



**La 5G pour la mobilité coopérative connectée et automatisée : vers plus de sécurité et d'efficacité**

Démonstration et séminaire du site français

21 avril 2022, 9h-17h30

Versailles, pistes de Satory et mobiLAB - FRANCE



Ces travaux font partie du projet 5G-MOBIX, qui a reçu des fonds du programme de recherche et innovation Horizon 2020 de l'Union Européenne sous le numéro d'agrément 825496

# Site français du projet 5G-MOBIX : tests et essais

Camille Plestan

**Chargée de projets européens**

**VEDECOM**

21 avril 2022



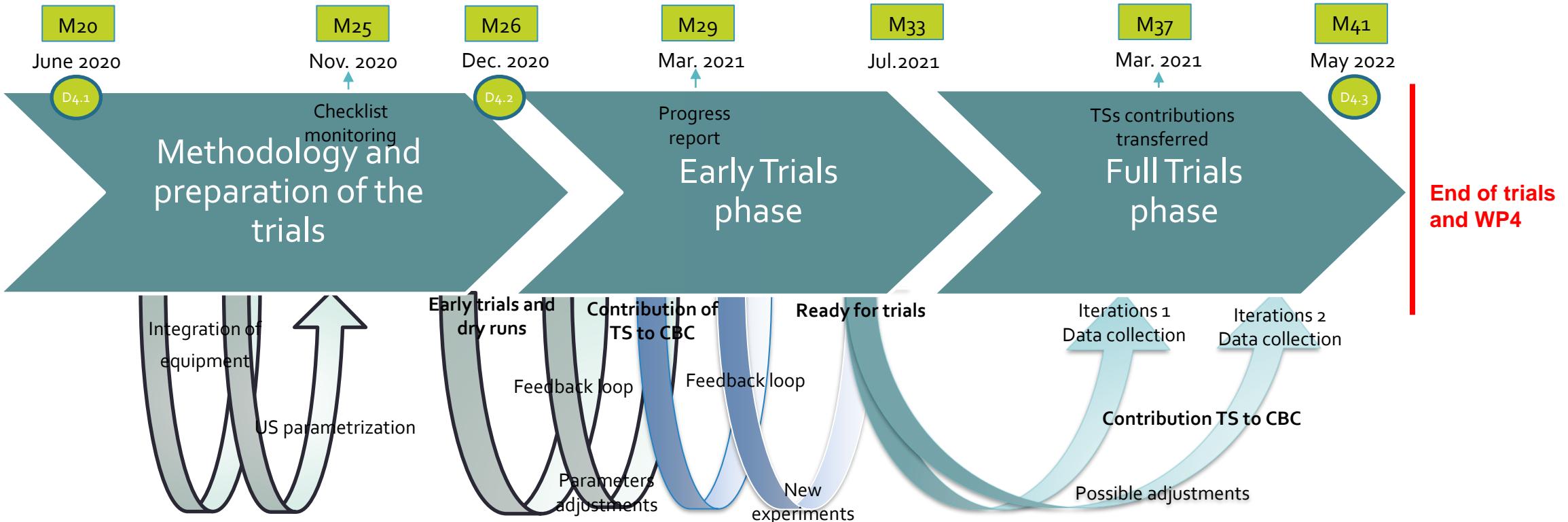
**CATAPULT**  
Satellite Applications

**Valeo**

**AKKA**  
PASSION FOR  
TECHNOLOGIES

**INSTITUT  
VEDECOM**

# Méthodologie des tests



**Preparation of trials:** Coordination of TSs contributions to CBCs, gathering the necessary authorizations for the execution of the trials (5G frequencies, road authorizations), ensuring interoperability between TSs and CBCs... definition of the Trial plans, detailed planning of the trials activities, and finally the monitoring of the trials readiness (readiness of the components)

**Early trials:** In this process, several iterative improvements will take place to ensure the effective interoperability between CBCs and TSs, to test the integration of TSs contribution to CBCs trials. The aim is to use the feedbacks collected to make some upgrades before the full trials.

**Full trials : Phase occurring once the early trials are successful. This phase involves data collection for the evaluation**



## Planning des tests

- Les tests en France ont débuté en Septembre 2020
  - Les tests à la frontière ES-PT étaient en Mars 2022

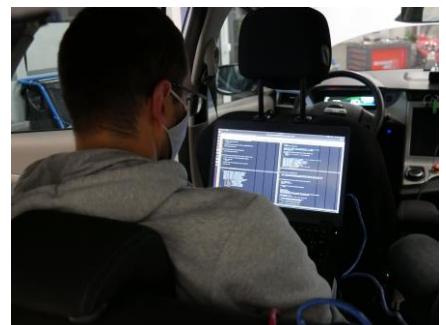
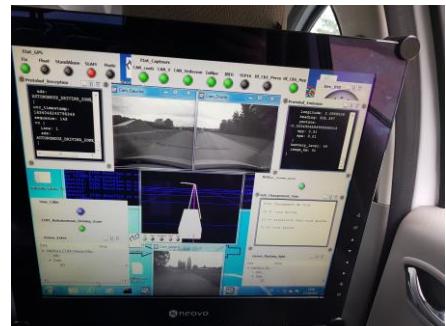
		Full Trials												Full trials																																
Year		2021						2021						2022																																
Months		July			August			September			October			November			December			January			February			March			April																	
UCC	Activity title	M33			M34			M35			M36			M37			M38			M39			M40			M41			M42																	
	Weeks	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
										FRENCH TRIAL SITE																																				
Advanced Driving	AssInfrastructure	LT (FR)						LT (FR)						LT(FR)				LT(FR)				LT(FR)				Final DEMO 21 LT																				
Contribution to CBC	FR contribution to ES-PT (5G connected car)					LT (FR)																CLR																								
Contribution to CBC	FR contribution to ES-PT (Multi PLMN/Multi-SIM)	LT (FR)				LT				LT												OR																								



# Test cases



Trials	Number of test cases (10-20 runs per test case)	Test areas	Equipments/modules
Use-case: Infrastructure assisted advanced driving	1. 4G 2. <b>5G cmWave</b> 3. 5G mmWave 4. 5G cmWave et mmWave	Satory, ES-PT CBC	<ul style="list-style-type: none"> <li>VAC, VC, VB,</li> <li>Capteurs débarqués,</li> <li>MEC</li> <li>V2X application,</li> <li>KPI management tool</li> </ul>
Multi-SIM and Satellite communication	1. 4G et 5G static/mobile 2. <b>5G et 5G (link selection/aggregation)</b> 3. <b>5G et satcom link selection</b>	TEQMO, Satory, ES-PT CBC, Open road	<ul style="list-style-type: none"> <li>VC (5G)</li> <li>Cloud Server</li> <li>Intelligent router,</li> <li>Satcom device</li> <li>KPI measurement tool</li> </ul>
QoS prediction	1. <b>4G/5G cmWave</b>	Open road	<ul style="list-style-type: none"> <li>VC</li> <li>Cloud server</li> <li>QoS prediction manager, client</li> </ul>

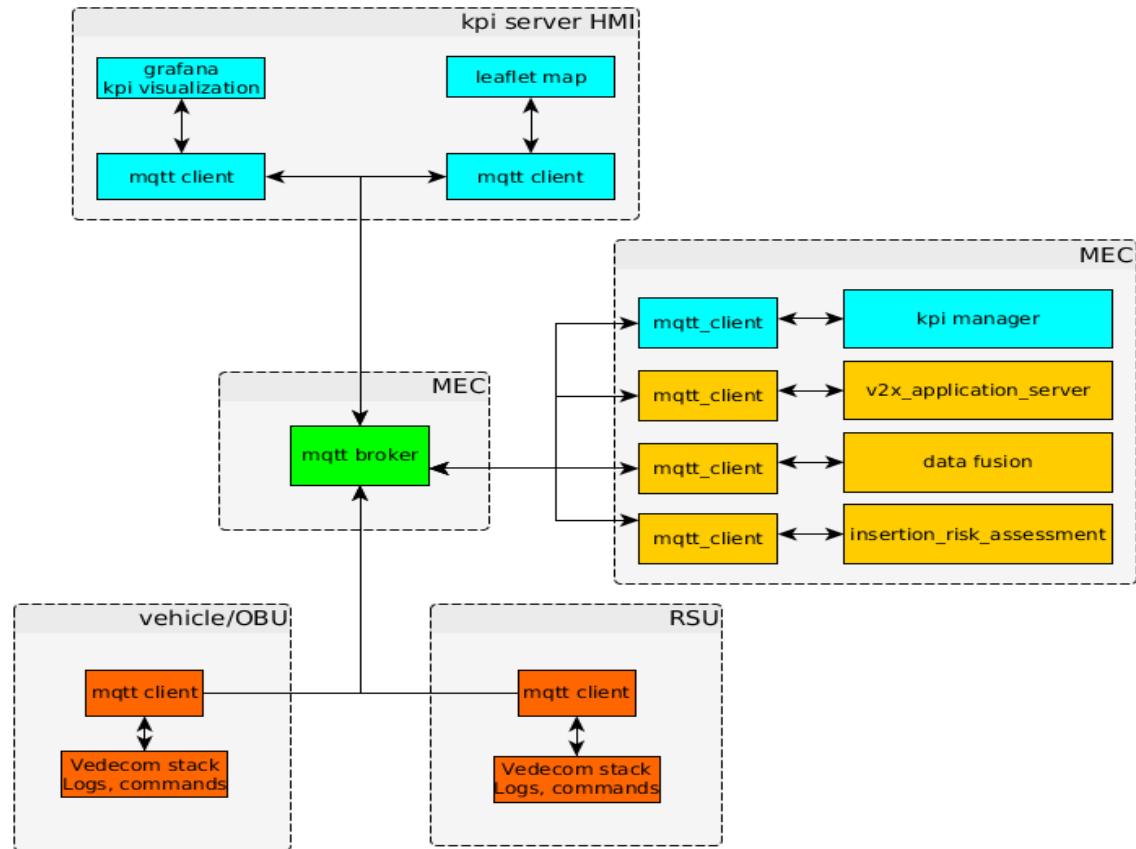
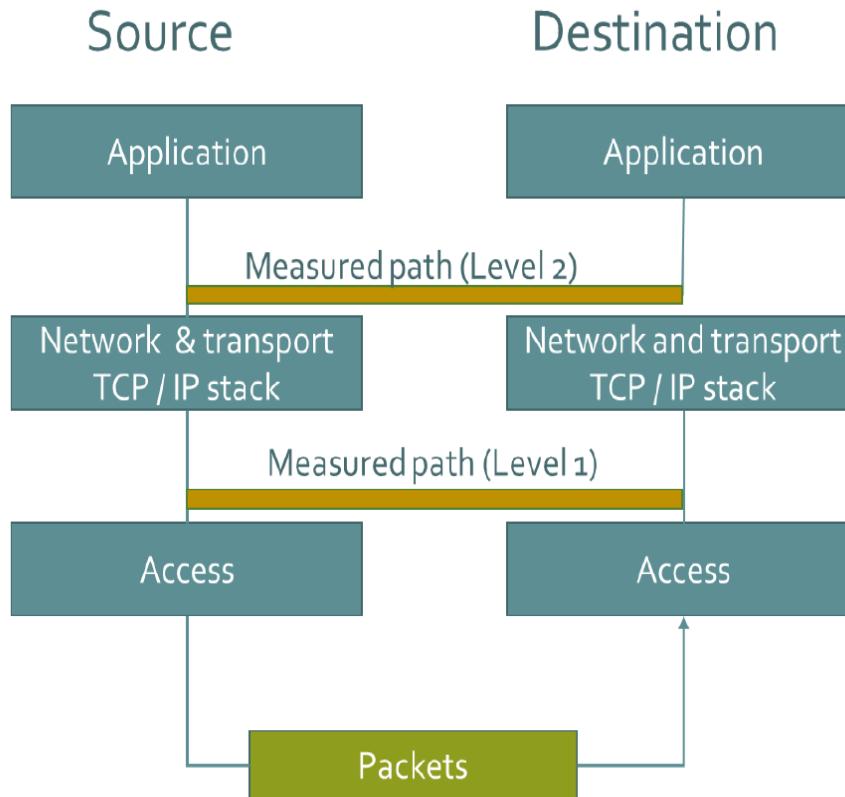


# Contribution du site Français au corridor ES-PT

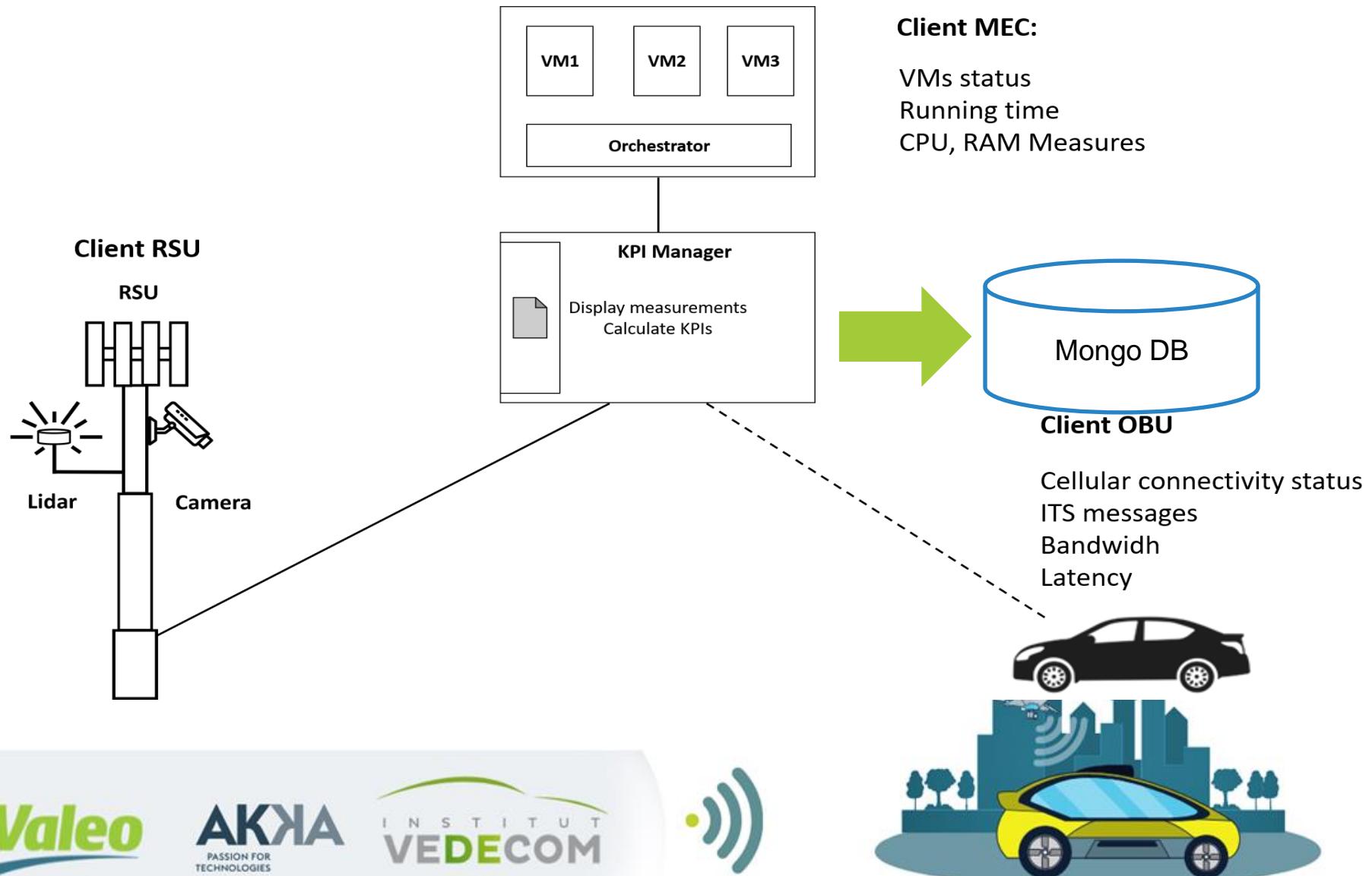
- Véhicule connecté transféré au site ES-PT : le véhicule « français » est équipé d'un OBU à double pile et d'un mécanisme de sécurité développé par le FR TS.
- Objectifs:
  - Tester l'interopérabilité entre le véhicule FR et la 5G et l'infrastructure du corridor ES-PT
  - Utilisation de la solution multi-SIM pendant les tests durant lesquels le véhicule FR se connecte au MEC (ES) et au MEC (PT) en utilisant multi-SIM dans la zone de couverture qui se chevauche.



# Mesure de performance



# Mesure de performance



# MongoDB: stockage de données



- Vehicle:  
Vehicle data  
Vehicle position, velocity, driving mode ...  
Neighbors information

- Network:  
Network/link quality data  
Network ID, RSSI, RSRQ, Bandwidth etc.  
Bit rate of individual flows

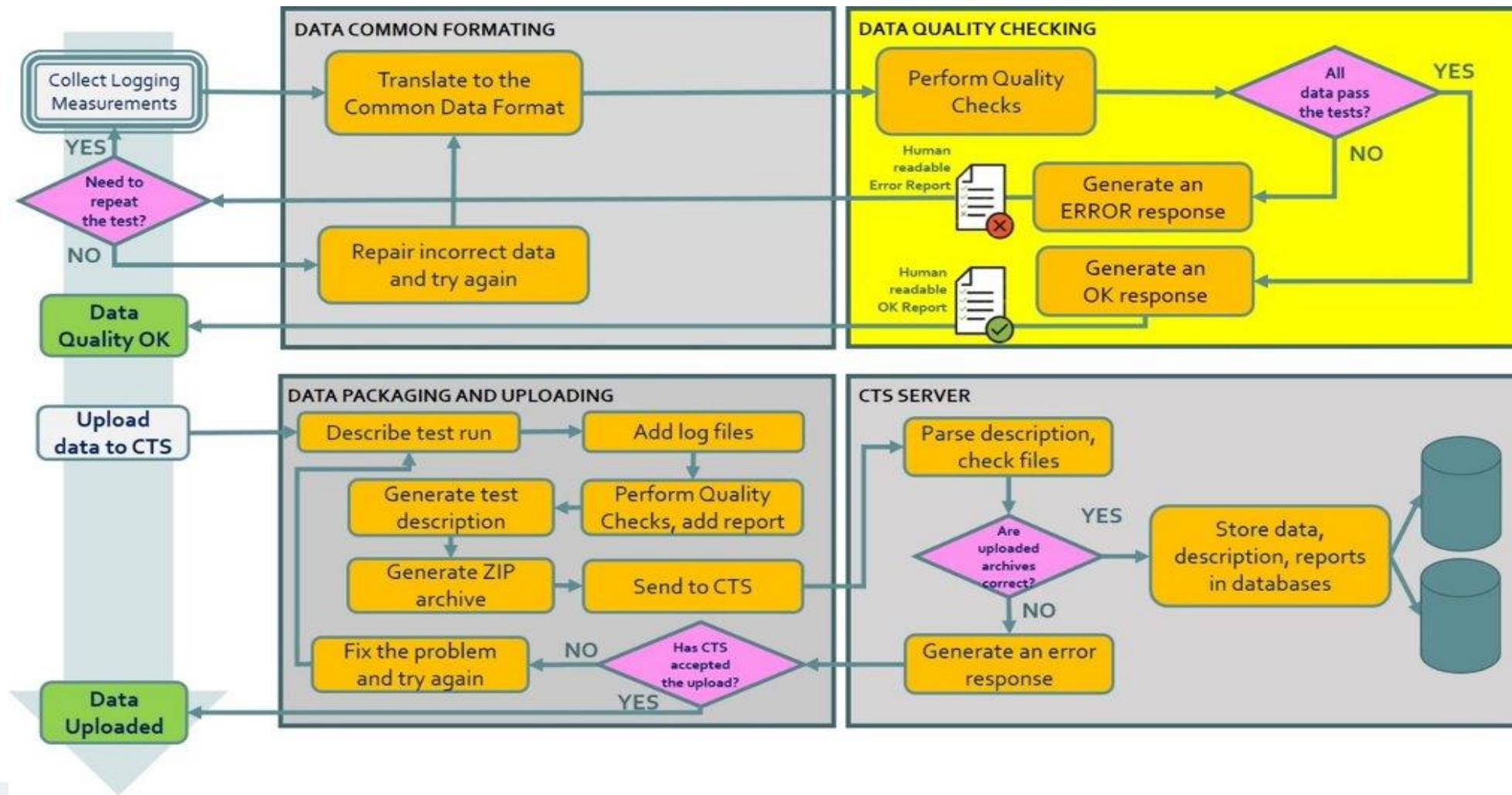
- Facilities  
CAM: number of transmitted/recieved pkts, size, delay, PDR, throughput  
CPM: number of transmitted/recieved pkts, size, delay, PDR, throughput  
MCM: number of transmitted/recieved pkts, size, delay, PDR, throughput

- Application  
Local perception: lists of detected objects, their descriptions  
Cooperative Fusion: Output of the data fusion  
Risk analysis: collision risk

The screenshot shows the MongoDB Compass interface with the database 'robo3t' selected. The 'EmulatorLogs' collection is open, showing a list of 32 documents. Each document is represented by a blue icon and a unique ObjectID. The 'stationInfo' field is expanded, showing nested fields such as timestamp, stationId, latitude, longitude, altitude, locationType, heading, yawrate, speed, lonAccelaration, steerAngle, steeringWheelAngle, stationType, landid, drivingMode, and directionIndicator. The preview pane at the bottom shows the full document structure.



# Analyse de données et transfère vers la database commune



# Data acquisition



**SG-Mobix - Upload Test**

### Upload Test Data

<b>Evaluation scenario</b>		<b>Test Run</b>	
Trial Site	UC Category	Test Case Identifier	Execution Status
User Story/ User Agnostic		Test Run Identifier	To Be Evaluated
Evaluation Scenario/ Performance Measurement		Test Run Context	
<b>Test Session</b>			
Session Name	Session Description	Run Start TimeStamp	Run End TimeStamp
Session Date		Test Run Comment	
<b>Data Manager</b>		<b>Test Data Files</b>	
Name	Email	Add File	
		Check File	
		Delete File	
<b>Add description files</b>		<b>Context</b>	<b>Safety Intervention</b>
		<b>Quality Check</b>	<b>Build Archive</b>
		<b>Send</b>	

Actions	I	Tri	Use Case C...	User Story	Evaluation ...	Session Na...	Test Case I...	Test Ru...
	1	CN	Advanced_Dri...	CloudInfrastruc...	My evaluation...	SessionProdT...	TCI	5
	2	FI	Remote_Driv...	RedundantNE	PM	SN	TCI	5
	3	FI	Vehicles_Plat...	AsseRSU	ES	SN	TCI	12
	4	FI					TCI	1
	5	DE					TCI	1
	6	FR					ProdT...	TCID001
	7	FR					ProdT...	TCID001
	8	FR	Advanced_Dri...	AssInfrastruc...	My evaluation...	SessionProdT...	TCID001	TRID003
	9	FI	Remote_Driv...	RedundantNE	PM	SN	TCI	5
	10	DE	Vehicles_Plat...	AsseRSU	ES	SN	TCI	1

Ouverture de 4\_1618900850450\_FI\_Remote\_Driving\_US0\_SN\_TCI.zip

Vous avez choisi d'ouvrir :

4\_1618900850450\_FI\_Remote\_Driving\_US0\_SN\_TCI.zip  
 qui est un fichier de type : Compressed (zipped) Folder (5,6 Ko)  
 à partir de : blob:

Que doit faire Firefox avec ce fichier ?

Ouvrir avec Windows Explorer (par défaut)

Enregistrer le fichier

Toujours effectuer cette action pour ce type de fichier.

