Nardò Technical Center

Porsche Engineering

UNIVERSITÀ
DEL SALENTO

SimLab: General Work Model

INFRASTRUCTURE & COMPETENCES AT **NARDÒ TECHNICAL CENTER**

- Testing & Validation of ADAS, Chassis, NVH systems
- Integration of physical test and simulation
- HW/SW automotive solutions development

INTEGRATED OUTCOME

SIMLAB

- **Joint R&D laboratory** enabling collaborative research and development activities
- Full immersion in extended, realistic environments to simulate **complex scenario**
- Integration with **automated, robotized test systems** for advanced validation

RESEARCH & DEVELOPMENT AT **UNIVERSITY OF SALENTO**

- Advanced research in digital simulation
- Development of Vehicle Models and Digital Twins
- Thesis, PhD programs and joint projects

SimLab: specifications

911 GT3 RS Cockpit

6 DOF · 800 kg Payload

Motion System Hexapod

210° Curved Screen

	Excursion	Velocity	Acceleration
Surge	-0.37m,0.35m	0.68m/s	0.68m/s²
Sway	-0.33m,0.33m	0.75m/s	7m/s²
Heave	-0.18m,0.22m	0.4m/s	5m/s²

	Excursion	Velocity	Acceleration
Roll	-24.5°,24.5°	40°/s	550°/s²
Pitch	-23.6°,21.8°	45°/s	600°/s²
Yaw	-37.0°, 37.0°	65°/s	800°/s²

SimLab: activity portfolio

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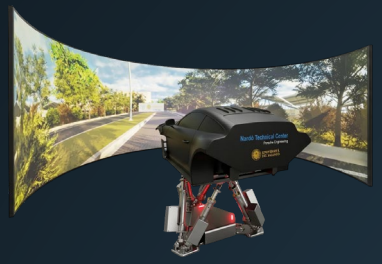
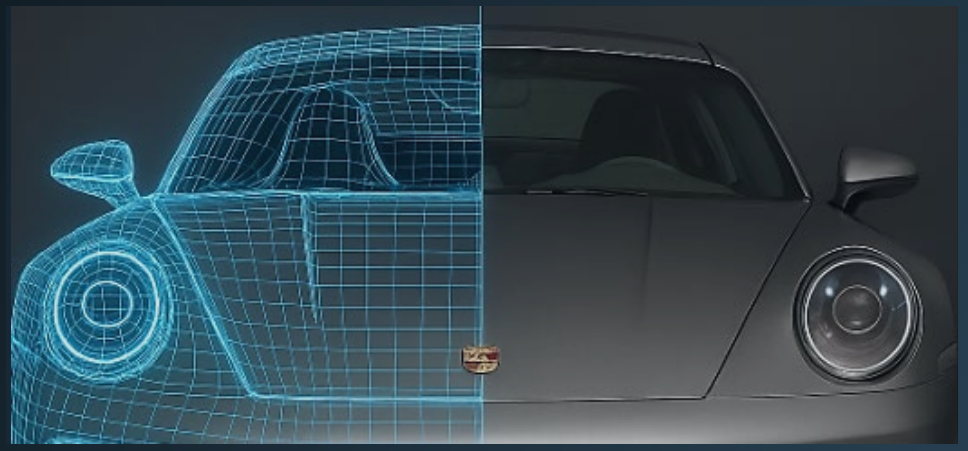
Customer-oriented use

- Realization of Customer specific V-ODD solutions
- Virtual Nardò – Tracks bundles and adaptions
- Real Time computing for veh. HW integration (incl.HIL)
- Validation activities (Virtual + Real)





Independent yet collaborative: a shared model integrated into joint activities.

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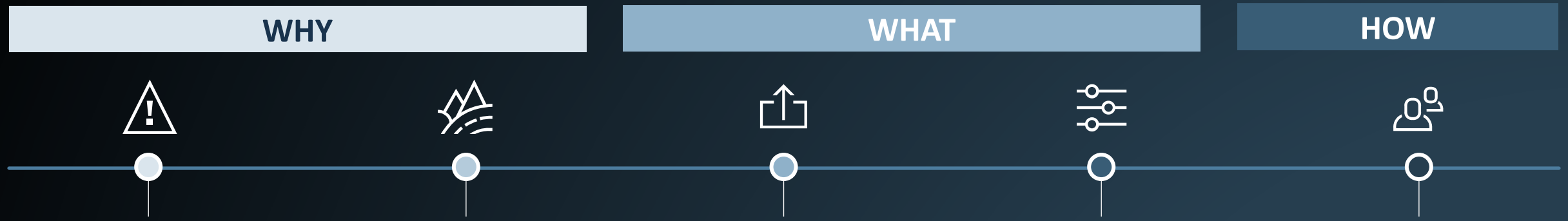
Research-oriented Use

- Scientific research in vehicle dynamics and simulation
- PhD projects, thesis, and academic programs
- Development of innovative simulation models and methods
- Experimental validation of research hypotheses

SimLab: contributes and services

Research Project: from current constraints to our approach

Enabling realistic and context-aware evaluation of vehicle systems through integrated large-scale simulation and driver monitoring.



CONSTRAINTS

- Simplified and isolated test scenarios
- Interaction between traffic, environment and driver

REALISM

- Need for context-rich and dynamic environments
- Driver behavior strongly influenced by surrounding complexity

INTEGRATION

- Coupling traffic, vehicle dynamics human behavior
- Unified simulation and driver monitoring framework

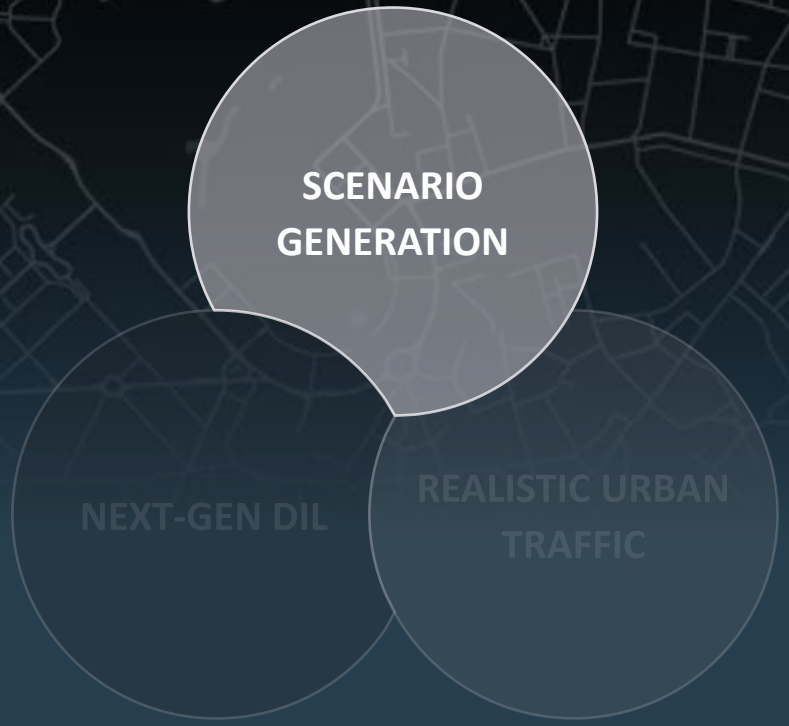
SCALABILITY

- Large-scale multi-agent traffic simulation
- From single event to complex, emergent interaction

ORCHESTRATION

- Real-time co-simulation management
- Automated 3D-2D scenario integration

Research Project: 1st goal (scenario generation)



Procedural 3D Environment Generation
Development of real-world urban scenarios for high-fidelity ADAS and DIL validation

Automated 2D SUMO Scenario Creation
Rapid traffic network modeling for vehicular interaction and emission estimation

Procedural 3D urban scenario generation

INITIAL DATA INGESTION

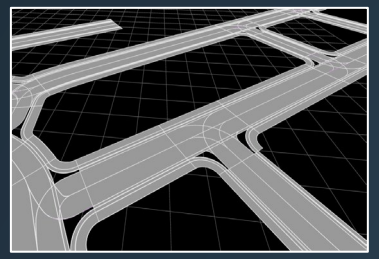
Dtwin area selection

Raw data extraction

Fragmentary and incomplete data

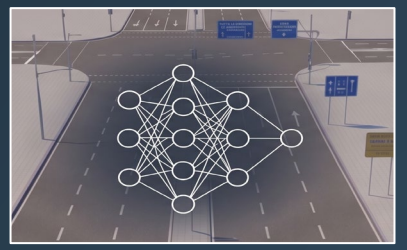
CORE PROCESS - NET RECONSTRUCTION

Semantic enrichment



Raw input

Roads properties assignment



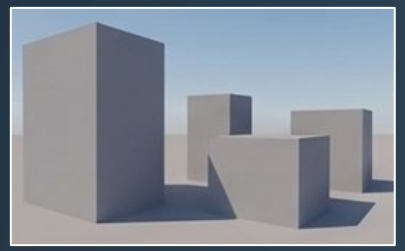
AI inference & modeling

Linking altimetry and road signal

Total network modeling

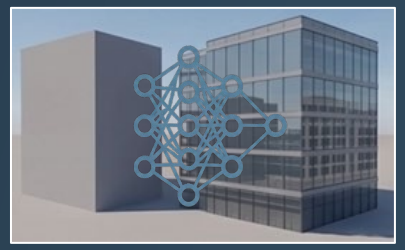
CORE PROCESS - BUILDING RECONSTRUCTION

Satellite data extraction



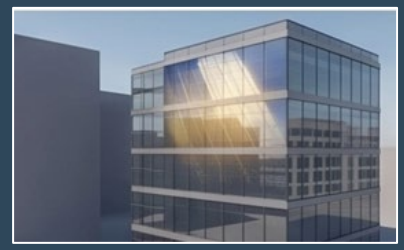
Simple volumetric input

Geometric properties assignment



AI propriety assignment

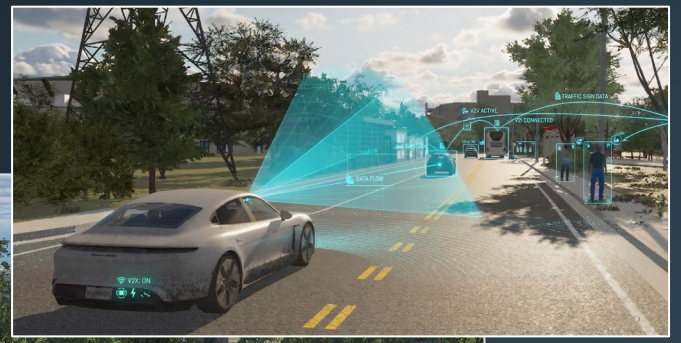
High fidelity material generation



Final building modeling

Procedural 3D urban scenario generation

TOWARDS THE FINAL SCENARIO



KEY ADVANTAGES

- Automated Procedural Generation Framework
- Comprehensive Physical and Material Modeling
- High-Fidelity Reproducibility of Road Scenarios and Vehicle Testing
- Enhanced Graphical Immersion for DIL Systems
- Advanced ADAS Validation Methodologies

Research Project: 2nd goal (realistic urban traffic)

Synchronized Traffic & Driving Simulation

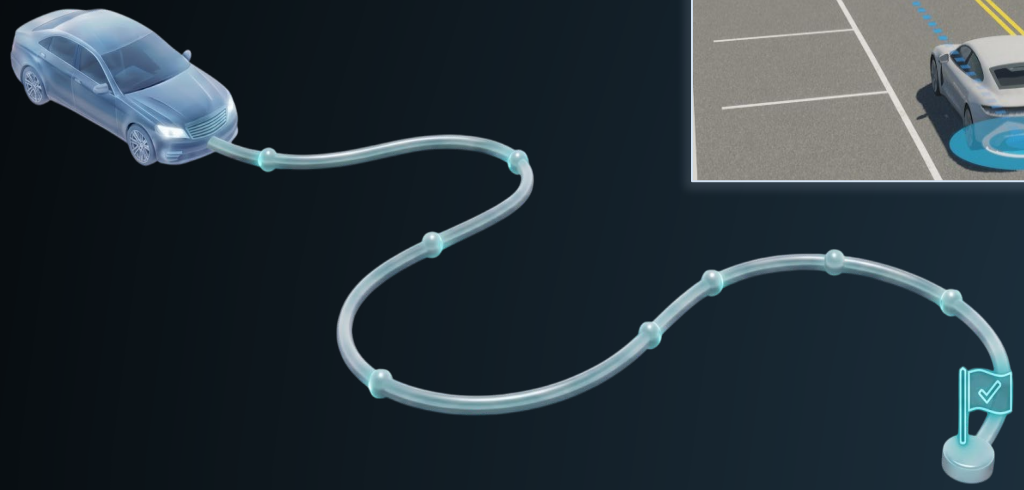
Integrating Cosimulation SUMO-based 2D microscopic traffic models with high-fidelity 3D environments for real-world vehicular simulation

Comparative Analysis of Simulation Architectures

VI-WORLDSIM SCENARIO CONFIGURATION

Manual route assignment for each individual vehicle

Vehicle rendering limited by computational constraints



CO-SIMULATION SCENARIO CONFIGURATION

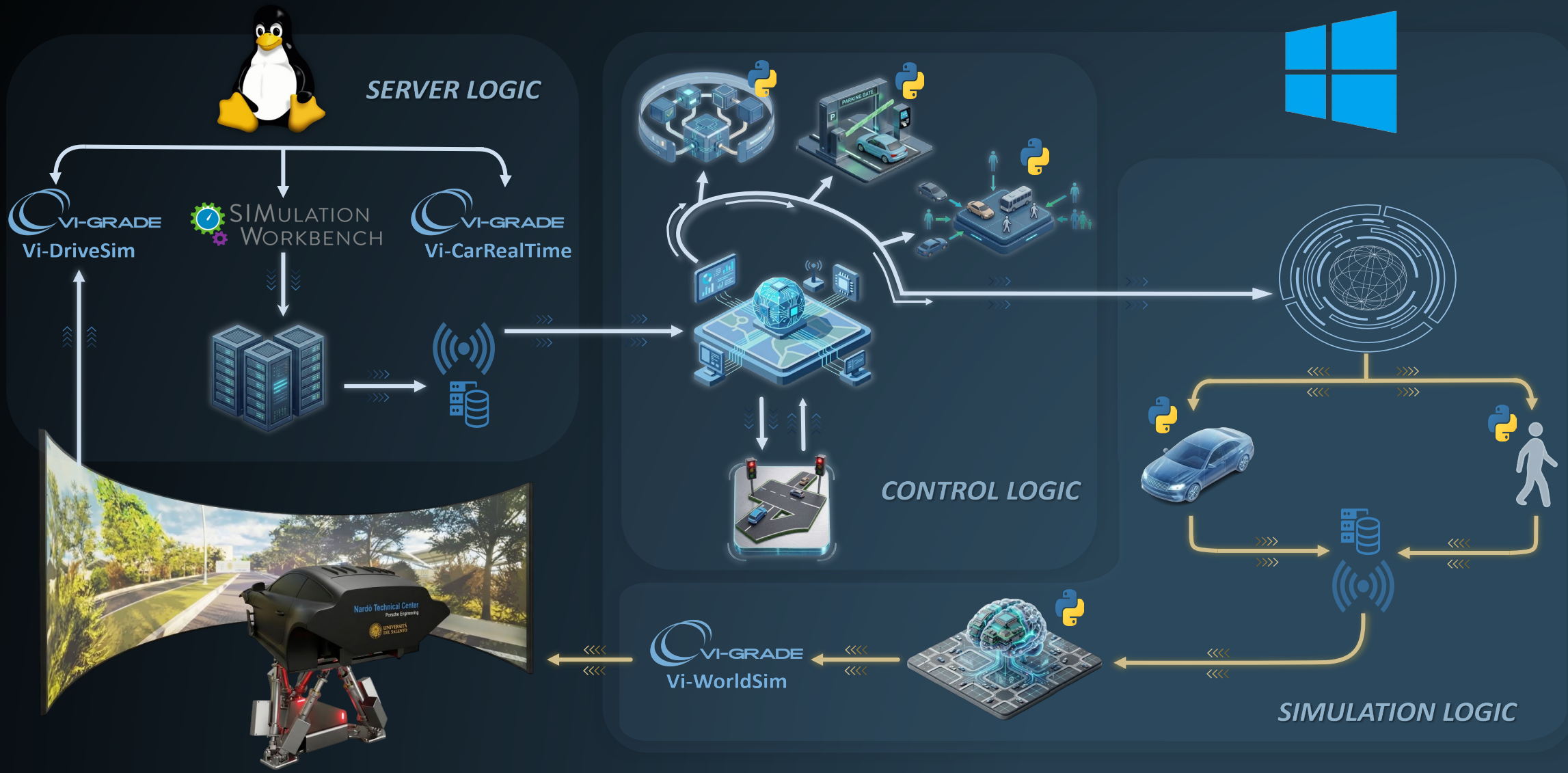
SUMO VI Grade

INTEGRATION | SIMULATION

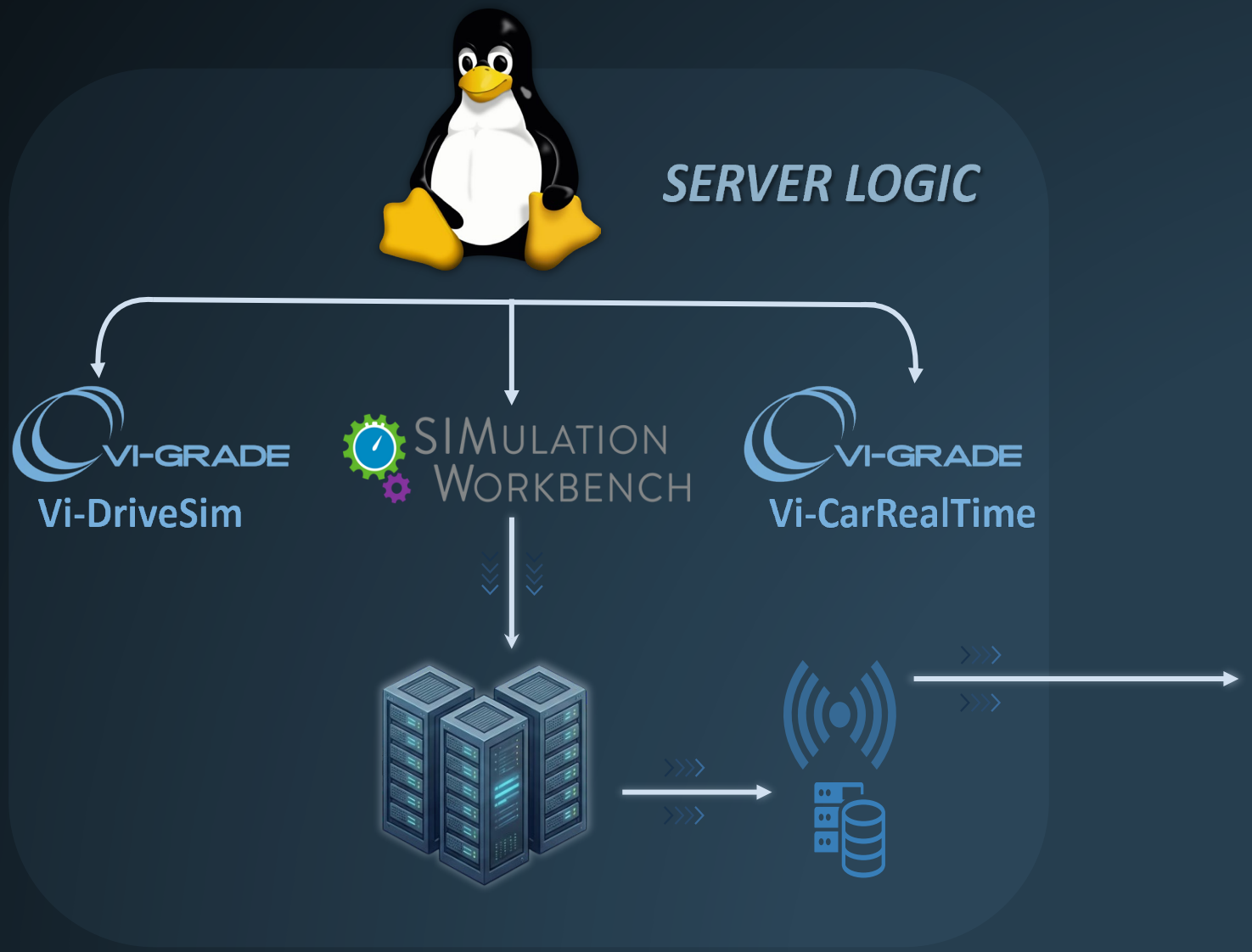
Automatic real urban traffic generation via

No rendering constraints on simulated actors

Urban traffic co-simulation framework



Urban traffic co-simulation framework



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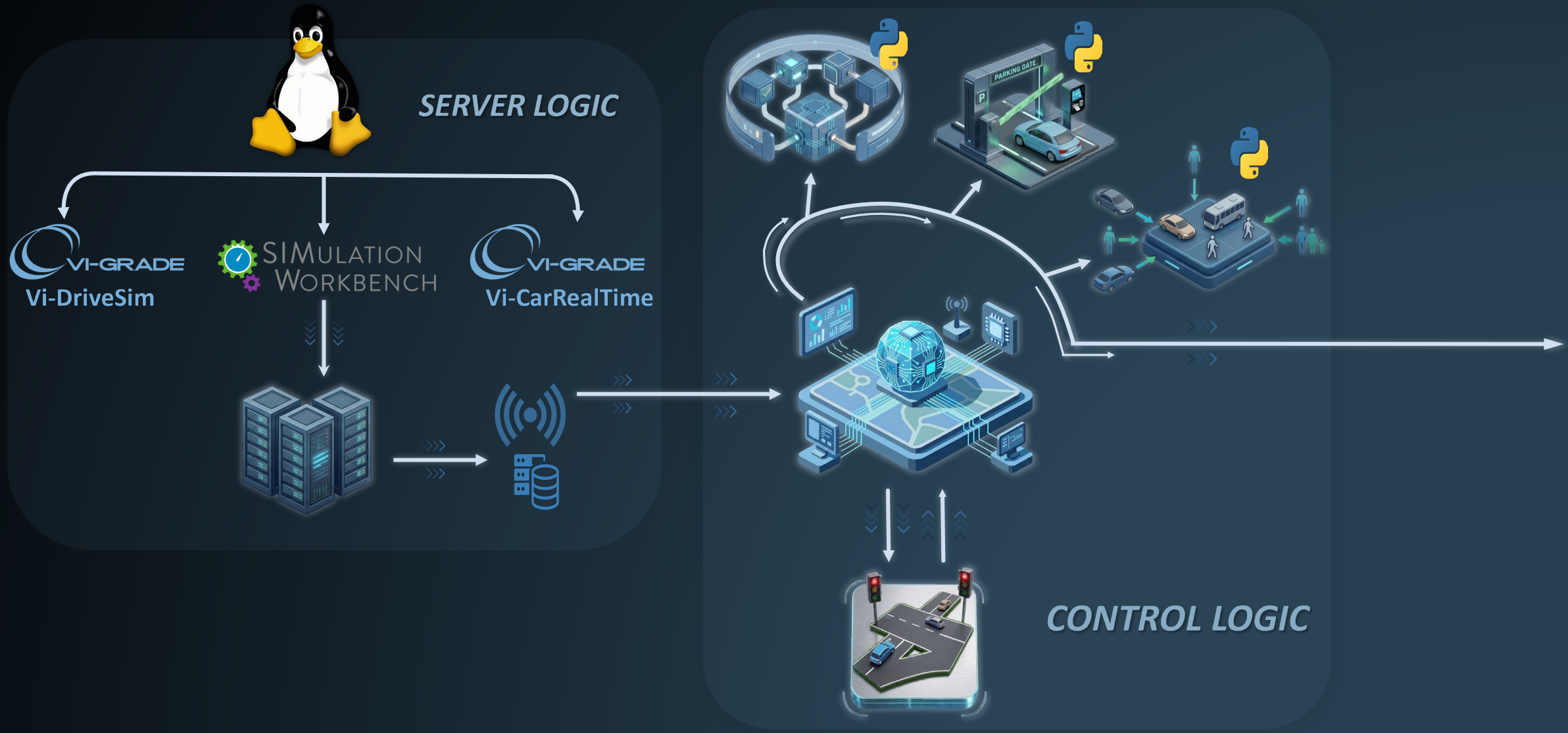
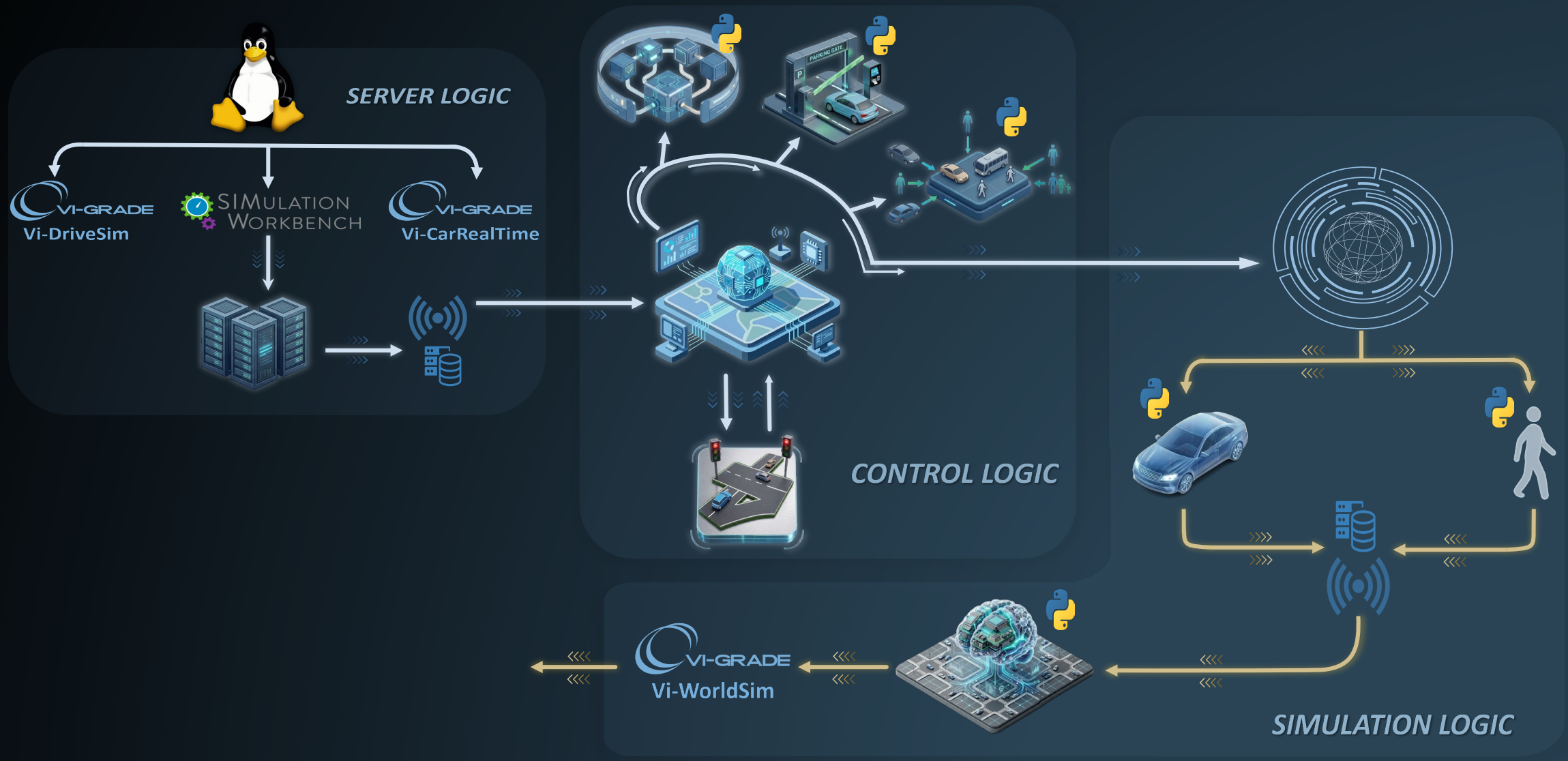
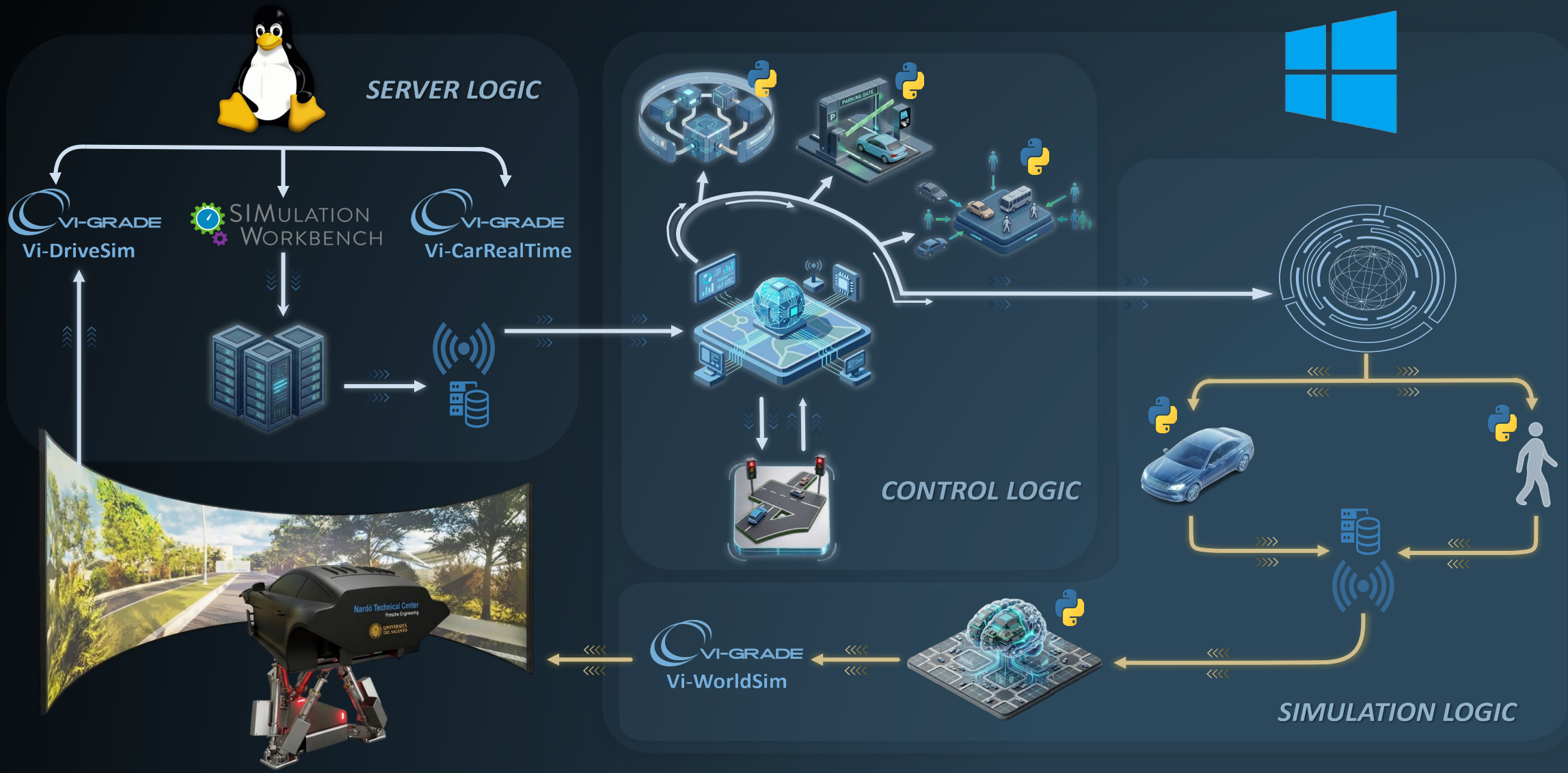


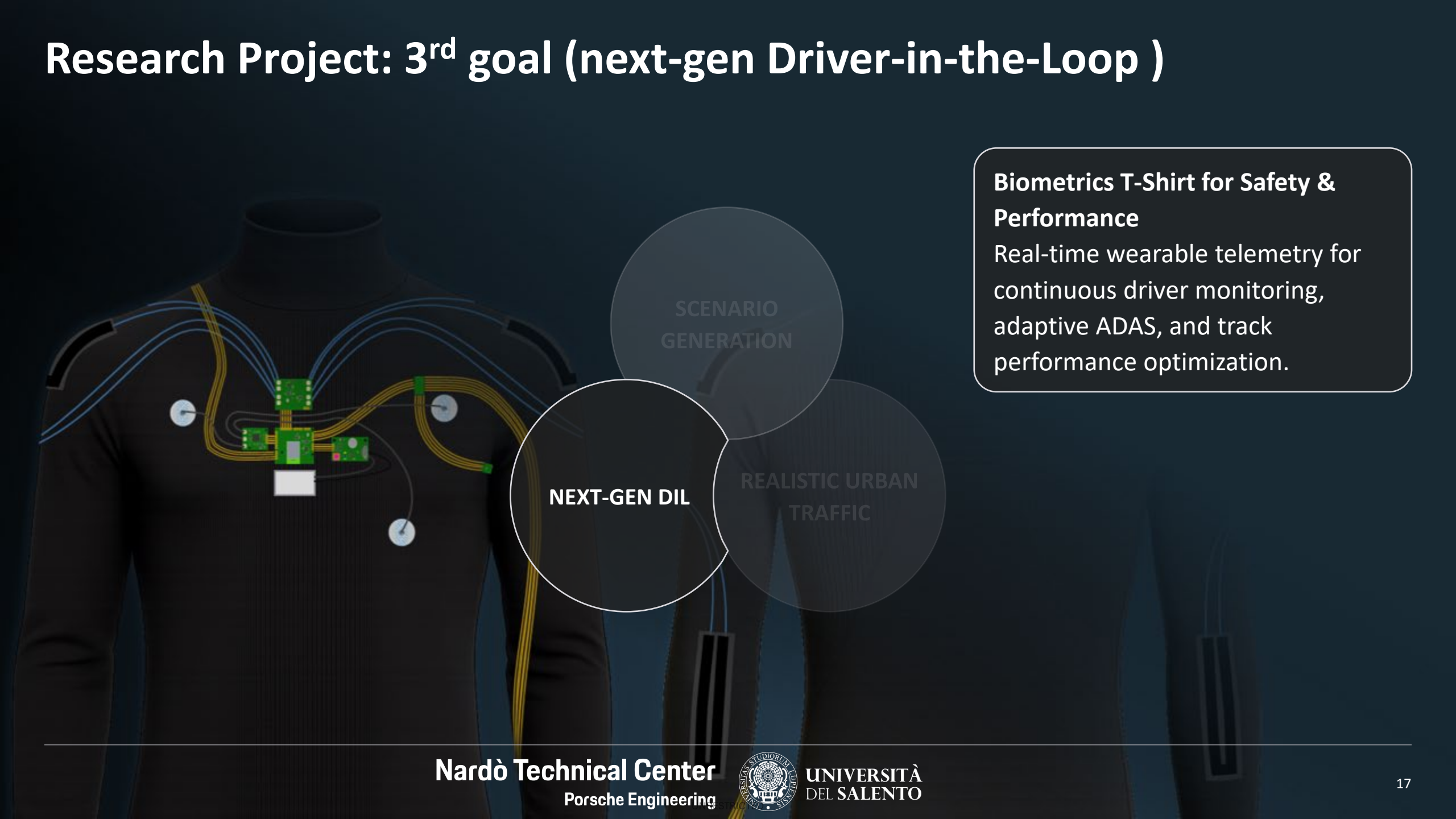
Urban traffic co-simulation framework



Urban traffic co-simulation framework



Research Project: 3rd goal (next-gen Driver-in-the-Loop)



Biometrics T-Shirt for Safety & Performance

Real-time wearable telemetry for continuous driver monitoring, adaptive ADAS, and track performance optimization.

Next-gen DiL: biometric analysis

Adapting autonomous driving algorithms to the driver's psychophysical state

Checking the driver's health status over time to ensure long-term safety

Optimizing track performance through real-time biometric and motion data analysis

Next-gen DiL: key advantages

Bluetooth and high-frequency data transmission that enables precise real-time monitoring

Ultra-miniaturized sensors and control boards with removable components

Long-lasting battery life optimized for extended on-track testing sessions

Next-gen DiL: sensor setup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DEL SALENTO

Salvatore Lomartire

ADAS & Simulation Engineer, Nardò Technical Center - Porsche Engineering

salvatore.lomartire@porsche-nardo.com

Pasquale Licci

Automotive Systems & Simulation Researcher, University of Salento

pasquale.licci@unisalento.it

Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

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