

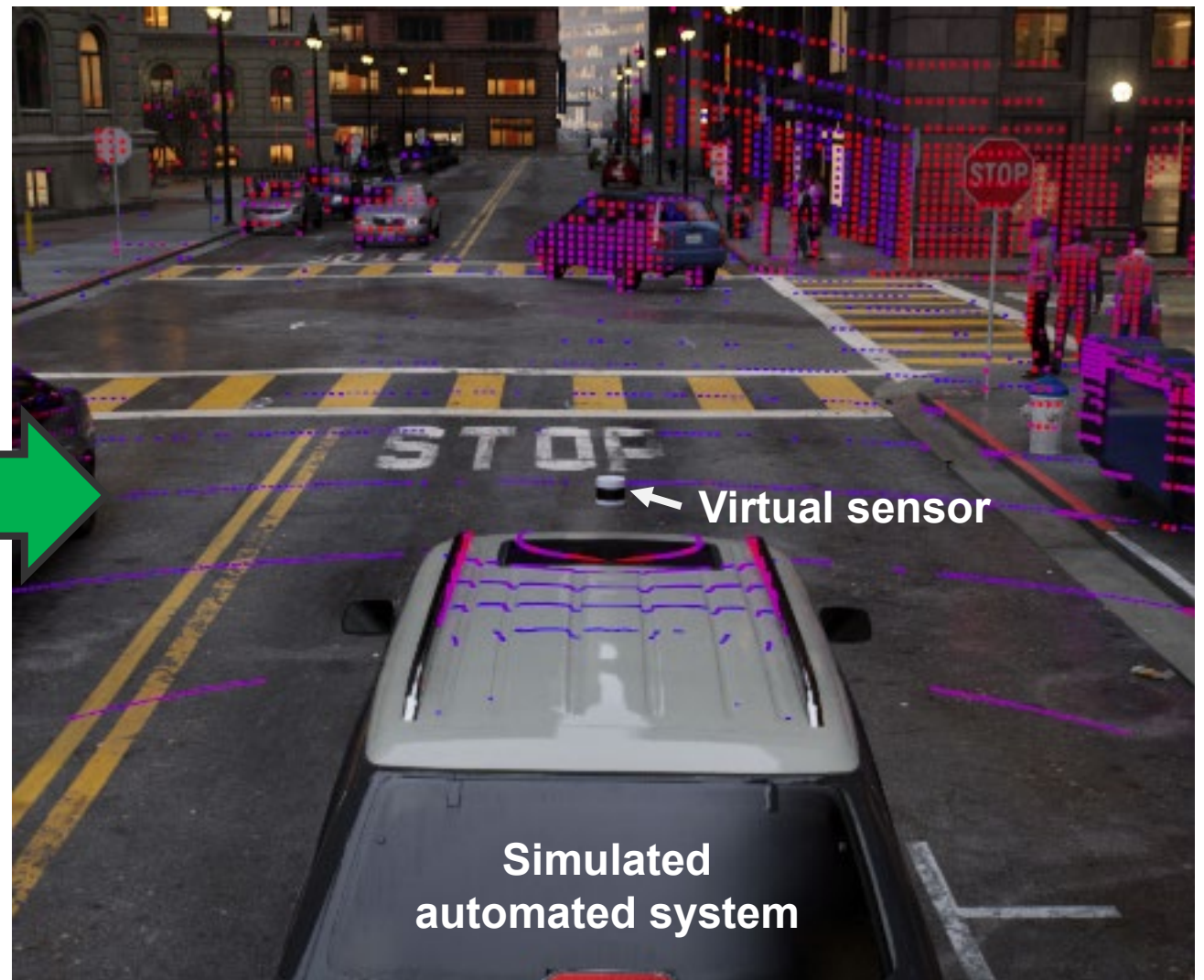
Implementation Examples for Reflection Based Sensor Simulation

Dr.-Ing. Philipp Rosenberger,
Persival GmbH

21.03.2023
Fürstenfeldbruck



Target: Development and Testing in Simulation



Perception Sensors to Simulate



Ultrasonic



Camera



Radar

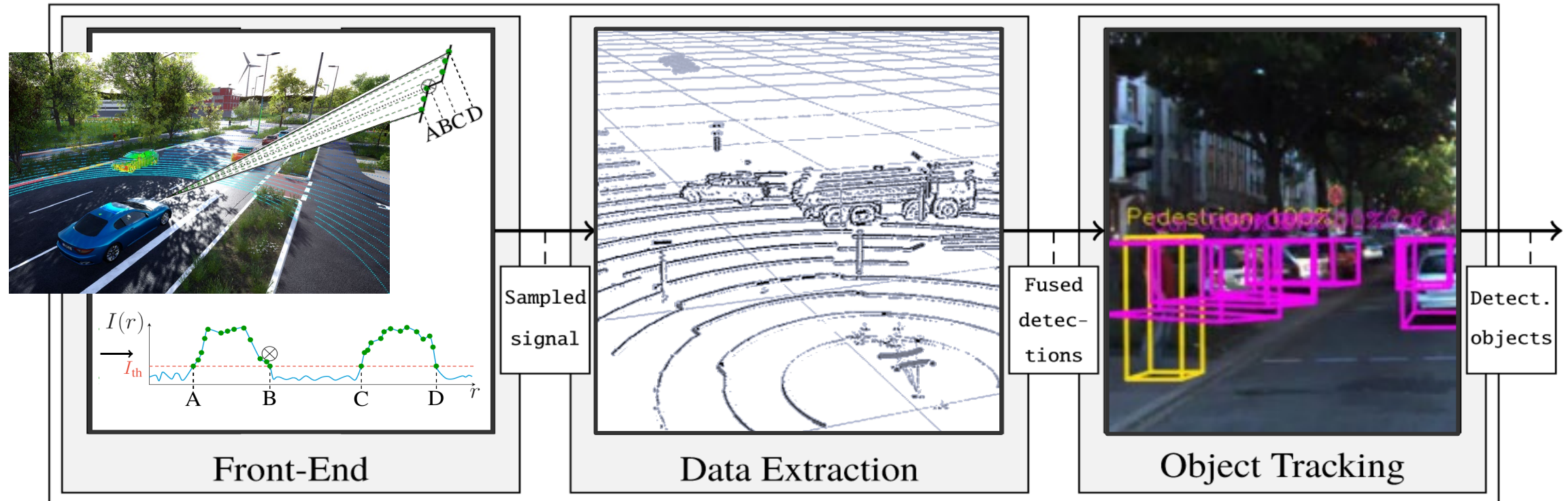


Lidar
selected as application
example

Image Sources:

- Jürgen Wille: *ENVITED Academy - Sensor Basics*, FrontMod GmbH, 29 April 2022
- Rosenberger, Philipp; Schunk, Gerhard; Ikemeyer, Frederik; Tuan Duong, Quang (2022): *Validation of Test Infrastructure – from cause trees to a validated system simulation*. VVM Project: Mid-Term Presentation, Virtual Event, 15 / 16 March 2022

Lidar Perception Sensor System

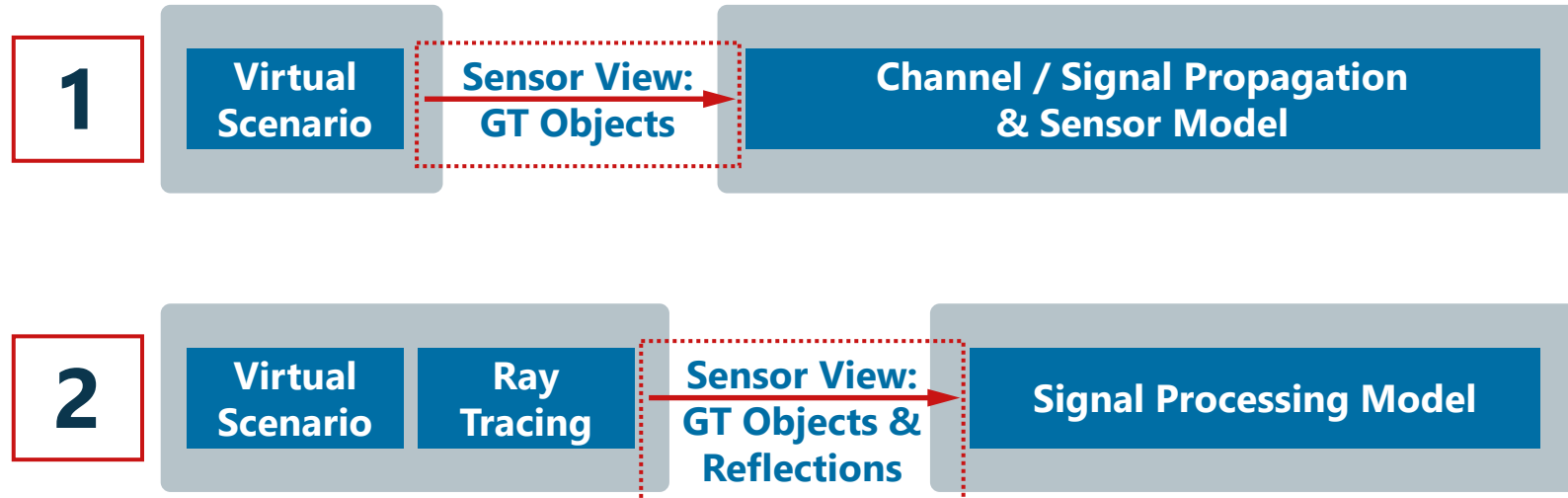


Source: C. Linnhoff, P. Rosenberger, M. F. Holder, et al.: Highly Parameterizable and Generic Perception Sensor Model Architecture.
 In: Bertram T. (eds) Automatisiertes Fahren 2020. Proceedings. Springer Vieweg, Wiesbaden. https://doi.org/10.1007/978-3-658-34752-9_16

Image Source: Rosenberger, Philipp; Schunk, Gerhard; Ikemeyer, Frederik; Tuan Duong, Quang (2022):
 Validation of Test Infrastructure – from cause trees to a validated system simulation. VVM Project: Mid-Term Presentation, Virtual Event, 15 / 16 March 2022

Sensor Model Classification

Different Kinds of OSI implementation options for sensor models



Examples

**Object Based
Radar/Lidar Models**

PMSF Persival
IT Consulting

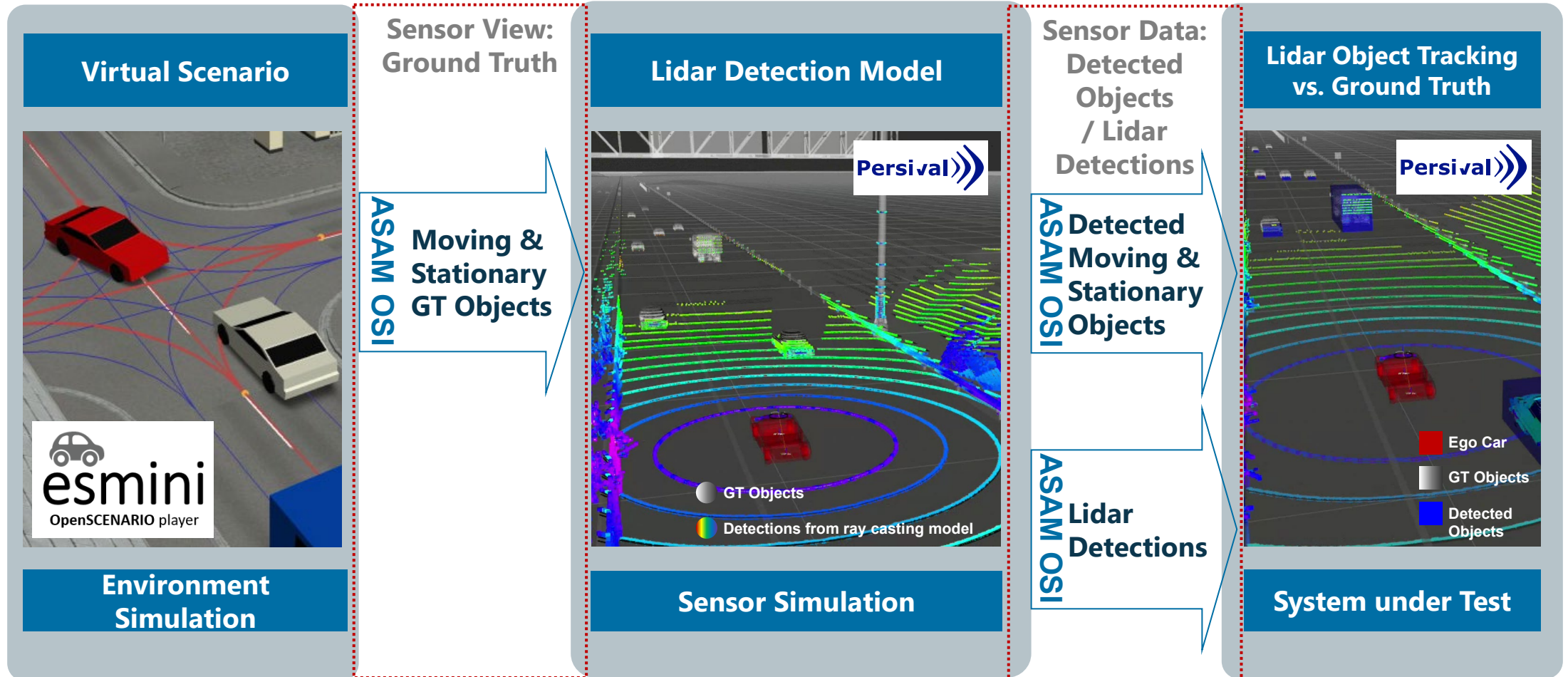
**Reflection Based
Lidar Model**

SET Level

Object Based Lidar Model

Developed by Persival GmbH

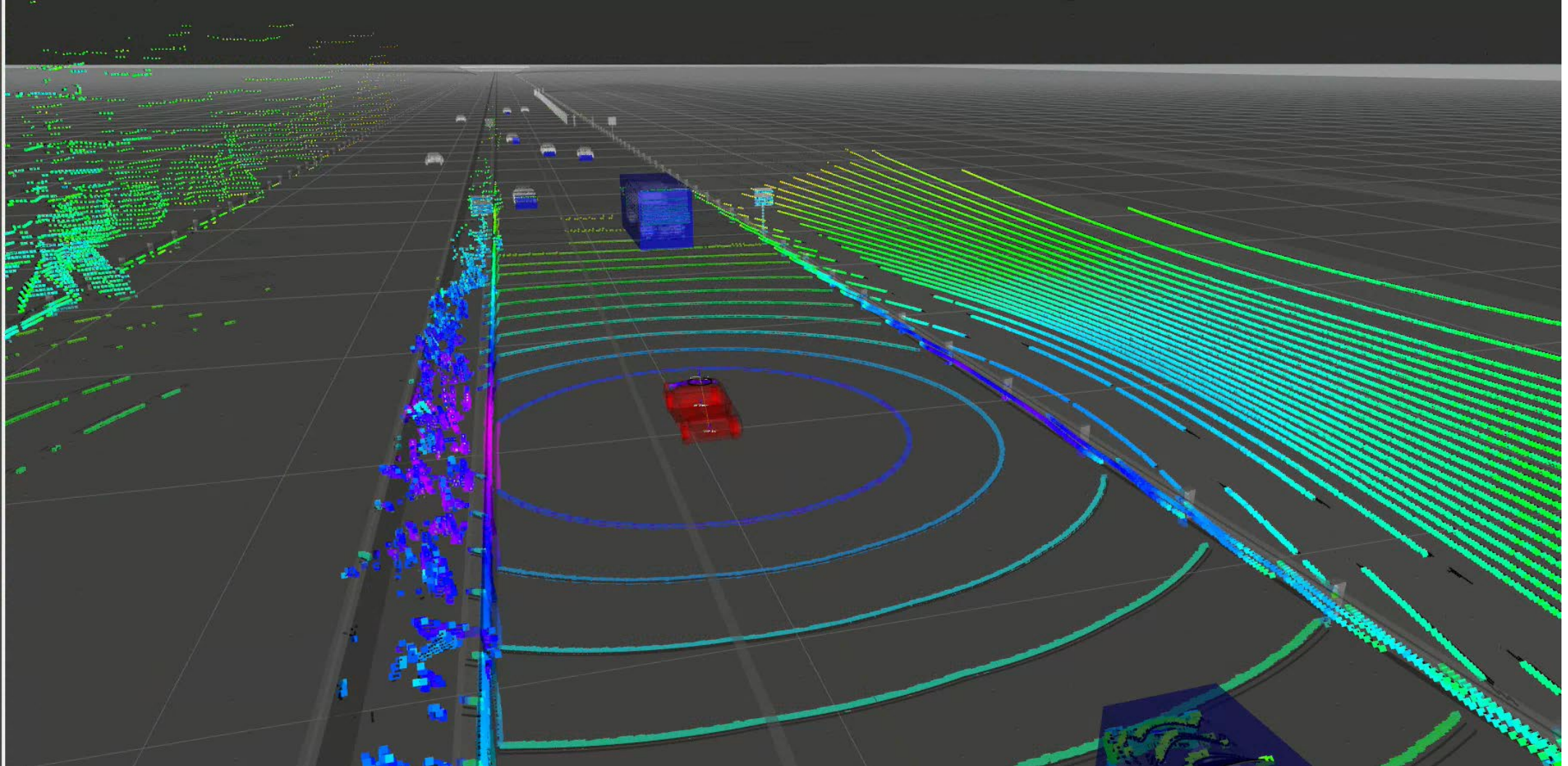
Type 1



Object Based Lidar Model

Type 1

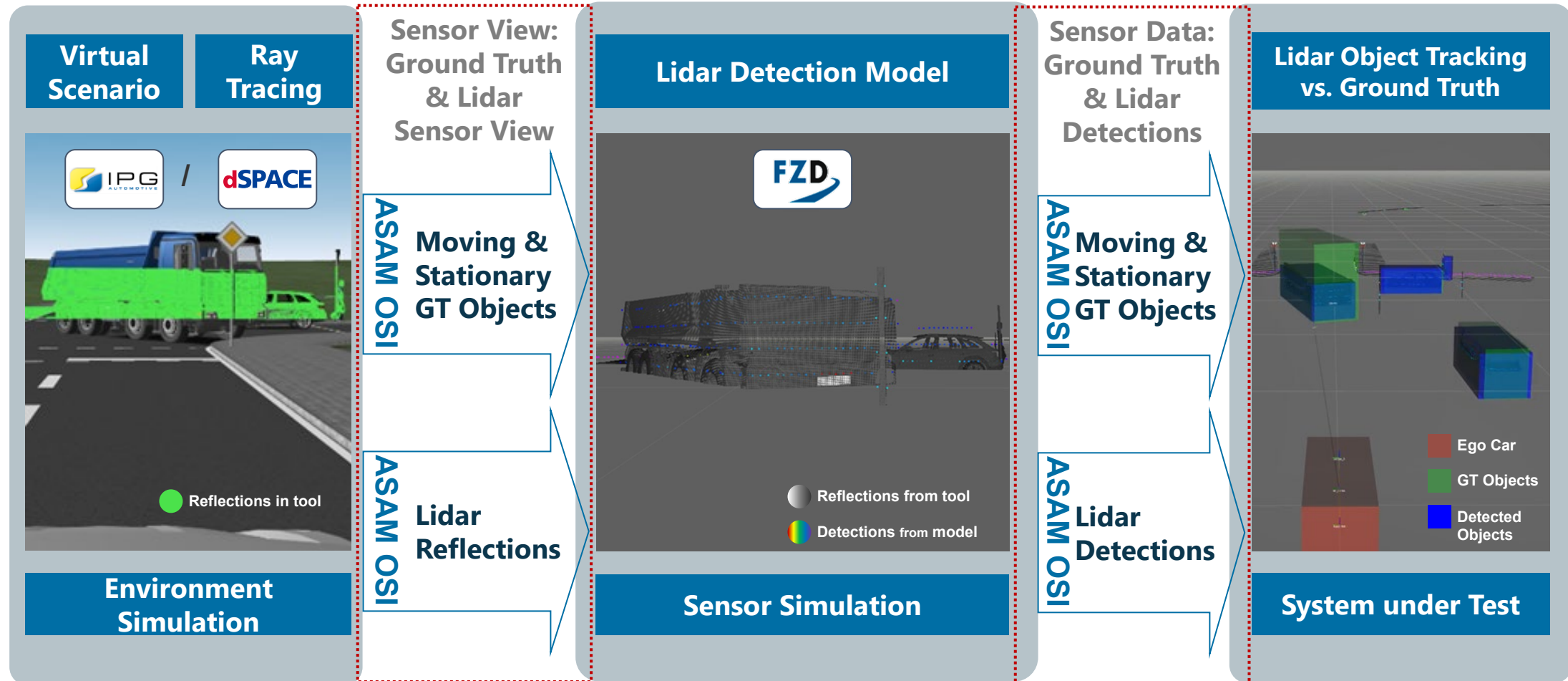
Developed by Persival GmbH



Reflection Based Lidar Model

Type 2

Developed by TU Darmstadt - FZD in the SET Level Project

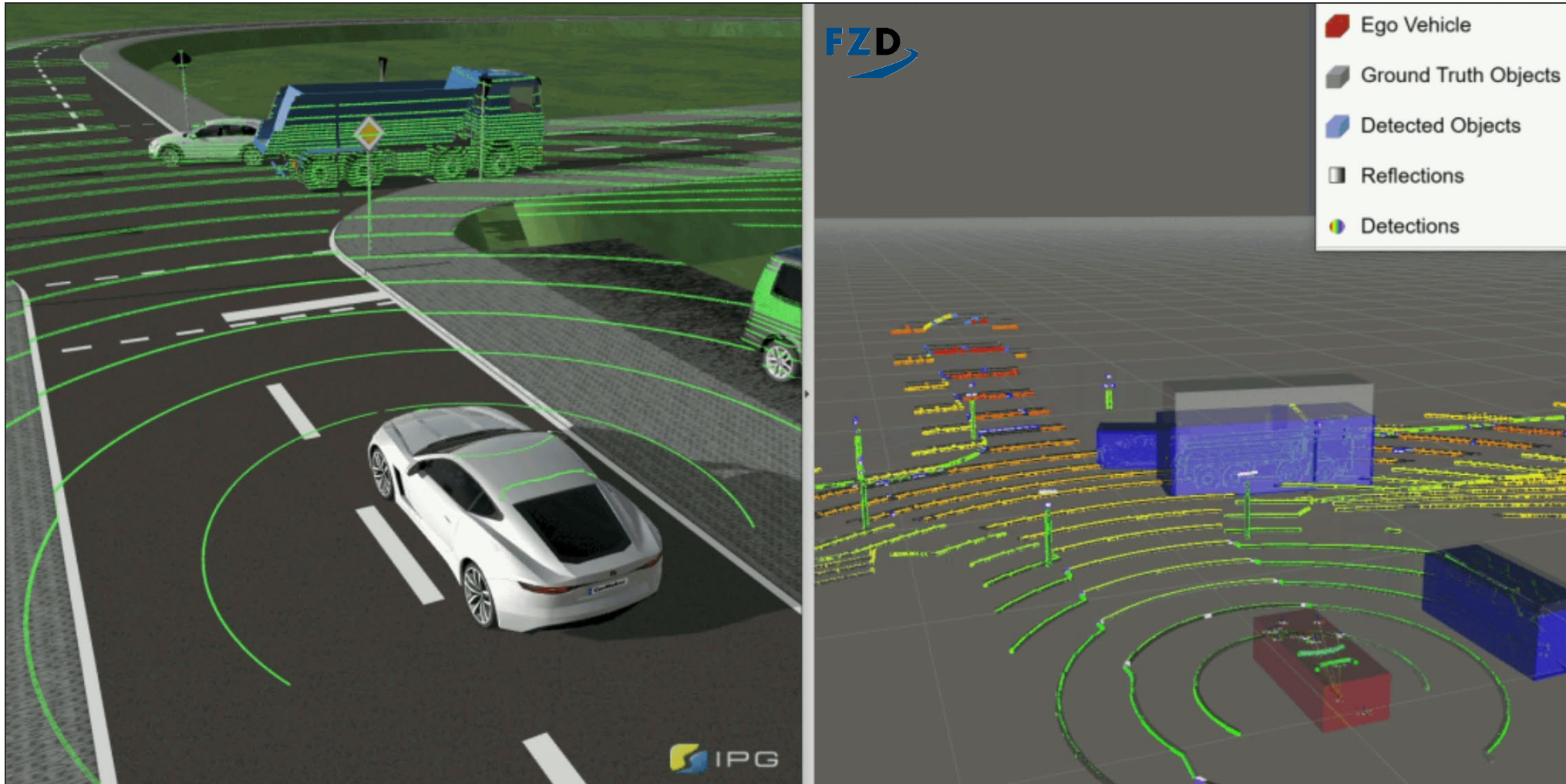


<https://github.com/openMSL/sl-1-2-reflection-based-lidar-object-model>

Reflection Based Lidar Model

Type 2

Developed by TU Darmstadt - FZD in the SET Level Project



SET Level

Supported by:



on the basis of a decision
by the German Bundestag



<https://github.com/openMSL/sl-1-2-reflection-based-lidar-object-model>

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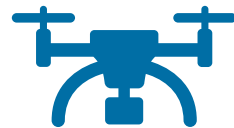
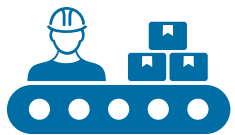


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One OSI – Multiple Domains



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