ASAM OpenODD
An Overview on Concept and Solutions

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Online

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Association for Standardization of
Automation and Measuring Systems

Agenda

Agenda

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Motivation

11 Billion miles[1]

To demonstrate with 95% confidence that AVs are 20% better than human drivers

1 N. Kalra and S. M. Paddock, "Driving to safety: How many miles of driving would it take to demonstrate autonomous vehicle reliability?," *Transp. Res. Part A Policy Pract.*, vol. 94, no. December, pp. 182–193, 20163

Some Challenges for CAVs

11 Billion miles[1]

To demonstrate with 95% confidence that AVs are 20% better than human drivers

100,000 lives[2]

Saved (in the next 30 years) if AVs which are 10% better than human drivers are introduced

1 N. Kalra and S. M. Paddock, "Driving to safety: How many miles of driving would it take to demonstrate autonomous vehicle reliability?," *Transp. Res. Part A Policy Pract.*, vol. 94, no. December, pp. 182–193, 20163
2 N. Kalra and D. G. Groves, The Enemy of Good. 2017
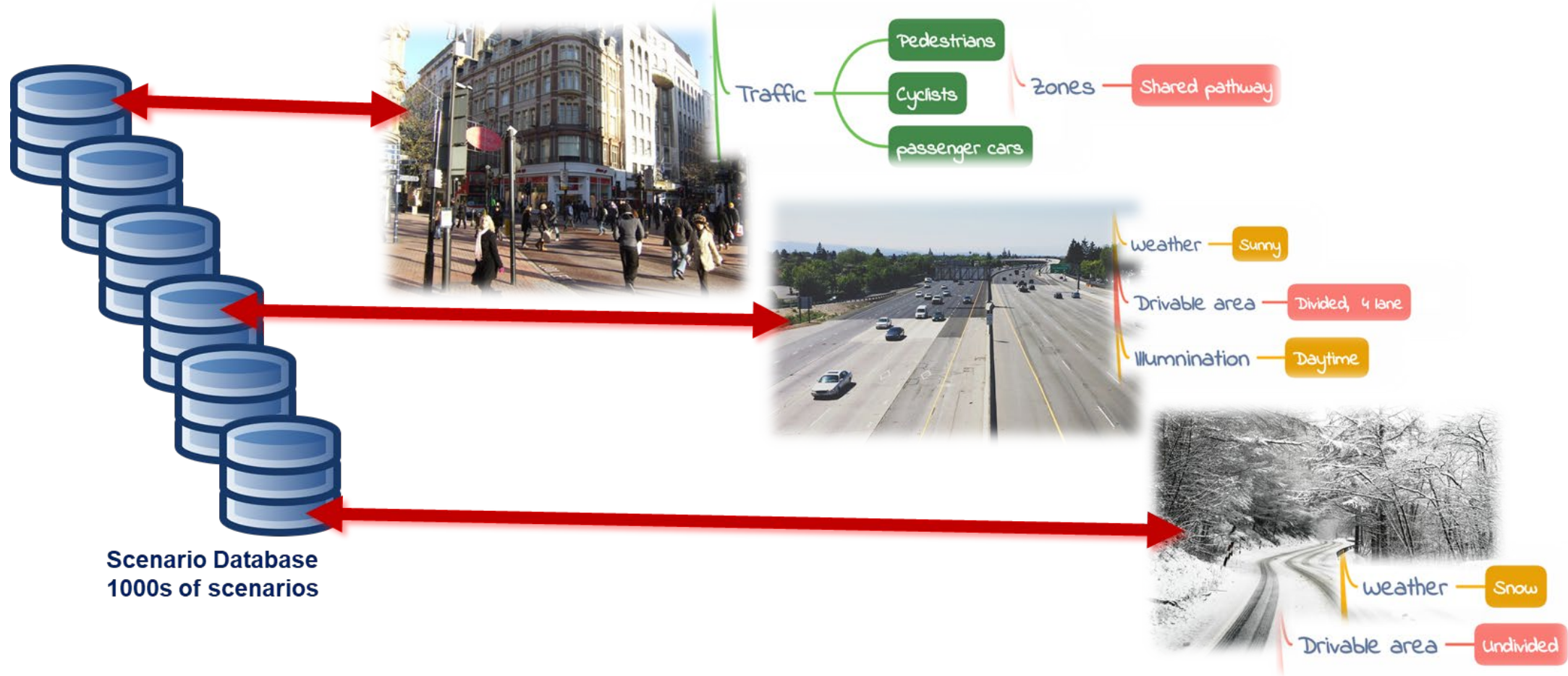
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Why is ODD important?

- Number of miles driven?
- Types of scenarios experienced?

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Why is ODD important?

Scenario mapping to ODD

Scenario Database 1000s of scenarios

Traffic
- Pedestrians
- Cyclists
- passenger cars

Zones — Shared pathway

weather — Sunny
Drivable area — Divided, 4 lane
Illumination — Daytime

weather — Snow
Drivable area — Undivided

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ODD considerations

What is an ODD?

"Operating conditions under which a given driving automation system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics."
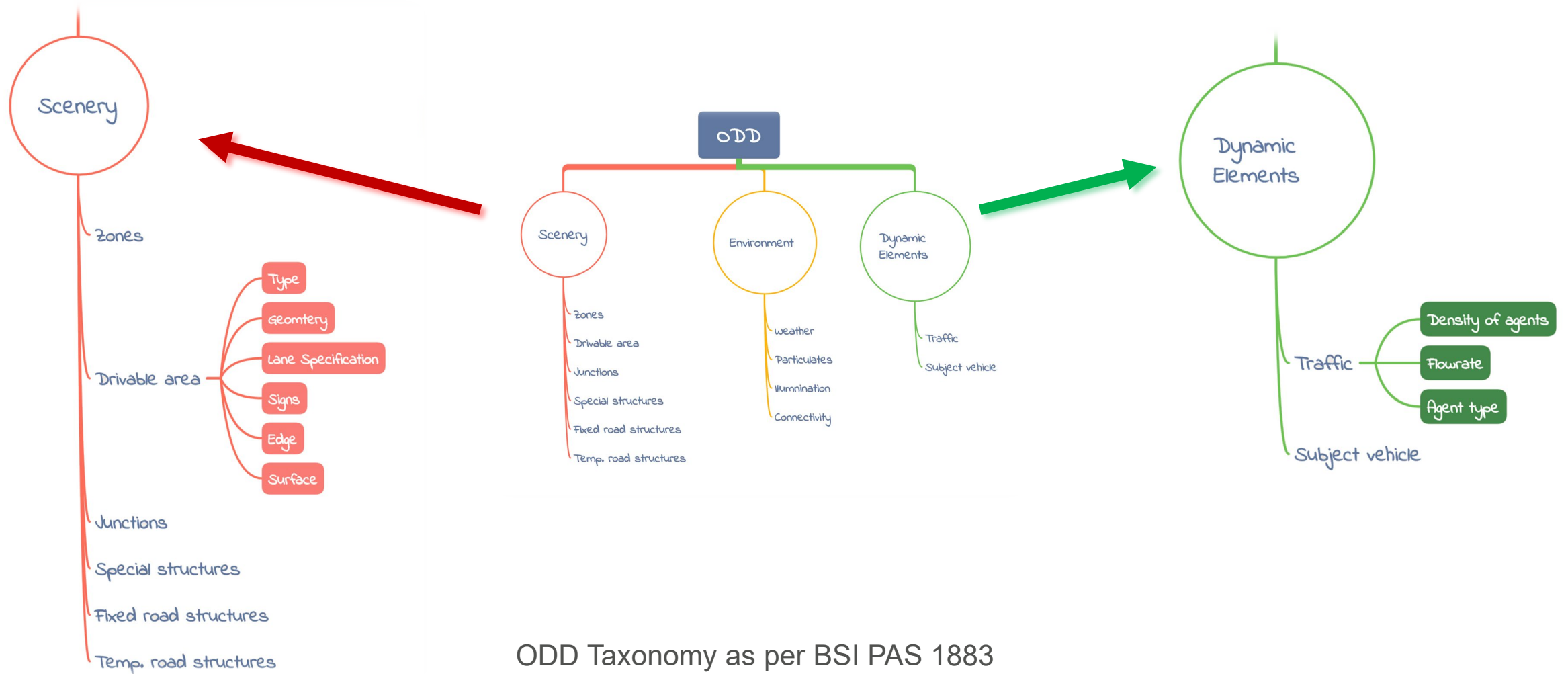
- SAE J3016 (2020)

ODD attributes awareness - Rainfall

- What does rainfall rate mean?

- How do we measure rainfall rate?

- Can the CAV measure it via on-board sensing only?

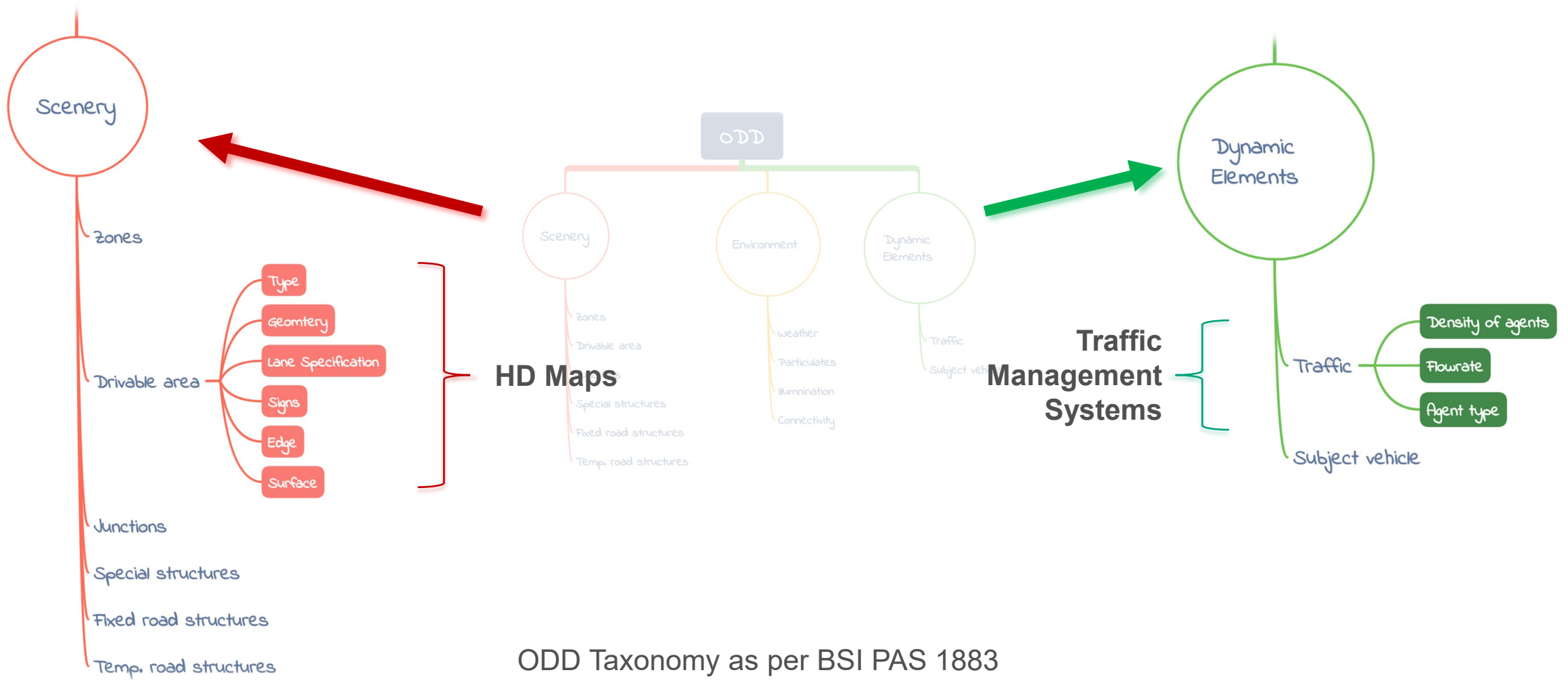- How do we address local variability issues?

For more on Curious case of ODD: https://bit.ly/CuriousCaseODD

ODD attributes awareness

ODD Taxonomy as per BSI PAS 1883

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ODD attributes awareness

ODD Taxonomy as per BSI PAS 1883

Other standardization activities

- Need for common understanding
- Need for collaboration
- Crowded landscape

Major activities
- BSI (UK): PAS 1883: ODD Taxonomy
- SAE: ORAD, AVSC: ODD Lexicon
- ISO: ISO 34503: ODD Taxonomy and definition format
- ASAM: OpenODD: simulation level ODD definition
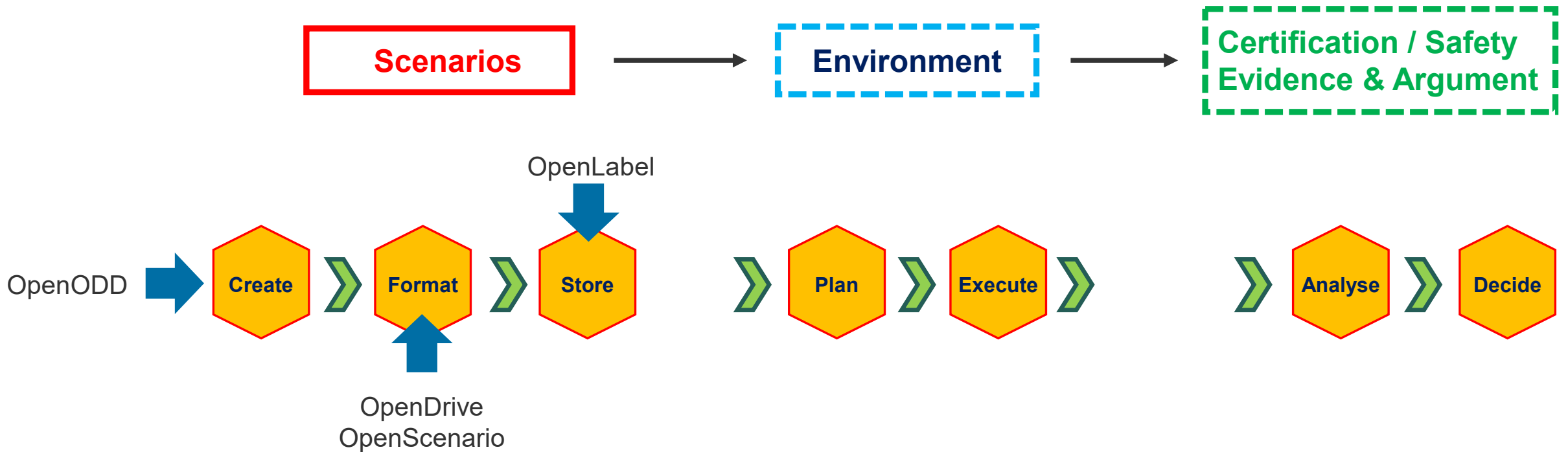
ASAM OpenODD
Objective and Work packages

ASAM OpenODD Aim

The aim is to provide a format that is capable of representing a defined Operational Design Domain for connected automated vehicles (CAV) for *simulation based testing*.

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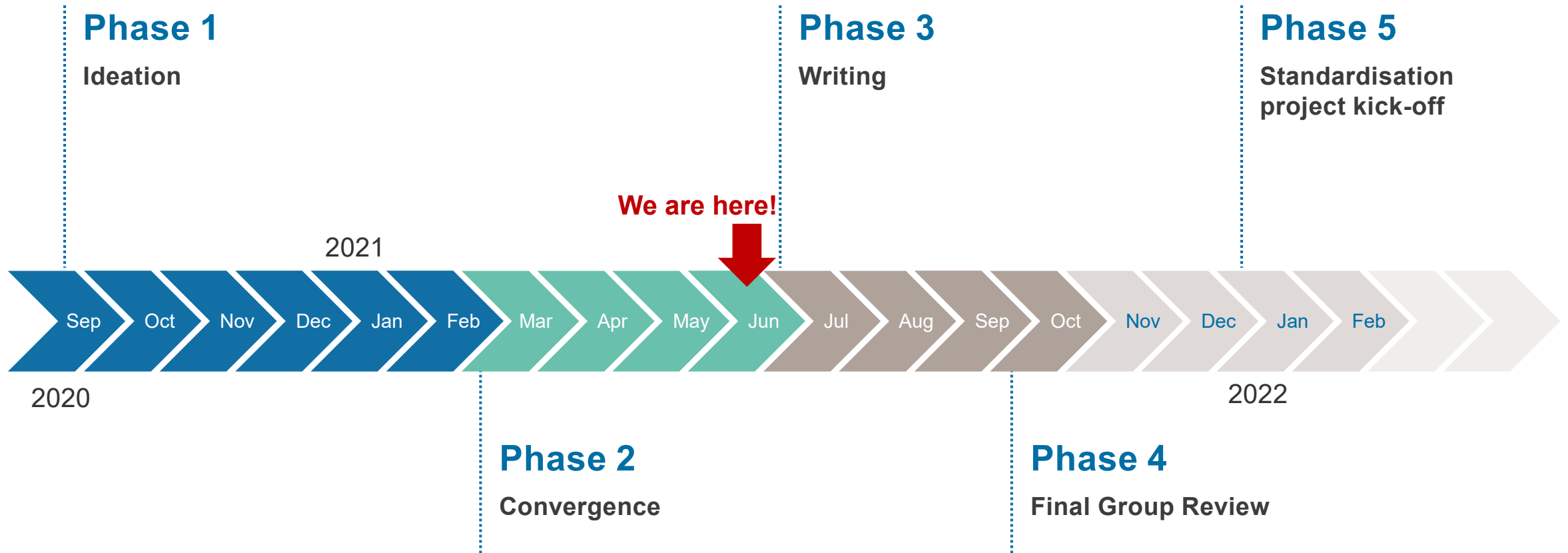
ASAM OpenODD work packages

- Four work packages

- **Work Package 1:** Attributes:
  - Ensure alignment with BSI PAS 1883, ISO 34503, and the ongoing ASAM OpenXOntology Project

- **Work Package 2:** Specification/format
  - Describe the semantic and syntactic description of the ODD description for format for simulation execution

- **Work Package 3:** Metrics / Measurement
  - Define and describes Metrics associated with ODD

- **Work Package 4:** Uncertainty
  - Define and describes uncertainty attributes associated with ODD

ASAM OpenODD
Timeline

ASAM OpenODD Project Timeline

Phase 1
Ideation

Phase 2
Convergence

Phase 3
Writing

Phase 4
Final Group Review

Phase 5
Standardisation
project kick-off

We are here!

2021

2020

2022

Sep · Oct · Nov · Dec · Jan · Feb · Mar · Apr · May · Jun · Jul · Aug · Sep · Oct · Nov · Dec · Jan · Feb

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Thank you for your attention!

Questions…

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