

Scenario Description Language (SDL): Motivation, Usage and Architecture Proposal

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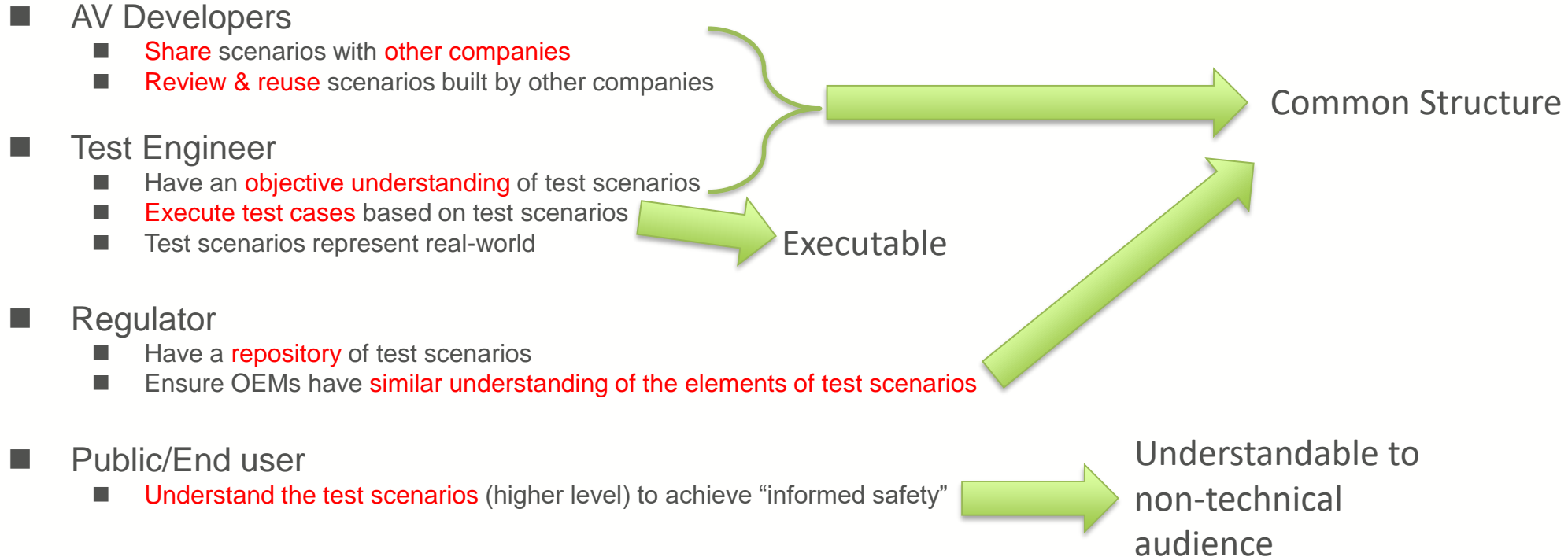
Agenda

- Motivation
- Usage
- Proposal

Motivation - requirements

- AV Developers
 - Share scenarios with other companies
 - Review & reuse scenarios built by other companies
- Test Engineer
 - Have an objective understanding of test scenarios
 - Execute test cases based on test scenarios
 - Test scenarios represent real-world
- Regulator
 - Have a repository of test scenarios
 - Ensure OEMs have similar understanding of the elements of test scenarios
- Public/End user
 - Understand the test scenarios (higher level) to achieve “informed safety”

Motivation - requirements



Levels of Scenarios?

Functional Scenarios

Base road network:

Three-lane motorway in a curve,
100 kph speed limited indicated
by traffic signs

Moveable objects:

Ego vehicle, traffic jam;
Interaction: Ego in manoeuvre
“approaching” on the middle
lane, slow traffic

Environment:

Summer, rain

Logical Scenarios

Base road network:

Lane width [2.5.. 3.5]m
Curve radius [0.4.. 0.9]km

Moveable objects:

Traffic jam speed [0...20]kph
Ego distance [30...400]m
Ego speed [60.. 120]kph

Environment:

Temperature [12..35]degC
Droplet size [20..100] μm

Concrete Scenarios

Base road network:

Lane width [3]m
Curve radius [0.6]km

Moveable objects:

Traffic jam speed [10]kph
Ego distance [50]m
Ego speed [70]kph

Environment:

Temperature [20]degC
Droplet size [50] μm

Adapted from Pegasus project

Levels of Scenarios?

Use cases

Functional Scenarios
<u>Base road network:</u> Three-lane motorway in a curve, 100 kph speed limited indicated by traffic signs
<u>Moveable objects:</u> Ego vehicle, traffic jam; Interaction: Ego in manoeuvre “approaching” on the middle lane, slow traffic
<u>Environment:</u> Summer, rain

SDL 1

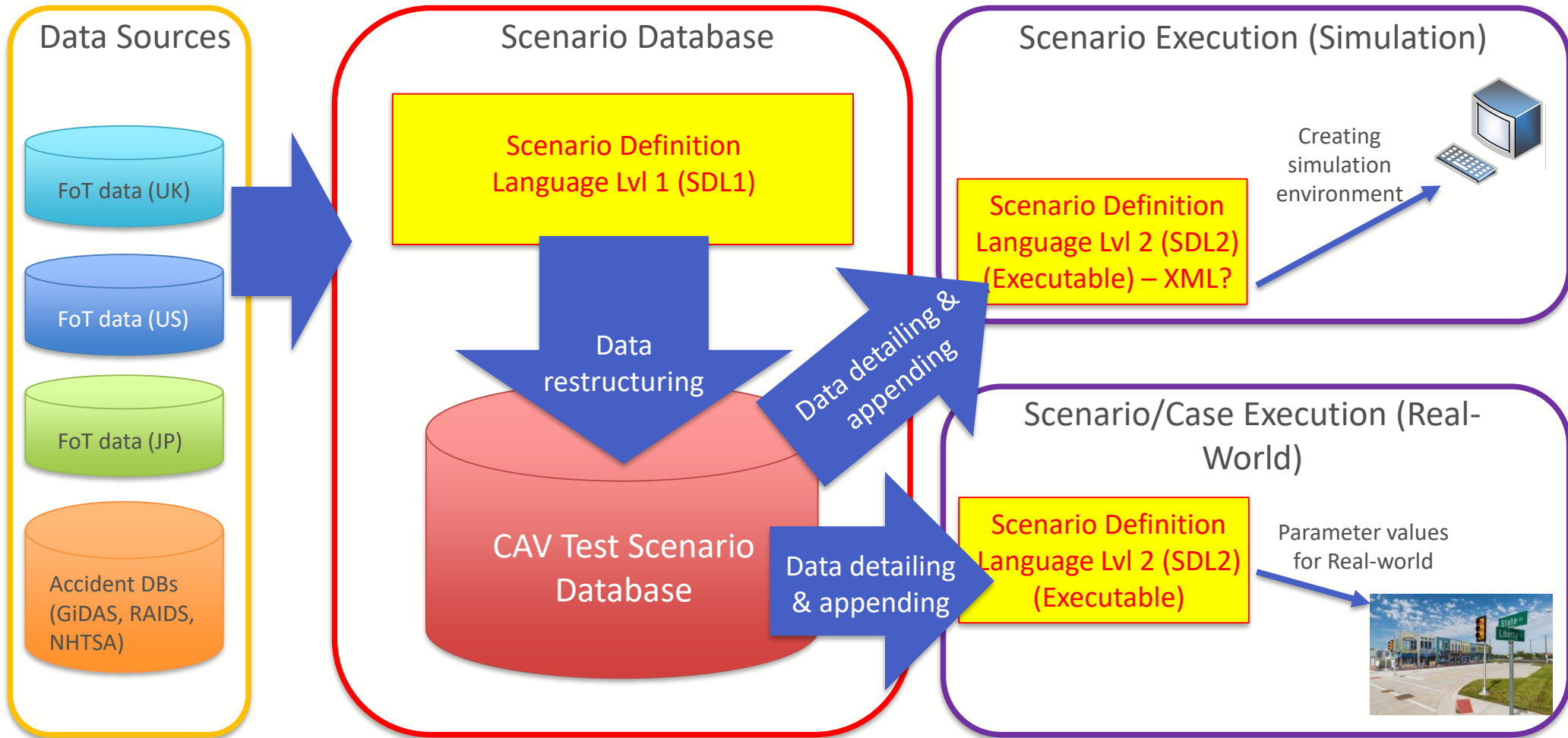
Logical Scenarios

<u>Base road network:</u> Lane width [2.5.. 3.5]m Curve radius [0.4.. 0.9]km
<u>Moveable objects:</u> Traffic jam speed [0...20]kph Ego distance [30...400]m Ego speed [60.. 120]kph
<u>Environment:</u> Temperature [12..35]degC Droplet size [20..100] μm

SDL 2

Test Case

Concrete Scenarios
<u>Base road network:</u> Lane width [3]m Curve radius [0.6]km
<u>Moveable objects:</u> Traffic jam speed [10]kph Ego distance [50]m Ego speed [70]kph
<u>Environment:</u> Temperature [20]degC Droplet size [50] μm



Adapted from discussions in ISO TC22/SC33/WG9 committee

SDL Level 2 Requirements

- Scenery parameters
- Manoeuvre description → Manoeuvre library
- Manoeuvre model
- Driver model
- Traffic model
- Weather model
- Stochastic model for parameter selection (simulation only)
- Ranges for all elements

Comparison SDL Level 1 & 2

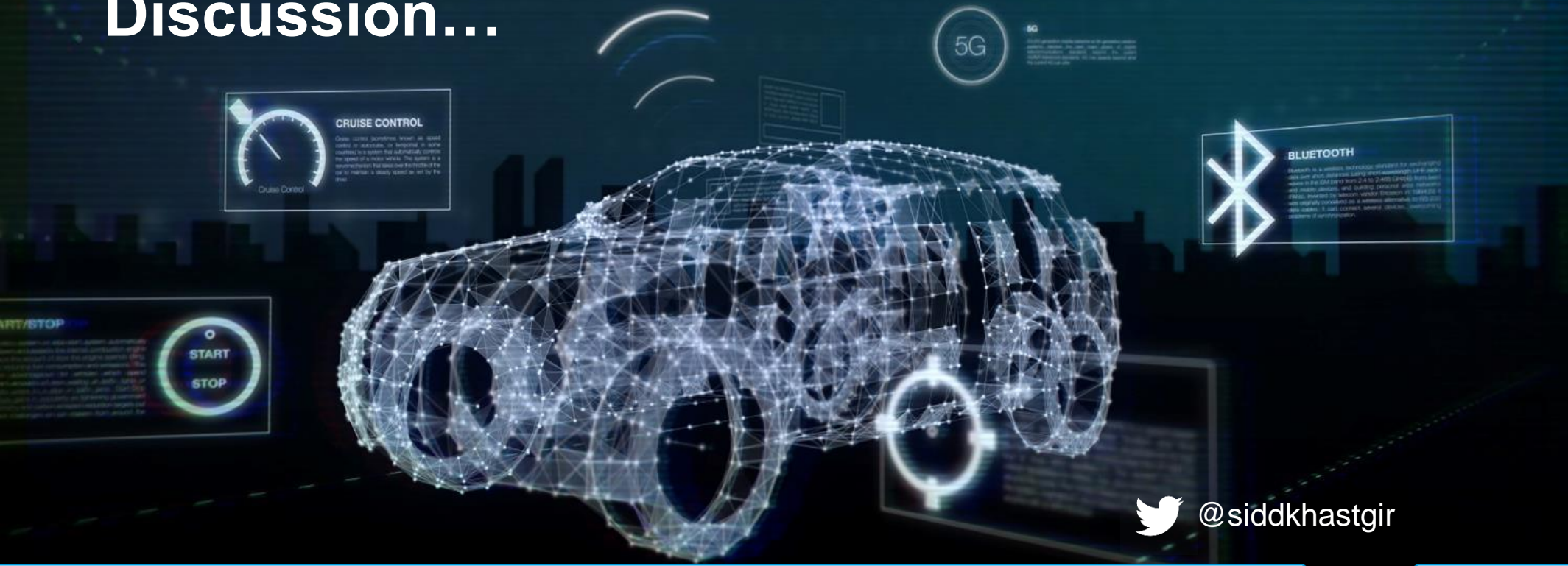
	SDL Level 1	SDL Level 2
Manoeuvre	Manoeuvre Name	Manoeuvre library with details
Driver model	Type (e.g. normal, conservative, crazy)	Detailed model parameters
Traffic model	Type (e.g. normal, conservative, crazy)	Detailed model parameters
Stochastic model	-	Detailed stochastic model
Range of elements	-	All ranges
Scenery parameters	Only parameter names	Values for each parameter

Comparison SDL Level 1 & 2

	SDL Level 1	SDL Level 2
Lane change in motorway	<p>For 3 lane motorway;</p> <ul style="list-style-type: none">- Change from middle lane to right lane for takeover.- Car in the right lane is approaching.- Car in the middle lane is decreasing speed.- Weather (Rain). Warning side road signs are deployed.	<p>For 3 lane motorway (Left lane is closed for road works);</p> <ul style="list-style-type: none">- Change from middle lane to right lane in a 4 lane straight road for takeover on [60-70mph].- Car in right lane is approaching on [70-80mph] with distance 20-30 meters from Ego vehicle.- Car in middle lane is decreasing speed [50-60mph] with distance 30-40 meters from Ego vehicle.- Weather heavy rain with flood sign active.

Thank you...

Discussion...



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