



Boosting  
Digital Transformation



# MOSAR Scenario Manager insights

ADAS & Autonomous Vehicle Technology Conference 2023

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**Institute of Research and Technology (IRT)**  
 Non-profit Scientific Cooperation Foundation  
 Paris-Saclay • Lyon • Singapour



**100**  
 Economic partners  
 of which **1/3** are large  
 groups and **2/3** are SMEs

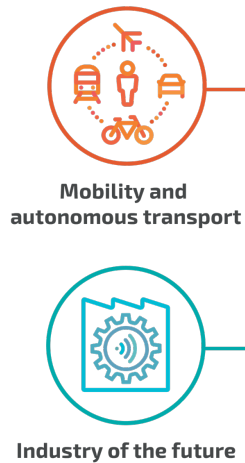


**36**  
 Academic  
 partners

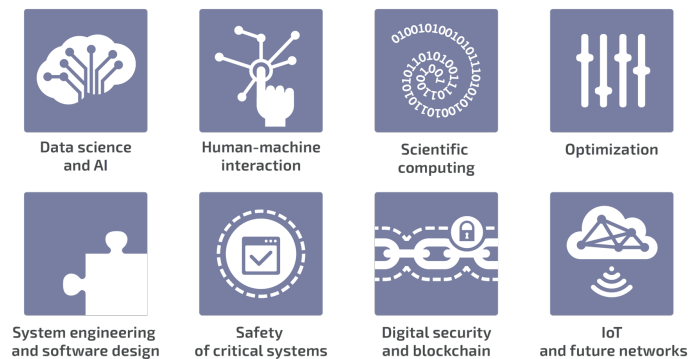
Leads market-driven and applied research projects for the digital transformation of industry, services and territories:

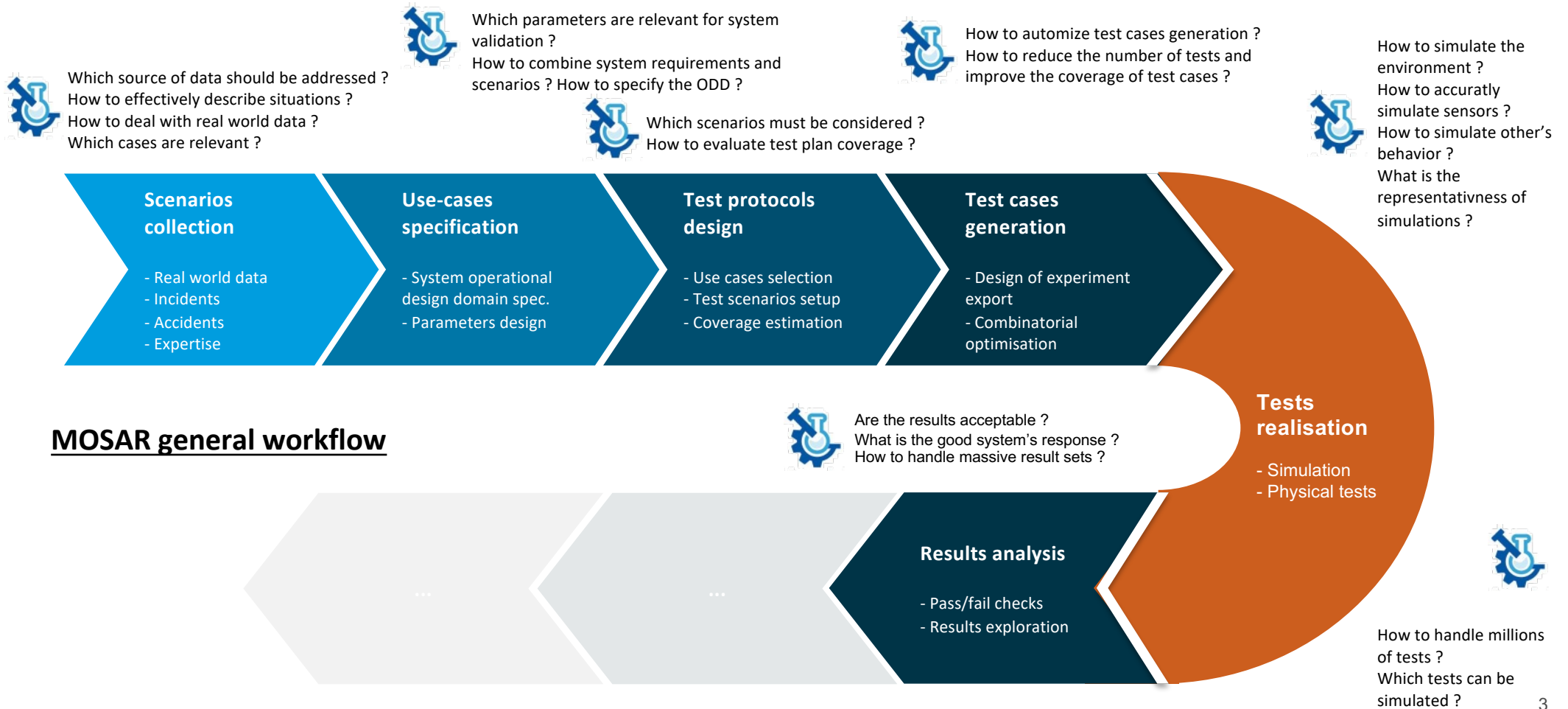
- 1 Expertise: analysis, modeling, simulation and decision management
- 2 Own skills
- 3 Own assets: software, cyber-physical and tool-based platforms

### 4 main application domains



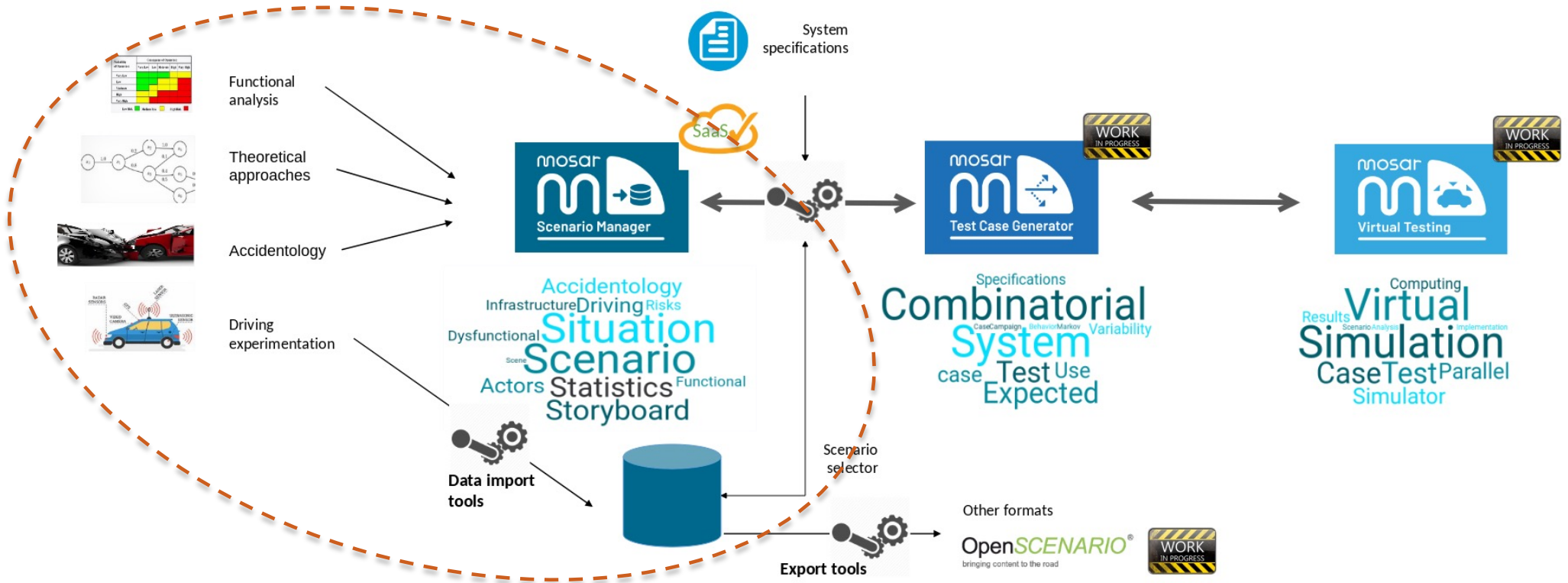
### 8 scientific and technical fields





### MOSAR general workflow

## MOSAR platform: SaaS tools for research projects



### MOSAR platform: build through research projects on driving automation systems safety validation

<p>2015 2019</p> <p><b>SVA: Simulation for the safety of autonomous vehicle</b></p>	<p>2019 2023</p> <p><b>3SA: Simulation for the safety of autonomous vehicle systems</b></p>	<p>2018 2022</p> <p><b>ASV: Autonomous driving simulation &amp; validation</b></p> <p>2019 2021</p> <p><b>SVR: Scenarios robots vehicles and autonomous shuttles</b></p>
<p>2019 2024</p> <p><b>SAM: Security and acceptability of autonomous driving and mobility</b></p>	<p>2021 2024</p> <p><b>PRISSMA: Investment and research platform for the safety and security of autonomous mobility</b></p>	

### Scenario library

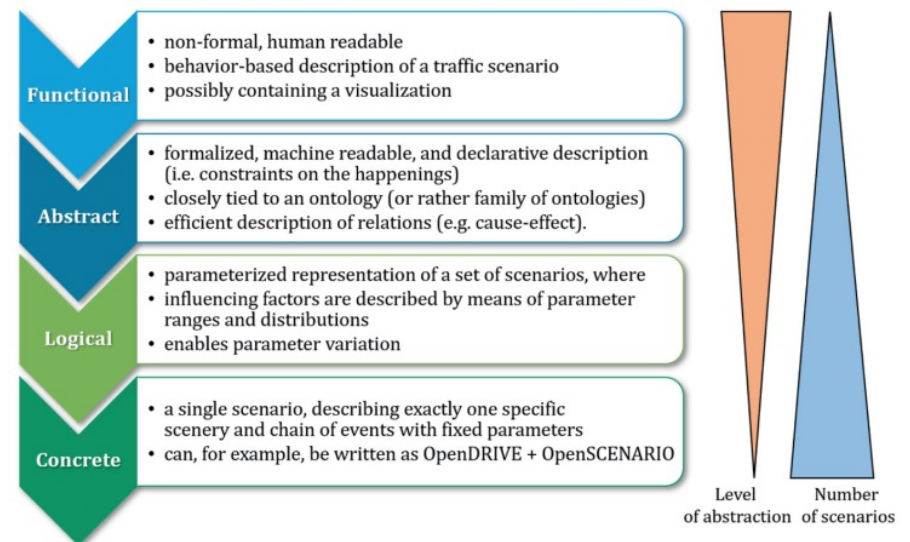
- Intended for conception, validation and homologation
- Expanding the known (and especially potentially unsafe) space of situations ; accumulate feedbacks
- From several sources :
  - expertise materials, real world data, accidentology studies, systems experimentations, coverage algorithms, ...

#### ■ MOSAR descriptive scenario format

- Specifies a situation and its evolution with an external point of view, describing what is observed ;
- Potentially infinite number of different concrete situations => abstraction
- Storyboard (sequence of snapshots) oriented description ;
- One data structure for all abstraction levels.

Following emerging standards: ISO 345xx – Test scenarios for automated driving

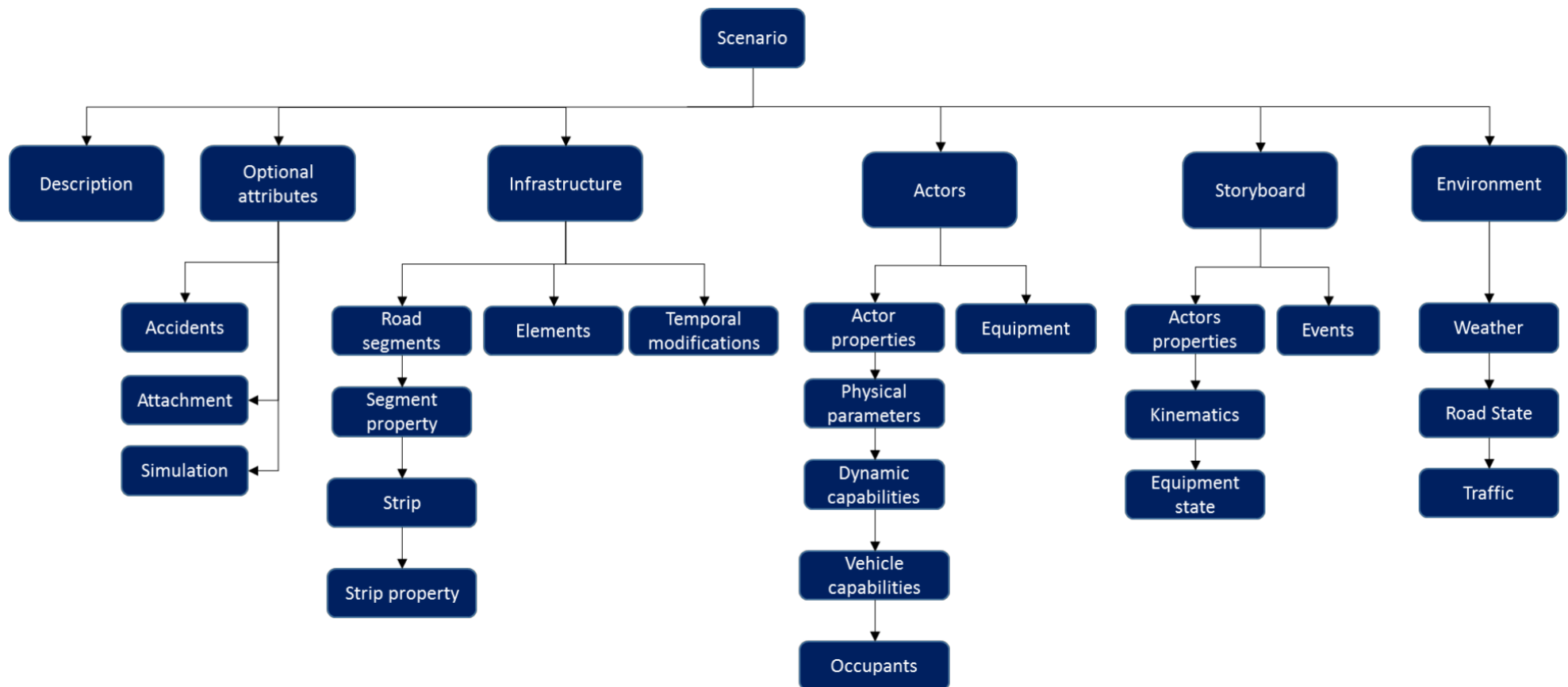
- **ISO 34501** – Vocabulary
- **ISO 34502** – Scenario based safety evaluation framework for ADS
- **ISO 34503** - Taxonomy for operational design domain
- **ISO 34504** – Scenario categorization



Relationship of functional scenario, abstract scenario, logical scenario and concrete scenario

Source: ISO/DIS 34501:2021

Taxonomy and ontology shared for scenario description and ODD specification



Scenarios organized into containers that store scenarios hierarchies from a specific data source and fitting a specific ODD

The screenshot displays the MOSAR ScenarioManager v4.2.1 interface. At the top, the MOSAR logo and navigation tabs for Scenarios, Systems & Use-cases, Test Protocols, and Frames of reference are visible. The main content area is titled 'Scenario library' and includes a search bar, a 'Browse containers' button, and a 'Containers overview' section with a list of categories such as '3SA - Expertise', 'MOSAR - Accidentology scenarios samples', and 'SAM - Bien partagé'. A 'Content repartition' donut chart shows 25 accessible containers and 2057 total scenarios. Below this, 'Related frames of reference quick links' are shown for Collections (Actors, Behaviors, Equipments, Infrastructure elements, Infrastructures, Tags), Actors, Tags, and Infrastructure elements, each with a corresponding donut chart.

Reference data used for scenarios description and ODD specification are stored into dedicated collections

**Documentation**

**Key documentation**

- Scenario data model reference PDF
- Dashboard user's guide PDF

**Videos**

- Scenario Creation
- How to Duplicate a scenario
- How to edit an infrastructure
- How to Move a scenario
- Access Explained

**Technical documentation**

- Scenario manager API reference
- Statistics API reference
- Python client documentation
- Descriptive scenario for simulation PDF
- Driving data import tutorial PDF
- Report generator user's guide PDF

Contact: support-mosar@irt-systemx.fr



Each container holds its own hierarchy of scenarios, from the most abstract level to the most concrete level

MOSAR - Driving scenarios samples scenarios

Filter

Add filter criteria...

No filters applied

293 scenarios found

**Cut-in (3) DRAFT**  
The EGO vehicle is on the main highway road. A vehicle in the adjacent lane of the EGO vehicle preforms a lane change in front of the EGO.

**01. Cut-in with no obstacles (9) DRAFT**  
The EGO vehicle is on the main highway road and a vehicle preforms a lane-change in front of him without any obstacle explaining its maneuver.

**000BAB837AA\_20160907\_073441\_1460\_1462 DRAFT**  
No description

**000BAB837AA\_20160907\_073441\_2781\_2783 DRAFT**  
No description

**000BAB837AA\_20160913\_121554\_1647\_1649 DRAFT**  
No description

Functional scenario

Logical scenario

Concrete scenario

	Scene initiale	Challenger starts overlap	Challenger enters Ego lane	Challenger enters Ego path
<b>Actors</b>				
<b>Kinematic</b>				
<b>Behaviors</b>				

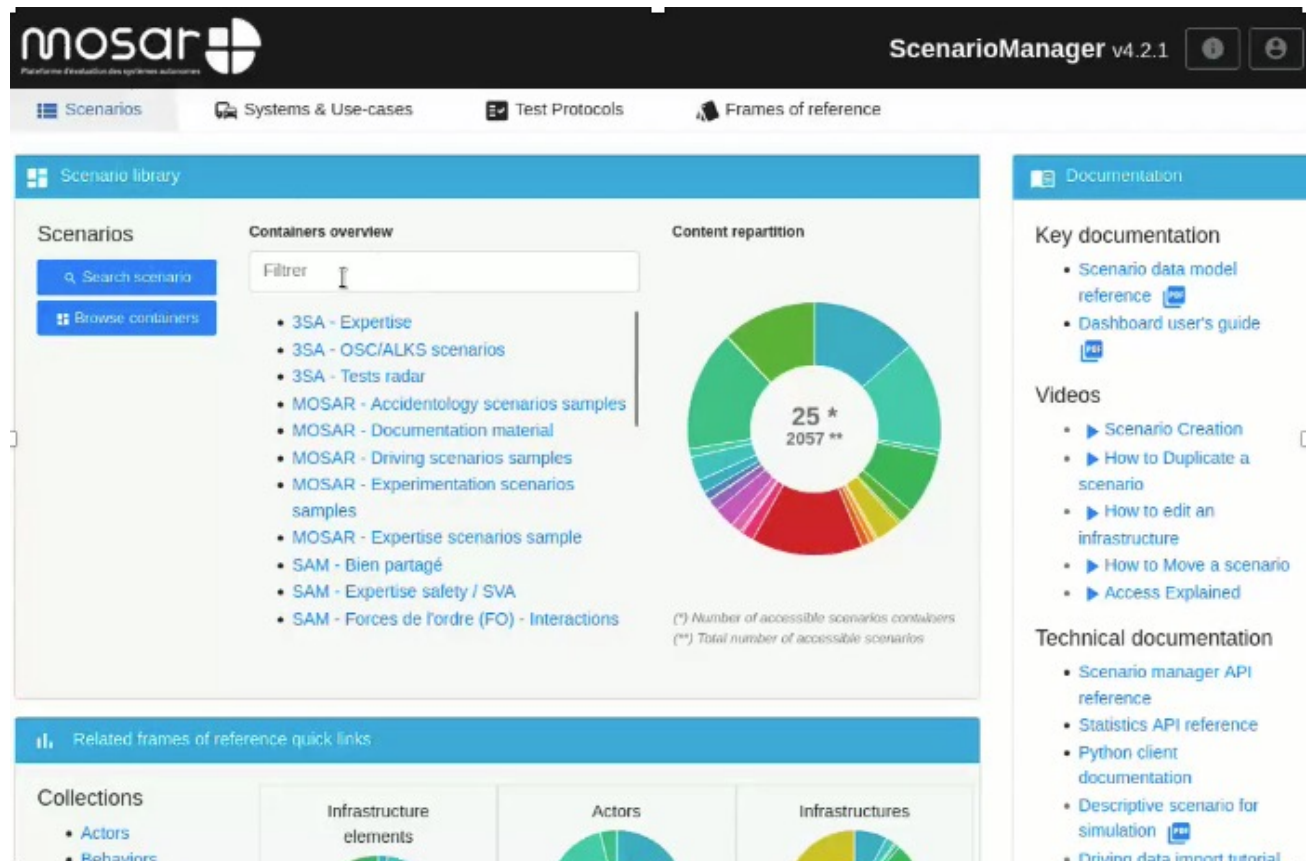
	Scene initiale	Challenger starts overlap	Challenger enters Ego lane	Challenger enters Ego path
<b>Actors</b>				
<b>Kinematic</b>				
<b>Behaviors</b>				

Each parameter can be specified with an abstract value, a range of value, a concrete value or can be let undefined if its not a distinctive feature of the scenario

## Expertise scenario

Documentation of *a priori* situations from several sources:

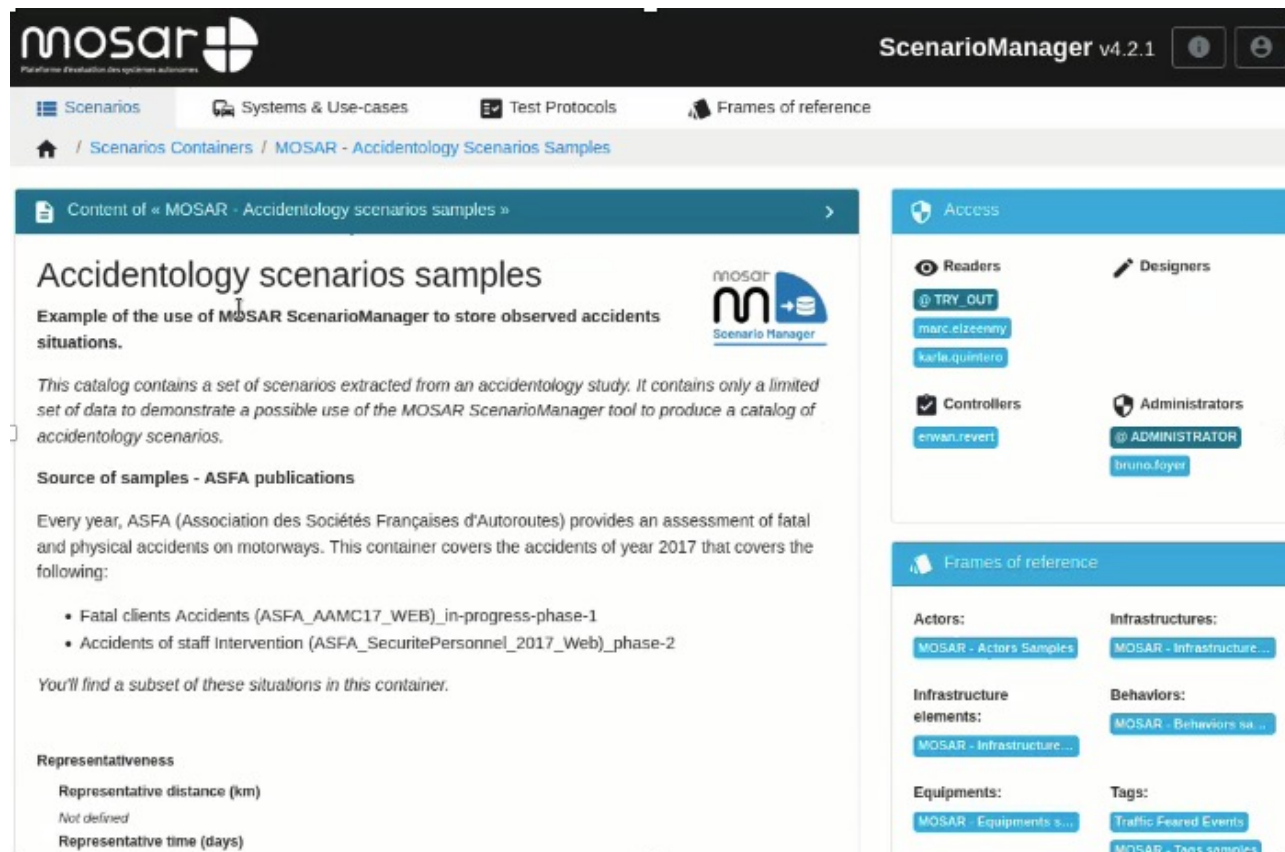
- System functional specification ;
- System and paths risks analysis ;
- Theoretical situation covering ;
- Reglementation ;
- ...



## Accidents scenarios

Documentation of *observed* situations that cause accidents:

- Accidents studies ;
- Experience feedback ;
- ...



**mosar** Plateforme d'évaluation des systèmes automobiles

ScenarioManager v4.2.1

Scenarios Systems & Use-cases Test Protocols Frames of reference

Home / Scenarios Containers / MOSAR - Accidentology Scenarios Samples

Content of « MOSAR - Accidentology scenarios samples »

### Accidentology scenarios samples

Example of the use of MOSAR ScenarioManager to store observed accidents situations.

This catalog contains a set of scenarios extracted from an accidentology study; it contains only a limited set of data to demonstrate a possible use of the MOSAR ScenarioManager tool to produce a catalog of accidentology scenarios.

**Source of samples - ASFA publications**

Every year, ASFA (Association des Sociétés Françaises d'Autoroutes) provides an assessment of fatal and physical accidents on motorways. This container covers the accidents of year 2017 that covers the following:

- Fatal clients Accidents (ASFA\_AAMC17\_WEB)\_in-progress-phase-1
- Accidents of staff Intervention (ASFA\_SecuritePersonnel\_2017\_Web)\_phase-2

You'll find a subset of these situations in this container.

**Representativeness**

Representative distance (km)  
Not defined

Representative time (days)

**Access**

**Readers**  
@ TRY\_OUT  
marc.zezeny  
karla.quintero

**Designers**

**Controllers**  
erwan.revert

**Administrators**  
@ ADMINISTRATOR  
bruno.foyer

**Frames of reference**

**Actors:**  
MOSAR - Actors Samples

**Infrastructures:**  
MOSAR - Infrastructure...

**Infrastructure elements:**  
MOSAR - Infrastructure...

**Behaviors:**  
MOSAR - Behaviors sa...

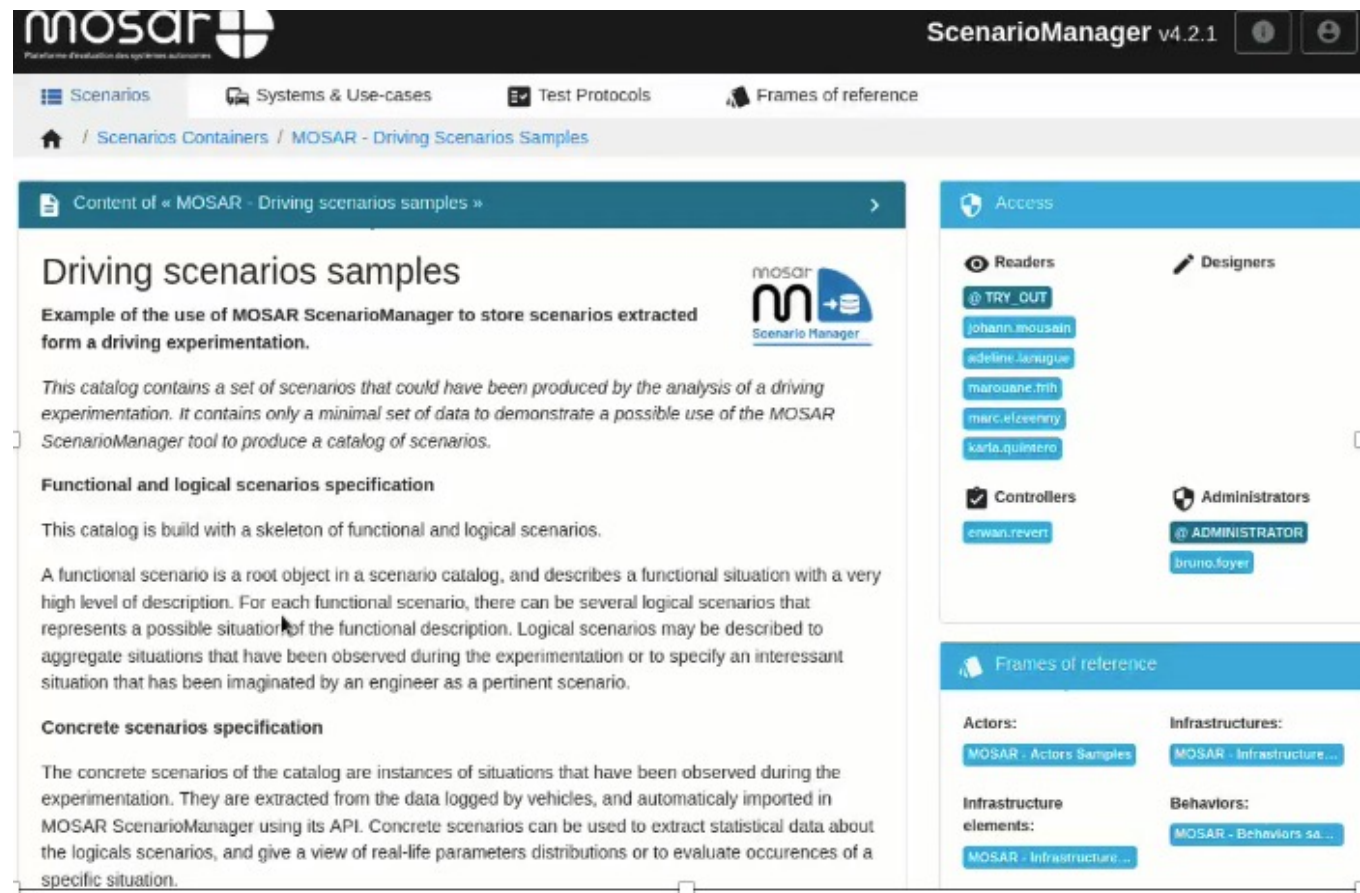
**Equipments:**  
MOSAR - Equipments s...

**Tags:**  
Traffic Feared Events  
MOSAR - Tags samples

## ■ Driving data analysis

Situation imported from driving experimentation data analysis

- Data segmentation and scenarios classification operated by external tools, concrete scenarios are then imported into the ScenarioManager using its API.
- Concrete data of imported occurrences are aggregated at the logical scenario level.
- Data gathering and statistical computation operated in real time.



The screenshot displays the MOSAR ScenarioManager v4.2.1 interface. The main content area shows a catalog titled "Driving scenarios samples" with the following text:

**Example of the use of MOSAR ScenarioManager to store scenarios extracted form a driving experimentation.**

*This catalog contains a set of scenarios that could have been produced by the analysis of a driving experimentation. It contains only a minimal set of data to demonstrate a possible use of the MOSAR ScenarioManager tool to produce a catalog of scenarios.*

**Functional and logical scenarios specification**

This catalog is build with a skeleton of functional and logical scenarios.

A functional scenario is a root object in a scenario catalog, and describes a functional situation with a very high level of description. For each functional scenario, there can be several logical scenarios that represents a possible situation of the functional description. Logical scenarios may be described to aggregate situations that have been observed during the experimentation or to specify an interessant situation that has been imagined by an engineer as a pertinent scenario.

**Concrete scenarios specification**

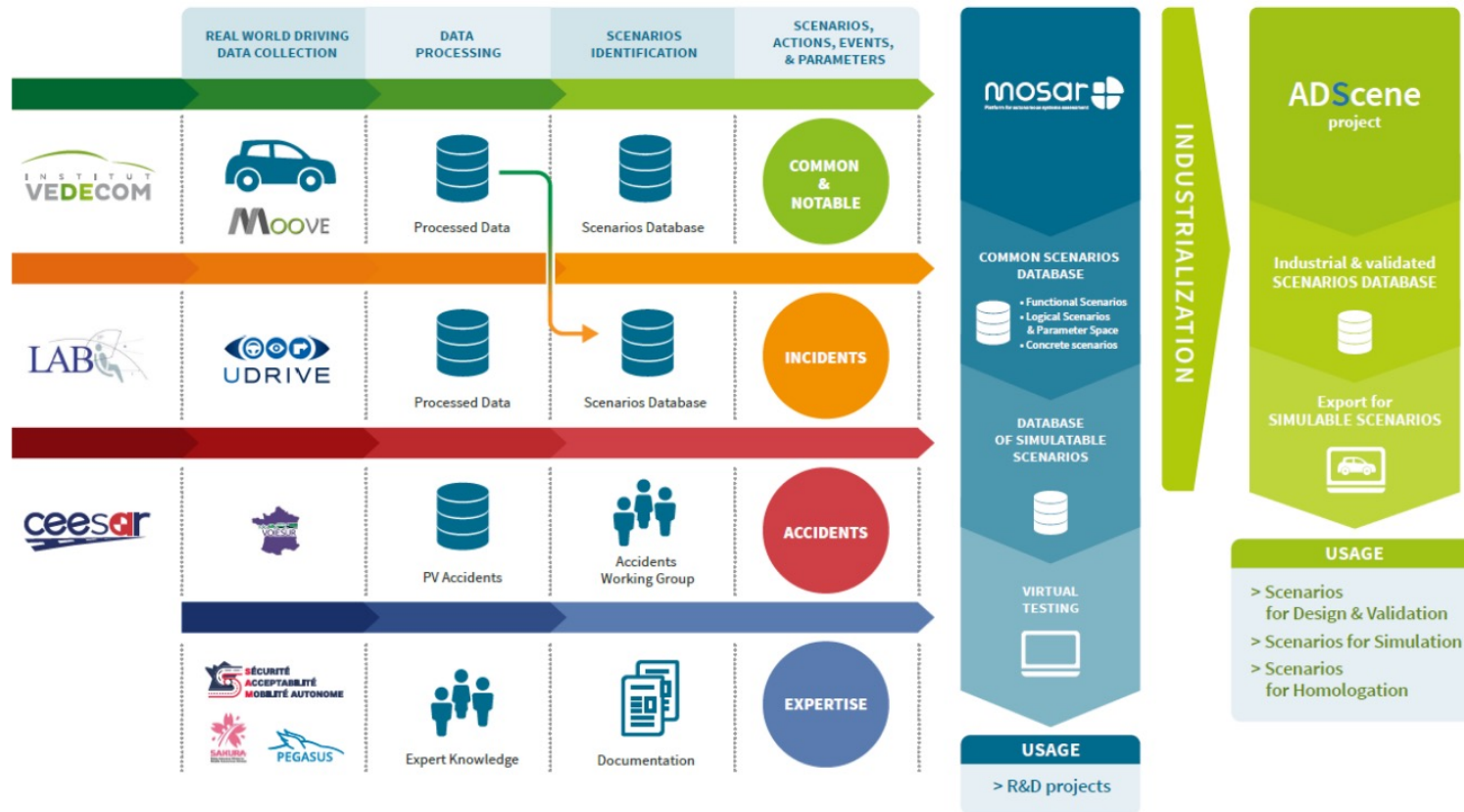
The concrete scenarios of the catalog are instances of situations that have been observed during the experimentation. They are extracted from the data logged by vehicles, and automatically imported in MOSAR ScenarioManager using its API. Concrete scenarios can be used to extract statistical data about the logicals scenarios, and give a view of real-life parameters distributions or to evaluate occurrences of a specific situation.

The right sidebar shows user access information:

- Readers:** @TRY\_OUT, johann.mousain, adeline.lanugue, marouane.trih, marc.elzevery, karta.quintero
- Designers:** (empty)
- Controllers:** erwan.revert
- Administrators:** @ADMINISTRATOR, bruno.foyer

At the bottom, there are sections for "Frames of reference":

- Actors:** MOSAR - Actors Samples
- Infrastructures:** MOSAR - Infrastructure...
- Infrastructure elements:** MOSAR - Infrastructure...
- Behaviors:** MOSAR - Behaviors sa...



# Any question ?

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[www.mosar.io](http://www.mosar.io)

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