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for Information Security

Informal document **GRVA-21-27**
21st GRVA, 20-24 January 2025
Provisional agenda item 3

AI/ National German Activity: BSI Technical Guideline "Process Guidelines for Derivation and Practical Evaluation of AI Security Requirements in Automotive"

Federal Office for Information Security [BSI], Germany)

WP.29/GRVA 21st session, January 20th 2025, Palais des Nations Geneva Switzerland

Introduction and Motivation

- In Germany we have identified the **challenge of operationalizing horizontal AI-regulations**, e.g. the EU AI Act, in the automotive domain (noting possible corresponding developments worldwide, e.g. in China and US)

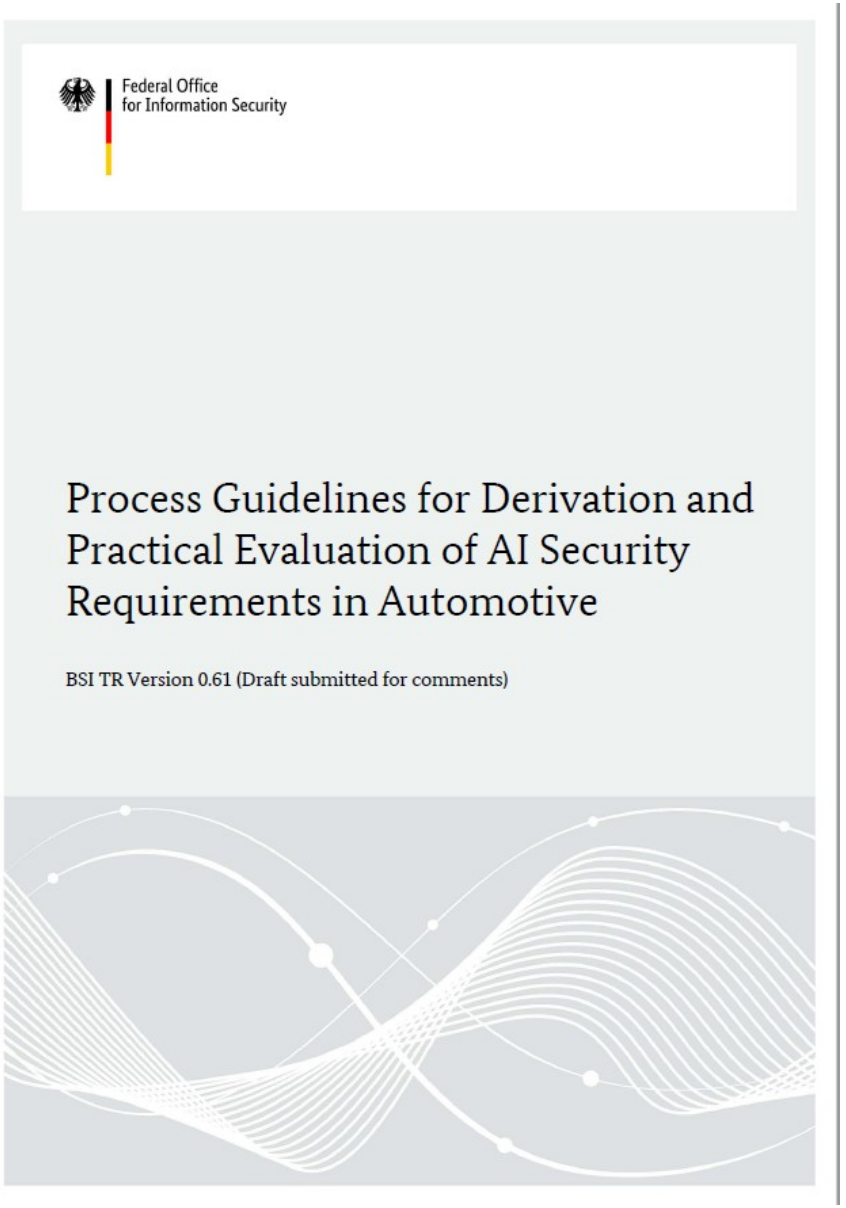
- In the project AIMobilityAudit we **worked out a process to translate existing domain-specific security and safety standards to generic and use-case-specific AI requirements and audit procedures** and presented this process togehter with exemplary audit results at the 20th GRVA session (09/2024)

- Here we present a **Draft Technical Guideline** based on the project results with a call for comments and **as a contribution to actively shape the auditing and regulation of AI systems within the automotive sector**

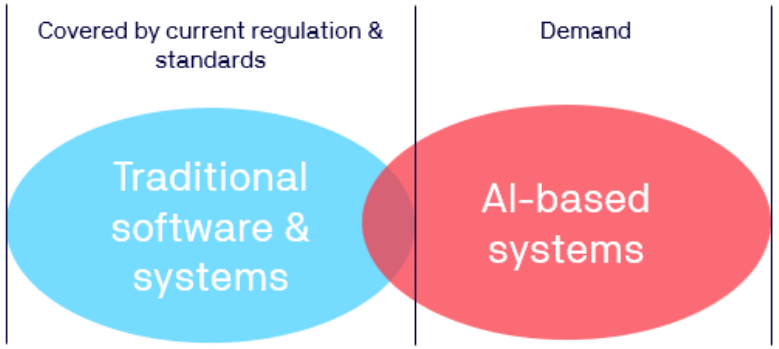
Structure of the Technical Guideline

1. Introduction
2. **Scope**
3. Terms and Definitions
4. Challenges in Compliance to Current Safety and Security Frameworks
5. **Generic Requirements for AI Systems**
6. **Generalized Audit Approach**

Appendix A.1 Exemplary Evaluation of AI Requirements based on a Use Case

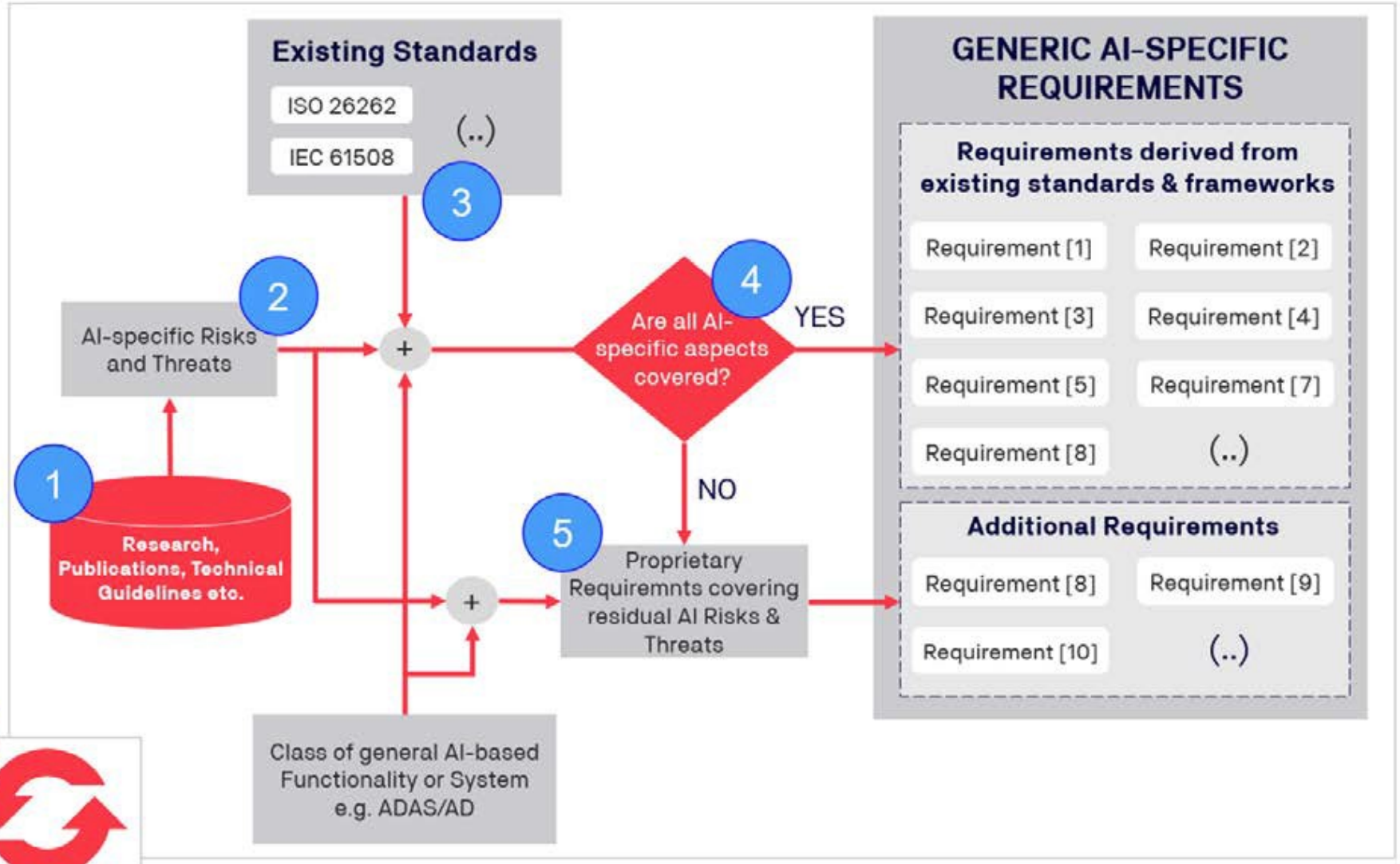


Section: Scope



- **Mapping and extension of requirements from applicable automotive safety standards** (ISO 26262, HARA methodology, ISO 21448) **for AI specific properties**
- **Robustness against AI related cybersecurity attacks** in accordance with established AI security frameworks and state-of-the-art research.
- **List of generic, use case-independent requirements**, adaptable to specific use cases and risk levels
- **Generalized iterative audit approach** to standardize and acquire practical knowledge for auditing AI systems, particularly addressing the gap of standardization and established thresholds for safety and security-critical AI systems
- **Transition from generic to specific audit requirements**, focusing on exploring methods and sources for defining and selecting thresholds and metrics for AI systems that aim to replicate non-quantifiable human behavior

Section: Generic Requirements for AI-Systems (1): Pre-requisites & Recommendation for Requirement Elicitation



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Section: Generic Requirements for AI-Systems (2): List of 15 Generic Requirements for AI-Systems in Automotive

ID	Description	Life-Cycle-Categories	Category
1	The AI design and development process shall adhere to existing standards and regulations, and it shall be tracked and documented.	Design & Development	Design & Development
2	The system shall implement safety mechanisms to prevent failures of the AI component.	Design & Development, Operation & Monitoring	Design & Development
3	The least complex AI model architecture shall be chosen to limit risks and enhance explainability.	Design & Development, Verification & Validation	Design & Development
4	The datasets shall be managed according to standardized methods, and all key processes shall be well-documented.	Design & Development, Verification & Validation	Data Management
5	The datasets shall undergo quality assessments and be adequately prepared for training and testing.	Design & Development, Verification & Validation	Data Management
6	The AI system shall be developed, tested, and operated within its operational design domain.	Design & Development, Verification & Validation, Deployment, Operation & Monitoring	Performance
7	The AI model shall consistently meet performance requirements.	Verification & Validation, Deployment, Operation & Monitoring	Performance
8	The AI model and system shall be tested against test scenarios created by domain experts.	Verification & Validation	Performance

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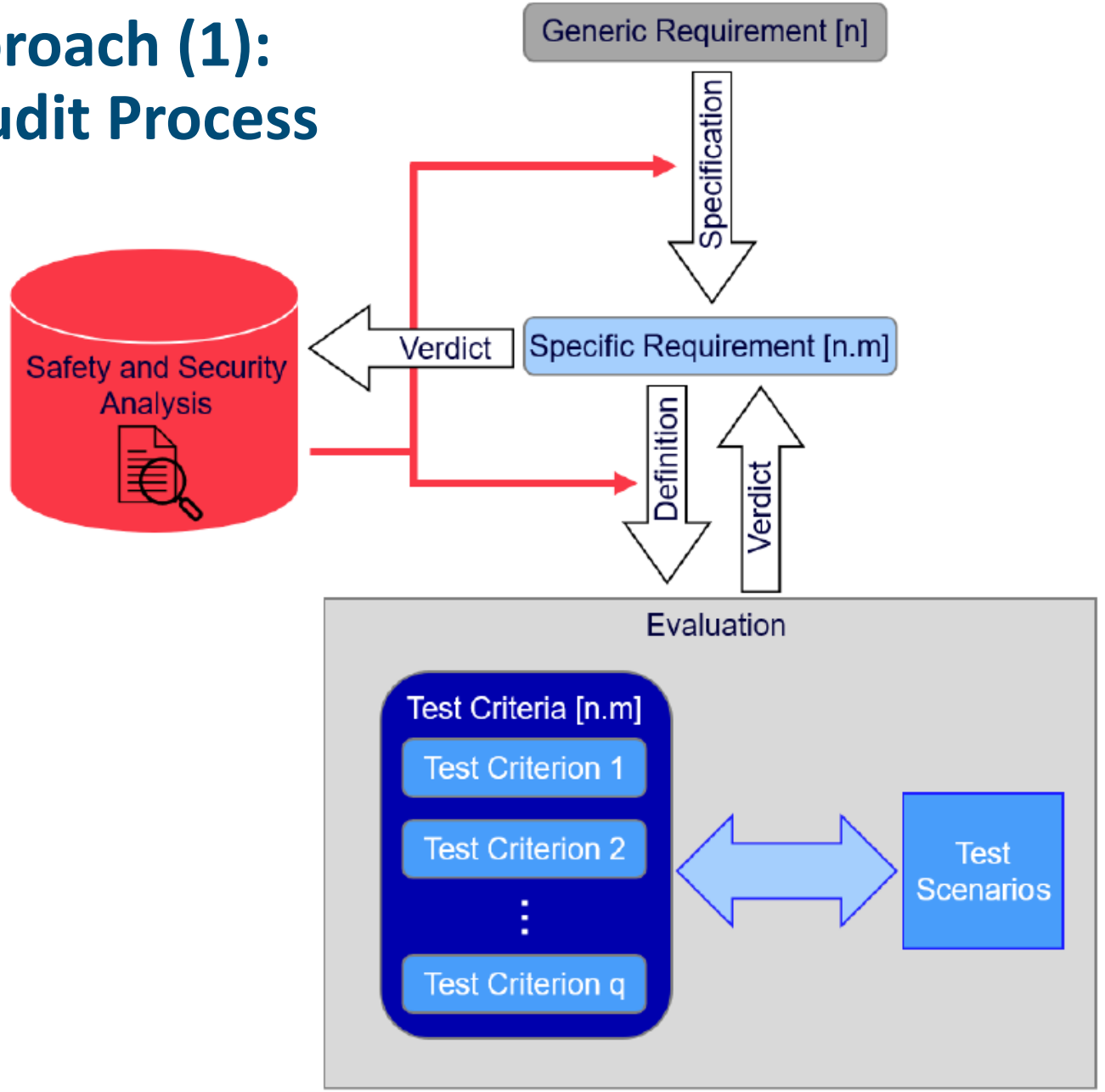
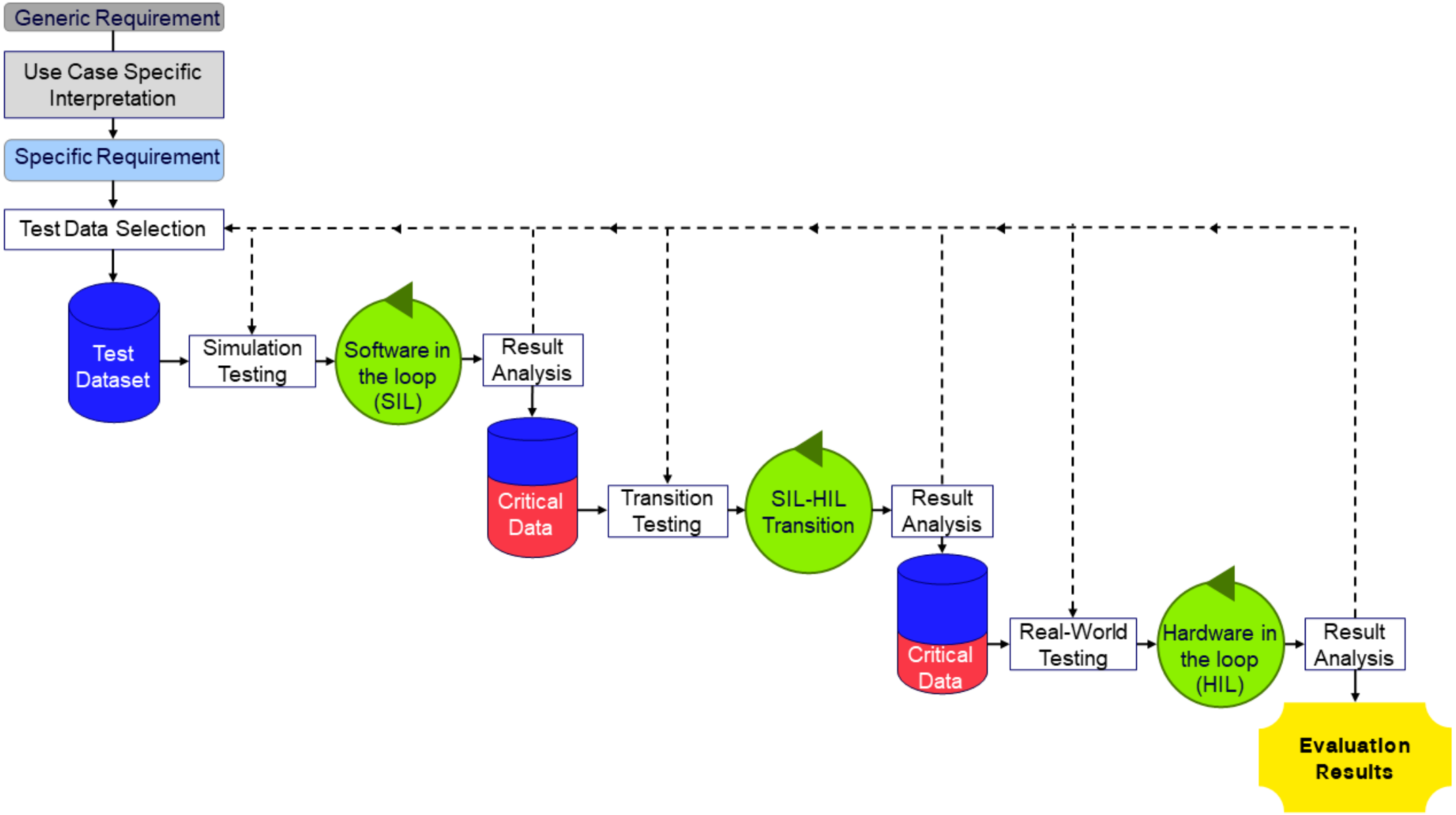
Section: Generalized Audit Approach (1): Iterative Evaluation Scheme/Audit Process

- **Sources to support the definition process** may include input and alignment from real-world feedback, simulations (Hardware-in-the-Loop/Software-in-the-Loop), and benchmarks of human performance

- **Multiple challenges within the process of defining precise values and thresholds**, e.g. high variety of input data and human performance variability



Section: Generalized Audit Approach (2): Testing Activities

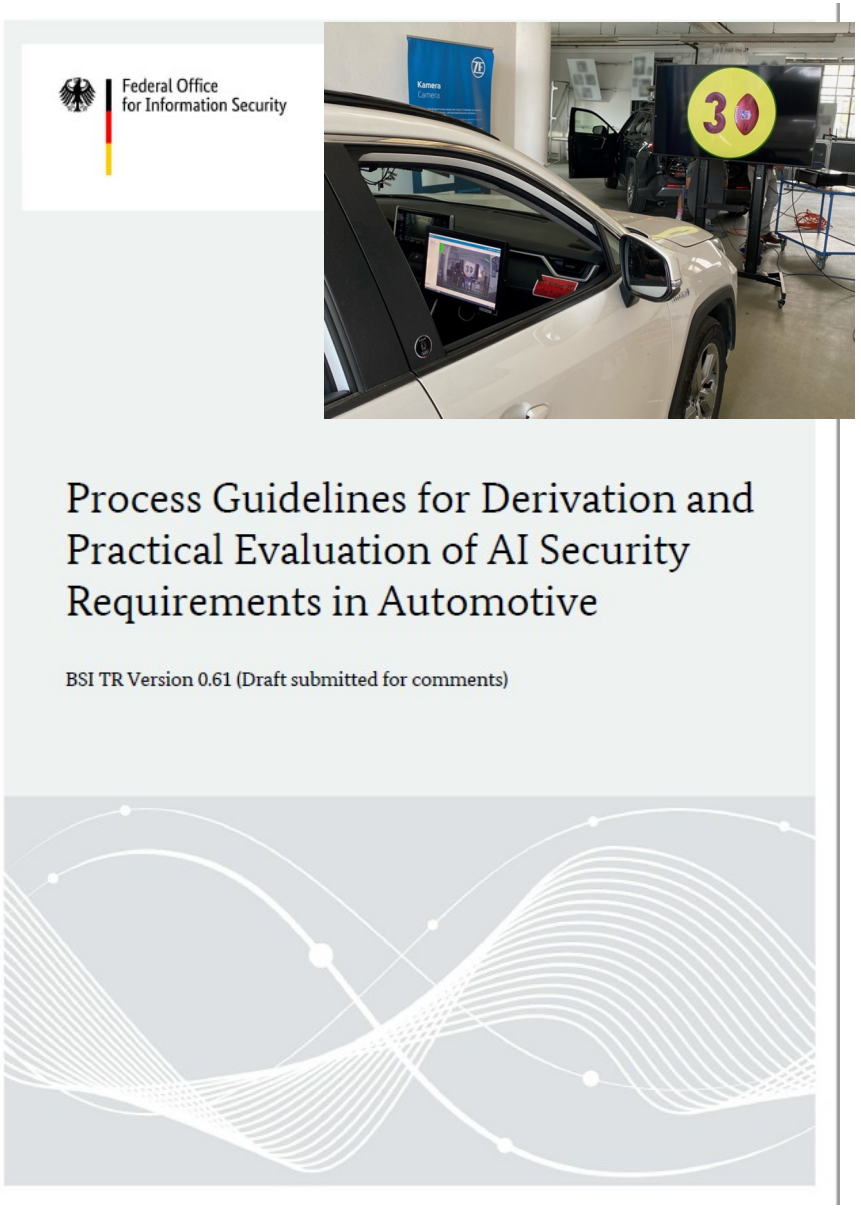


Appendix A.1 Exemplary Evaluation of AI Requirements based on a Use Case – Demonstrate the Practical Feasibility

- **Real-world automotive use case** (road user detection) **to evaluate an exemplary AI requirement** (the system shall be robust against relevant AI-related threats)
- **HARA:** 1. non-detection, 2. false detection, 3. false classification
- **Specification:** the system shall be robust against adversarial patches
- **Definition of test criteria:** the system shall be robust when exposed to a series of (1) black-box and (2) white-box adversarial body patches.
- **Dynamic & static tests** in simulation, transition testing and real world

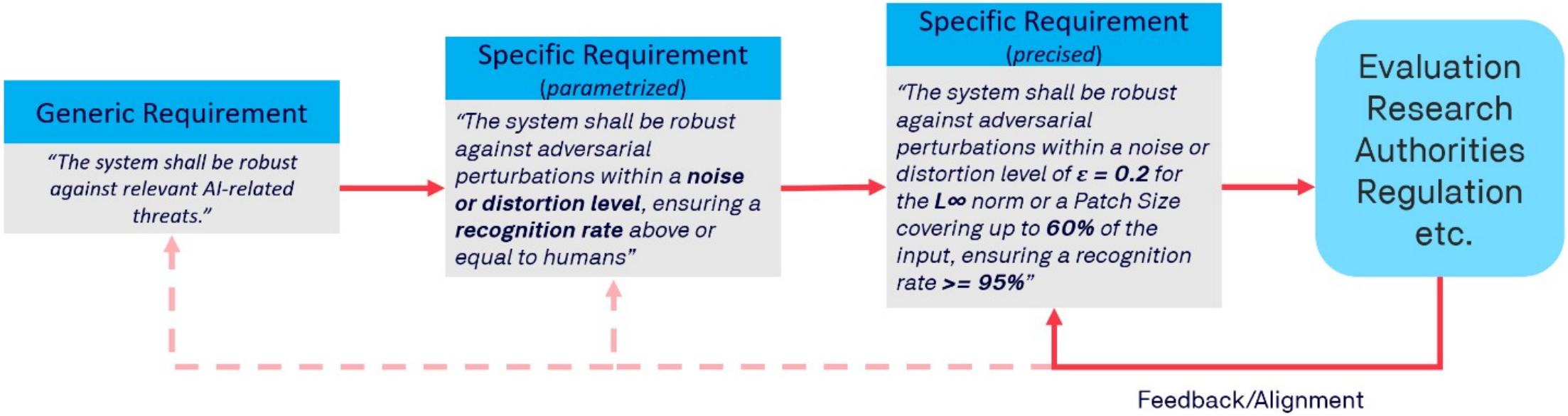
Next Steps

- **Coordinate draft technical guideline** (TG) with interested parties from government, industry and research
- **Apply TG to other use cases** and update according to evaluation results
- **Use TG as a contribution to shape the process of AI regulation for the automotive sector from within the sector**
- **Align TG with other approaches** and discuss open questions, e.g. in joint working group



Exemplary Open Questions

- How can reproducability and comparability of the generic approach be achieved as e.g. in the type approval process? How to align thresholds to achieve comparability?
- How can the iterative approach with continouos refinement be integrated into the process of type approaval and market surveillance?



Thank you for your attention!

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