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Sampling Infinite Configuration Spaces

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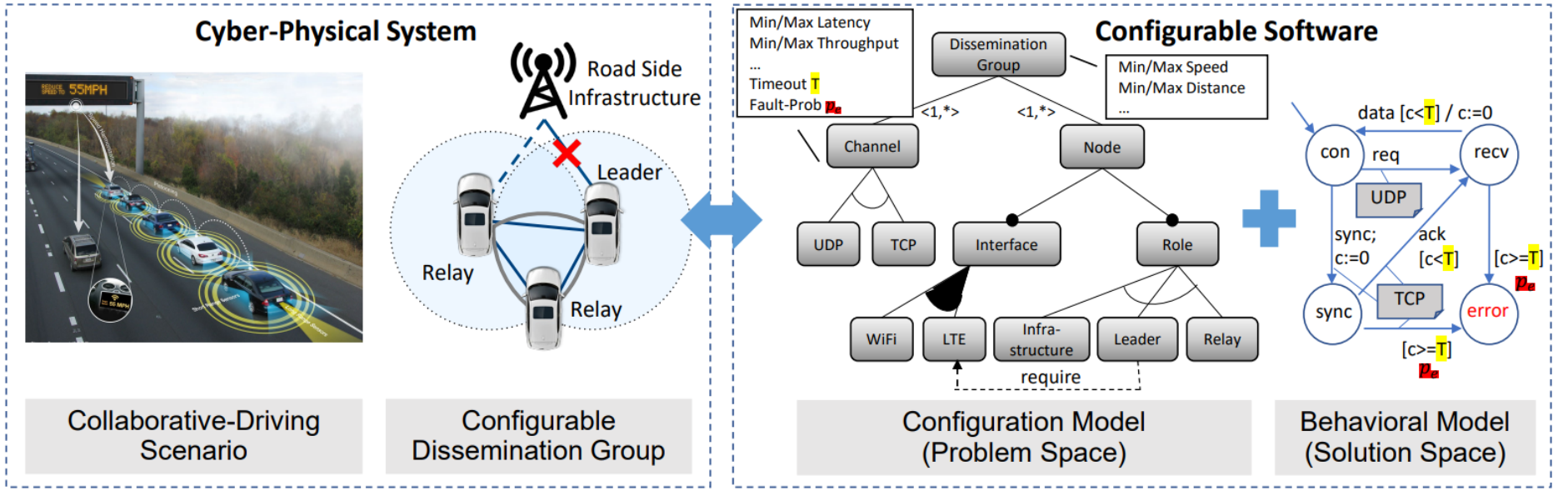
FOSD Meeting 2023, March, 27th – 31th
University of Ulm

Infinite Configuration Spaces

Min/max convoy size

Safety goals



Communication protocols

NFP goals

- Configuration options with **infinite value domains** (e.g., non-Boolean features for configurable NFP).
- Configuration options with **multiple instantiations** (e.g., multiplicity-annotated cloneable features for configurable amounts of resources).

Modeling and Sampling of Infinite Configuration Spaces

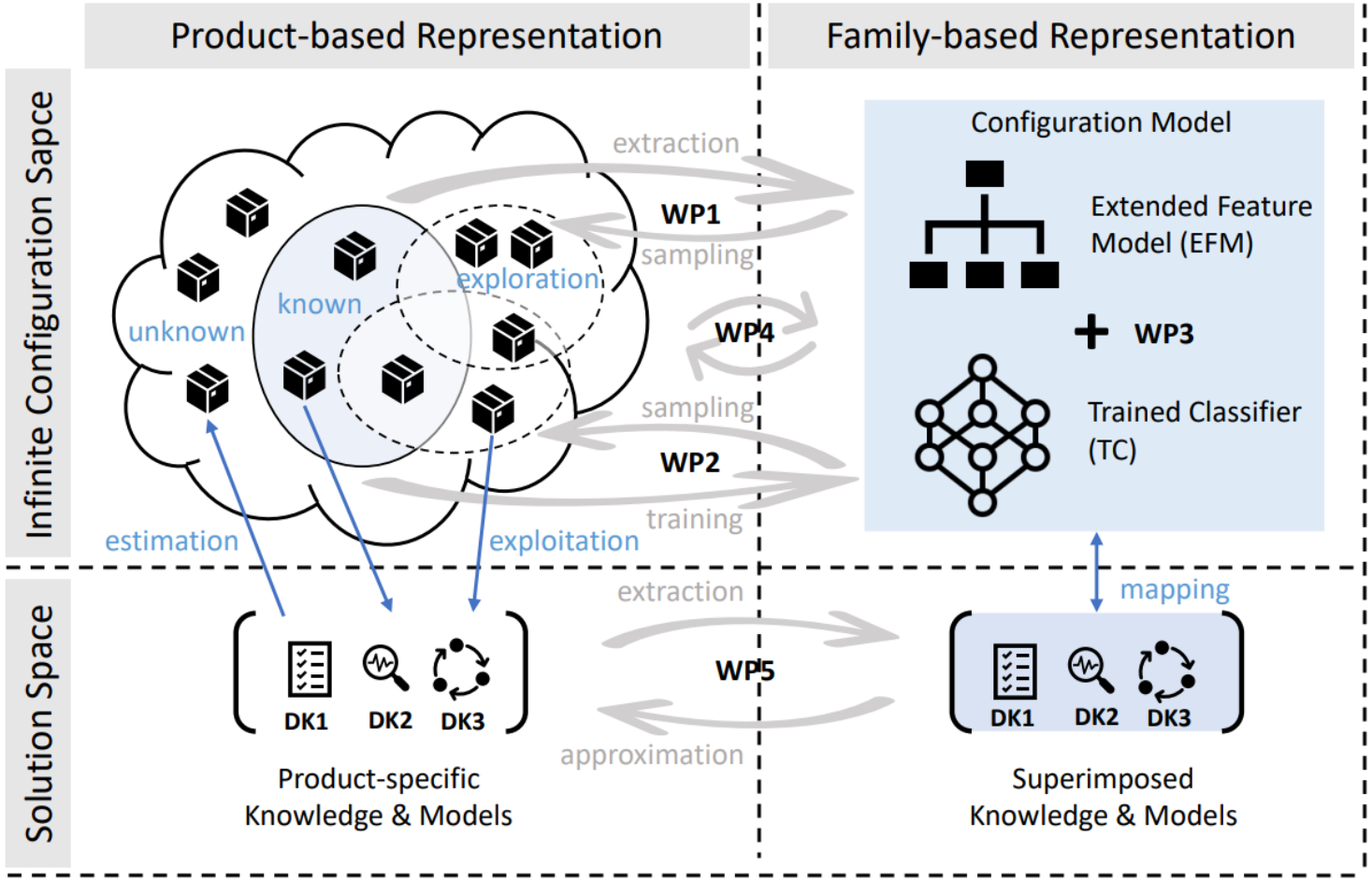
- Many recent sampling techniques for configurable software require **a-priori available configuration models completely specifying finite** (Boolean) configuration spaces for sample generation.
  [e.g., T-wise, uniform distribution, distance-based]
- Many recent exploration techniques for (partly unknown) configuration spaces of configurable software employ **a-priori known (property-labeled) Boolean configuration vectors** as training data to predict *one* configuration with estimated optimal/critical properties.
  [e.g., NFP, error predication]

Research Challenges

- **Adapt model extraction** techniques for exploring multi-dimensional infinite configuration spaces with a-priori unknown constraints and properties.
- **Define novel sampling criteria** and corresponding sample-generation techniques for covering multi-dimensional infinite configuration spaces.
- **Improve precision of extracted models** and **effectiveness of samples** by an incremental feed-back loop for/by continuously exploiting domain knowledge.

➡ Continuous Sampling – Measuring – Learning – Validation – Loop

Continuous Sampling – Measuring – Learning – Validation – Loop



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Co-InCyTe

Continuous Exploration of Infinitely Configurable Cyber-Physical Systems for Sample-based Testing

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