

❑ Depending of the **of the Research National Agency**

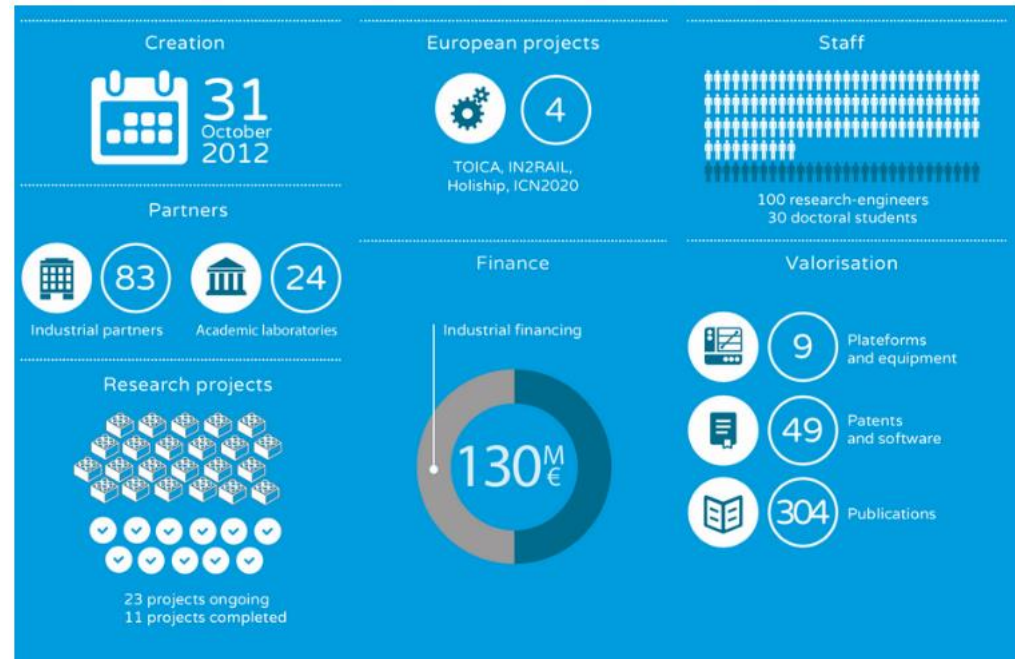
❑ **Public-private partnership projects**

❑ Topics :



*Digital engineering of complex systems*

- Agile Industry
- Smart Territories
- **Autonomous Transport** → **SVA project**
- Internet of Trust



Website : <https://www.irt-systemx.fr/en/>

## Simulation for the Safety of the Autonomous Driving

### Industrial partners:

### Academic partners :

## Safety of Autonomous Driving

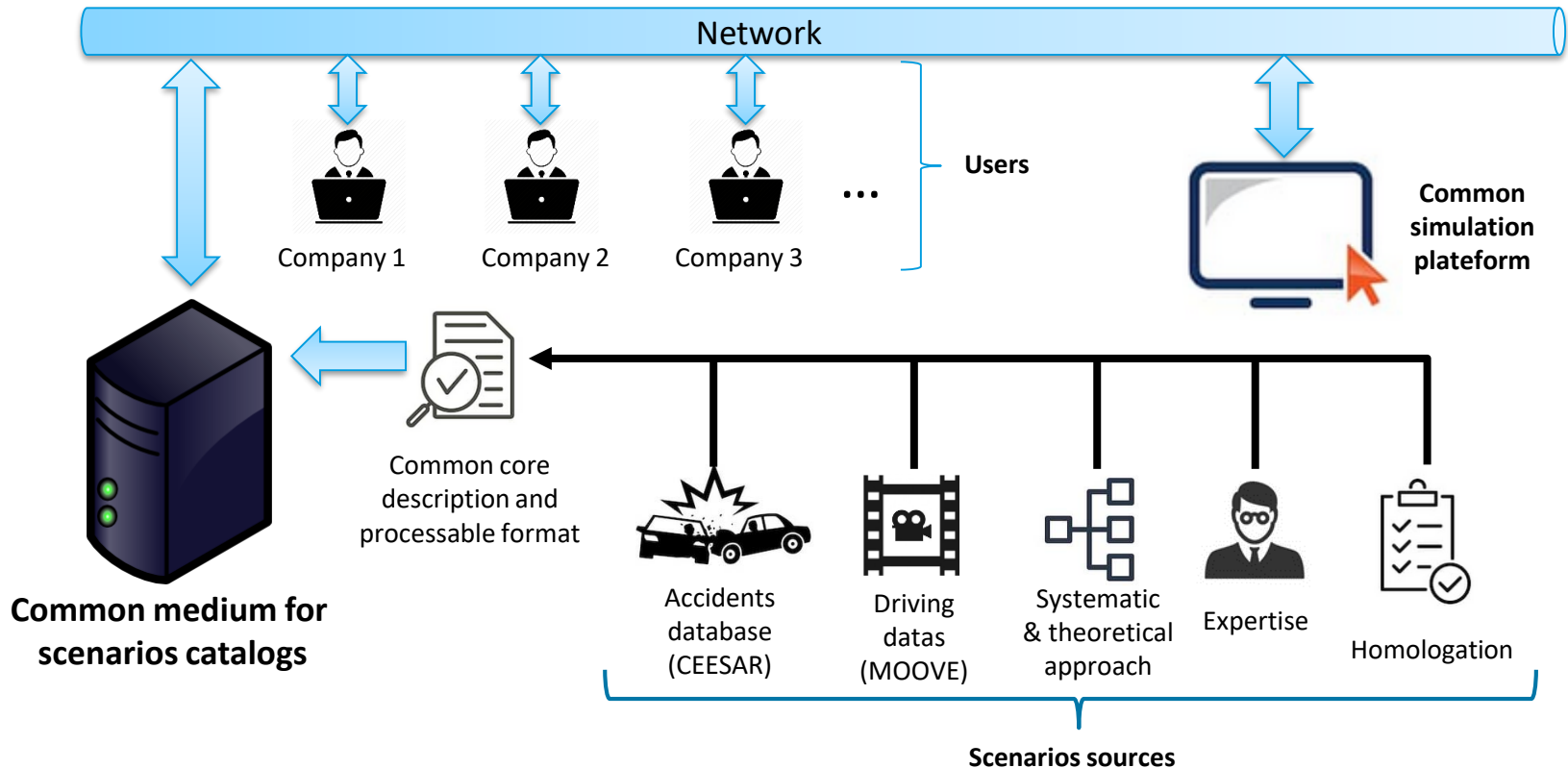
- Since 2015



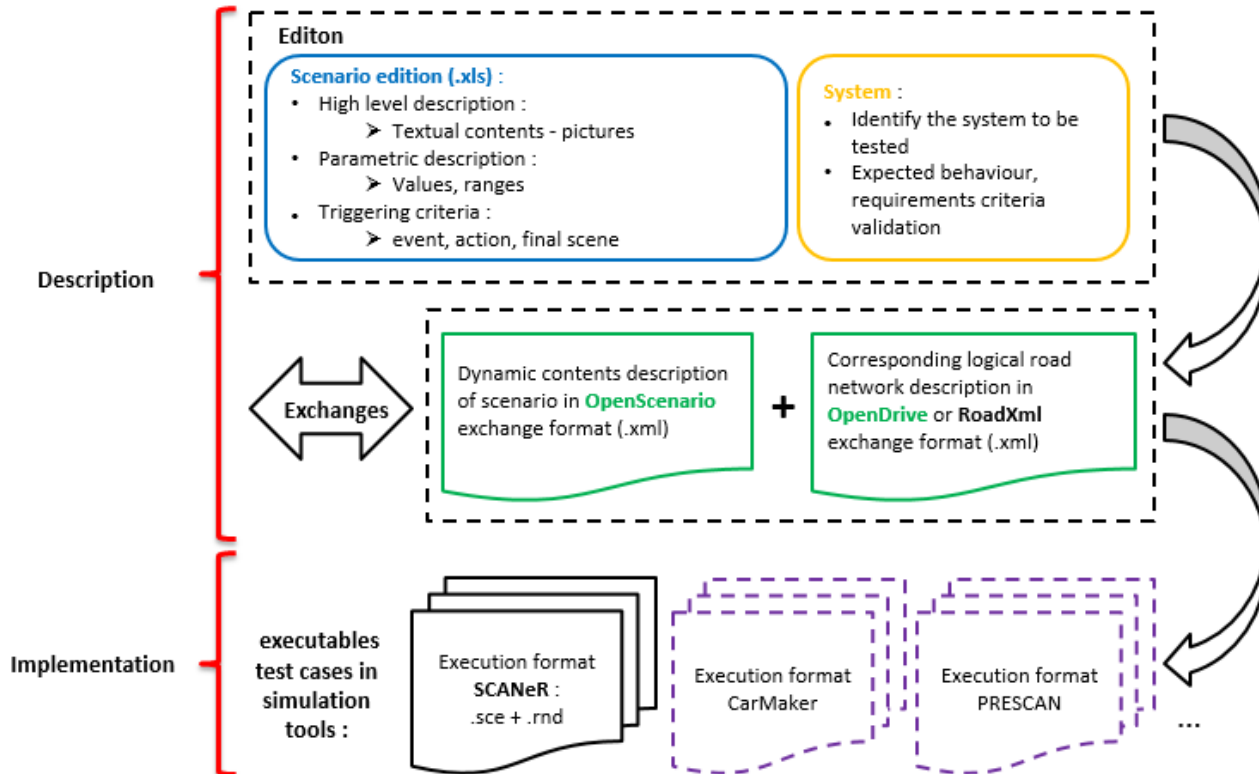
### Goals :

- Provide methodologies and tools able to assist design and validation of the AD next systems.
- Specify, adapt or develop models (vehicle components, environment) in order to simulate the behavior of the vehicle in case of critical situations or failures.

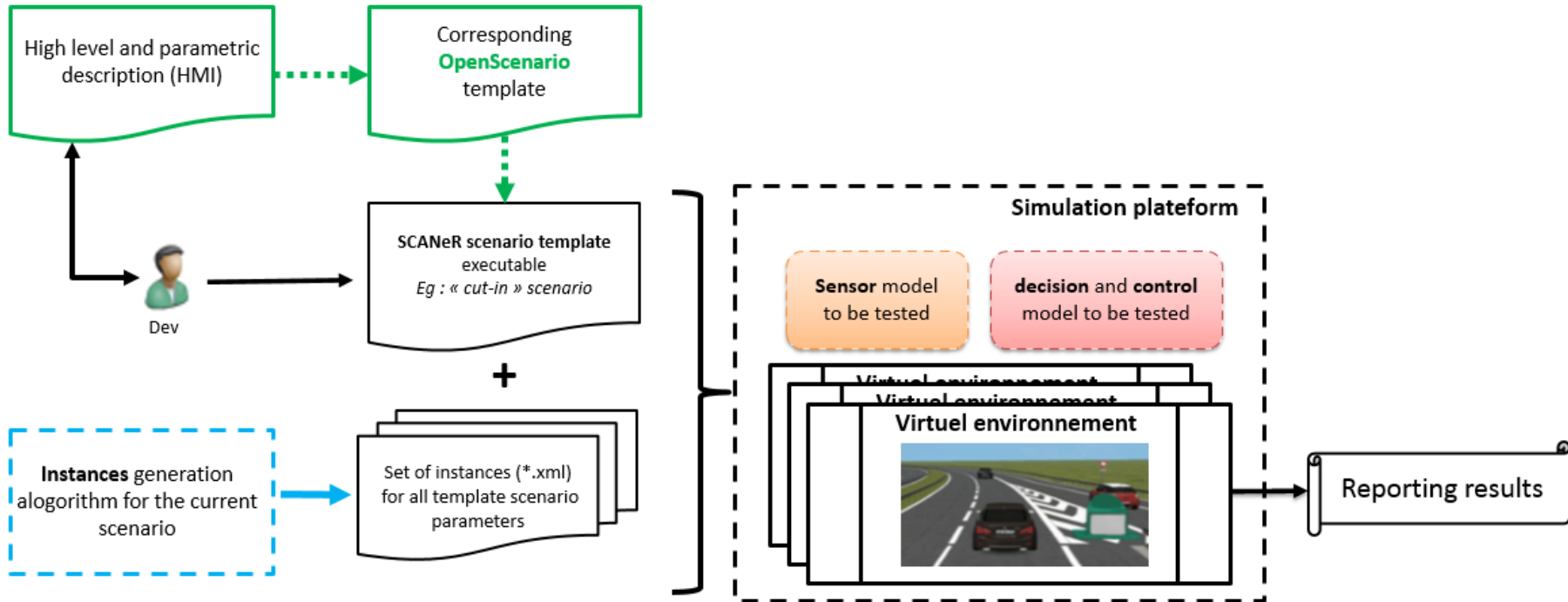
## Scenario's catalog



## What we expect from OpenScenario ?



## What we expect from OpenScenario ?



- **Elements/Parameters mapping between :**
  - Those available in OpenScenario
  - Those we are using to describes our scenarios
- **Studying the format and exploration of the sources through:**
  - The examples given from the website
  - The redmine's project (Subscriber)
  - Symposium participation (2017)
- **Attempt to include OpenScenario in our works :**
  - A few of scenario's from our catalog were translated in OSC

## Eg. of writing a scenario in OSC

```

- <OpenSCENARIO>
  <FileHeader author="Florian FAUCHER" date="2018-02-28T10:00:00" description="Scenario - Merging on highway" rev=
+ <ParameterDeclaration></ParameterDeclaration>
+ <Catalogs></Catalogs>
+ <RoadNetwork></RoadNetwork>
+ <Entities></Entities>
- <Storyboard>
  + <Init></Init>
  - <Story name="MyStory" owner="merging">
    - <Act name="MyAct">
      - <Sequence name="MySequence" numberOfExecutions="1">
        - <Actors>
          <Entity name="merging"/>
        </Actors>
        - <Maneuver name="MergeOnHighway">
          - <Event name="AccelerationEntranceRamp" priority="overwrite">
            - <Action name="AccelerationEntranceRamp">
              - <Private>
                - <Longitudinal>
                  - <Speed>
                    <Dynamics rate="2.8" shape="linear"/>
                  - <Target>
                    <Relative continuous="1" object="ego" value="1" valueType="delta"/>
                  </Target>
                </Speed>
              </Longitudinal>
            </Private>
          </Action>
        </Event>
      </Maneuver>
    </Act>
  </Story>
- <StartConditions>
  - <ConditionGroup>
    - <Condition delay="0" edge="rising" name="MergeOnHighwayStartCondition">
      - <ByValue>
        <SimulationTime rule="equal_to" value="13713"/>
      </ByValue>
    </Condition>
  </ConditionGroup>
</StartConditions>

```

```

ffaucher@ffaucher-Latitude-3340 ~/OpenScenarioProject/OpenSCENARIO v0.9.1
xmlint --schema OpenSCENARIO_v0.9.1.xsd TemplateOSCMergeScenario.xml --noout
TemplateOSCMergeScenario.xml:3: parser error : StartTag: invalid element name
</OpenSCENARIO>
^
TemplateOSCMergeScenario.xml:3: parser error : Extra content at the end of the
document
</OpenSCENARIO>
^
x ffaucher@ffaucher-Latitude-3340 ~/OpenScenarioProject/OpenSCENARIO v0.9.1
vim TemplateOSCMergeScenario.xml
ffaucher@ffaucher-Latitude-3340 ~/OpenScenarioProject/OpenSCENARIO v0.9.1
xmlint --schema OpenSCENARIO_v0.9.1.xsd TemplateOSCMergeScenario.xml --noout
TemplateOSCMergeScenario.xml validates

```

- **Not always matching with our needs**
  - Very low level specification (implementation ?)
  - Not really suitable for specific scenarios
  
- **Common scenarios description or reference implementation ?**
  - Need to be clarified
  
- **Lack of documentations**
  
- **Lack of tools for edition, validation, etc.**



- **Clarify the purpose of OpenScenario :**
  - Reference for implementation/executable
    - **Representativeness and comparability**
  - Common description/specification for scenario
    - **Ontology ?**