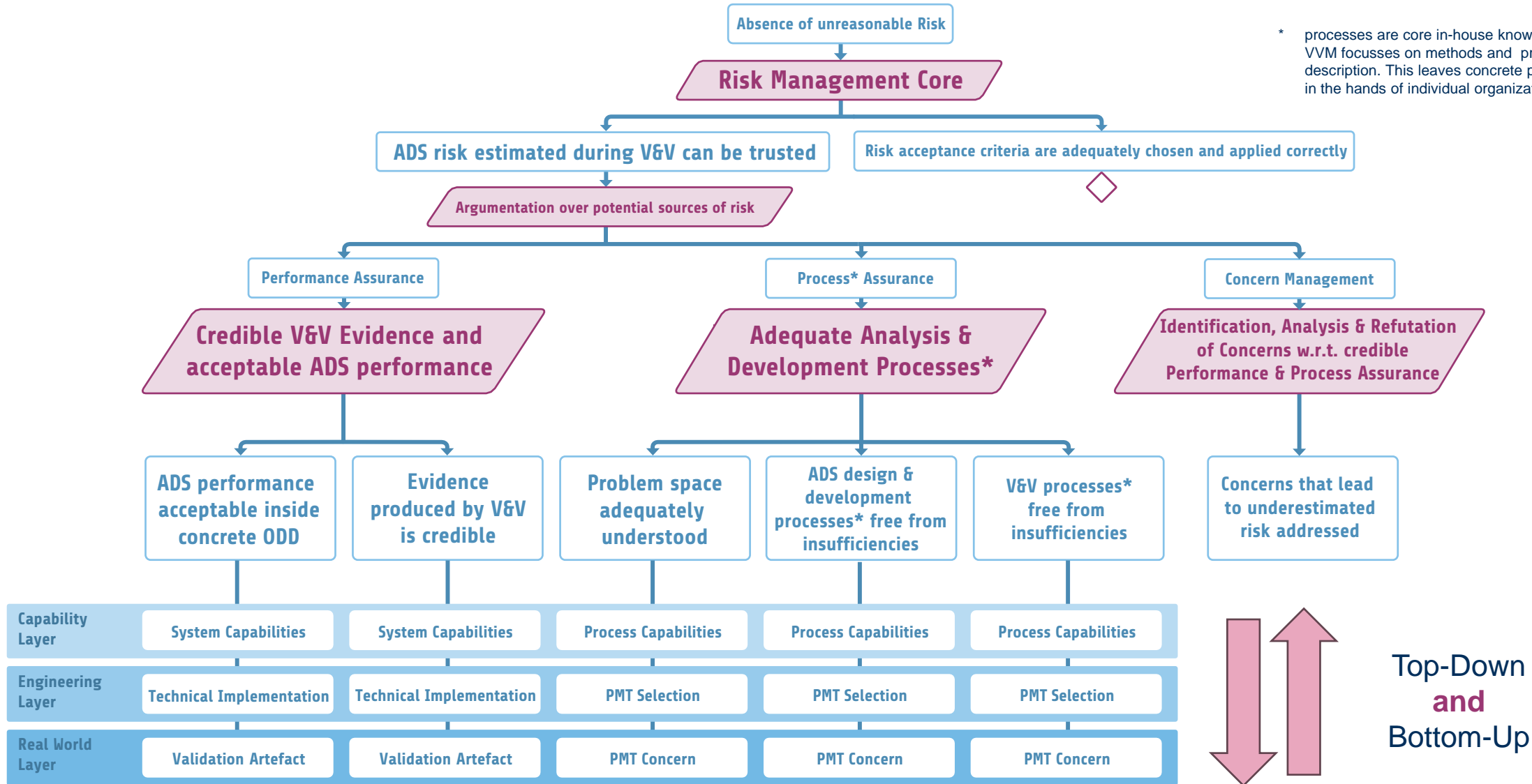


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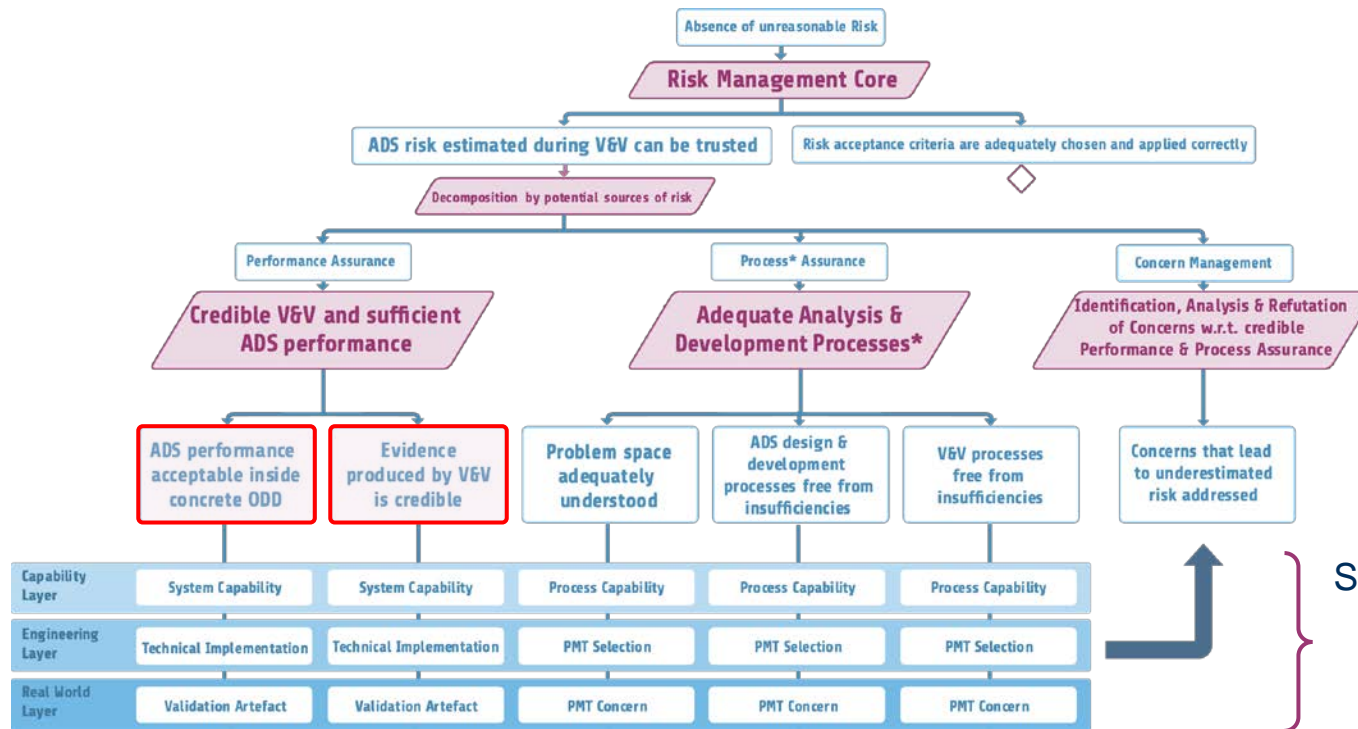
PMT = Processes - Methods - Tools

Top-Down vs. Bottom-Up



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More Details to Come



Selected examples in the following talks for VVM-approach to

- Scenario-Based V&V (Tino Brade)
- Behavior Specification (Nayel Fabian Salem)

Conclusion

- ▶ **Risk-based** top-level argumentation structure
 - ▶ Guided by Risk Management Core principles:
 - ▶ **valid** risk acceptance criteria have been chosen
 - ▶ the risk exposed by the ADS-EV has been **identified** and **analyzed**
 - ▶ the **comparison** between identified and accepted risk **is valid**
- ▶ Systematic consideration of **product** (performance) and **process** arguments
- ▶ Explicit focus on **confidence** in generated evidence

Thank you!

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Tino Brade, Bosch; Marco Fistler, IAV (contracted by BMW AG);
Christian Lalitsch-Schneider, ZF; Jan Reich, Fraunhofer IESE;
Nayel Fabian Salem, TU Braunschweig



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autonomous and connected driving

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