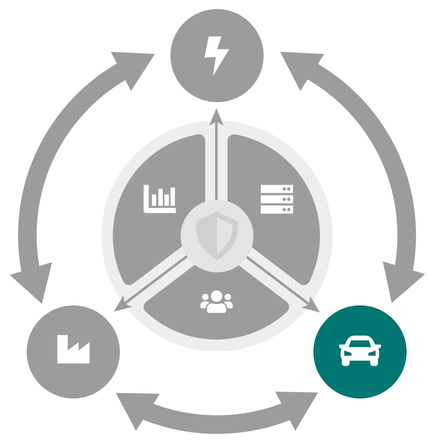
Karlsruhe Institute of Technology

P1T3

Collaborative Legal Assessments and Confidentiality Analysis under Uncertainty



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(Dependability, Legal Informatics)

Motivation and Research Questions

Modern mobility systems cross **technical domains,** operate within **various legal frameworks**. Further, the high variability regarding their internal structure and real-world environment leads to **uncertainty**.

➡ How to enable collaborative **data protection assessments** based on **software architecture**?

➡ How to analyze confidentiality at **design time** while considering the impact of **uncertainty** on the software architecture?

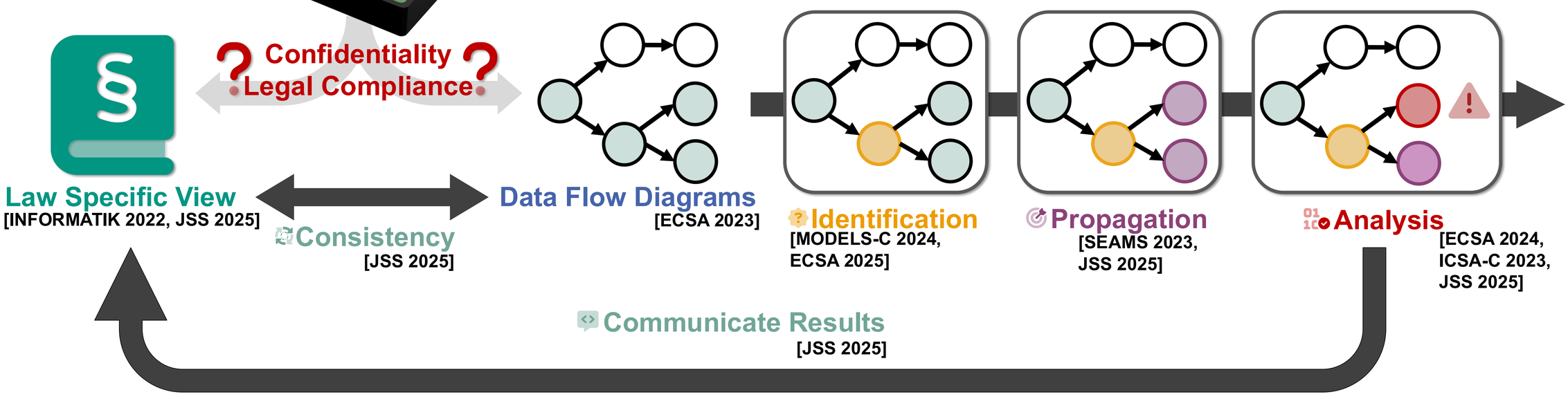
Impact

- **Improved communication** between domains, enables **efficient** development of **legally compliant** mobility systems.
- **Foundation** for future research in the field of **uncertainty interactions** and **self-adaptive systems**

Research Activities and Results

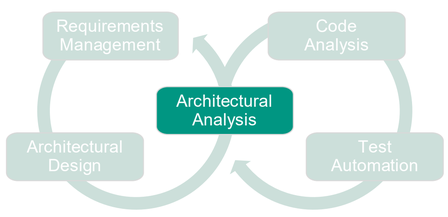
- Framework for collaborative and continuous data protection legal assessments [INFORMATIK 2022, JSS 2025, ECSA 2025]
- Approach for architecture-based and uncertainty-aware confidentiality analysis [SEAMS 2023, ICSA-C 2023, MODELS-C 2024]

- **Next steps:**
- Applying machine learning for the automated mitigation of confidentiality violations
- Conduct a user study for usability and learning effects



Publications

- An Extensible Framework for Architecture-Based Data Flow Analysis for Information Security. In: ECSA 2023.
- Architecture-Based Uncertainty Impact Analysis to Ensure Confidentiality. In: SEAMS 2023.
- A Model-Based Framework for Simplified Collaboration of Legal and Software Experts in Data Protection Assessments. In: INFORMATIK 2022.
- Model-based Confidentiality Analysis under Uncertainty. In: ICSA-C 2023.
- Bridging Legal and Technical Realms: An Architecture-Model-Based Framework for Continuous Data Protection Legal Assessments. In: JSS 2025 (under review).
- ARC³N: A Collaborative Uncertainty Catalog to Address the Awareness Problem. In: MODELS-C 2024.
- Towards Legal Knowledge Transfer Based on Software Architecture. In: ECSA 2025.



Modeling the Legal Framework for IT-Security in the Mobility Domain

KASTEL