



FAME

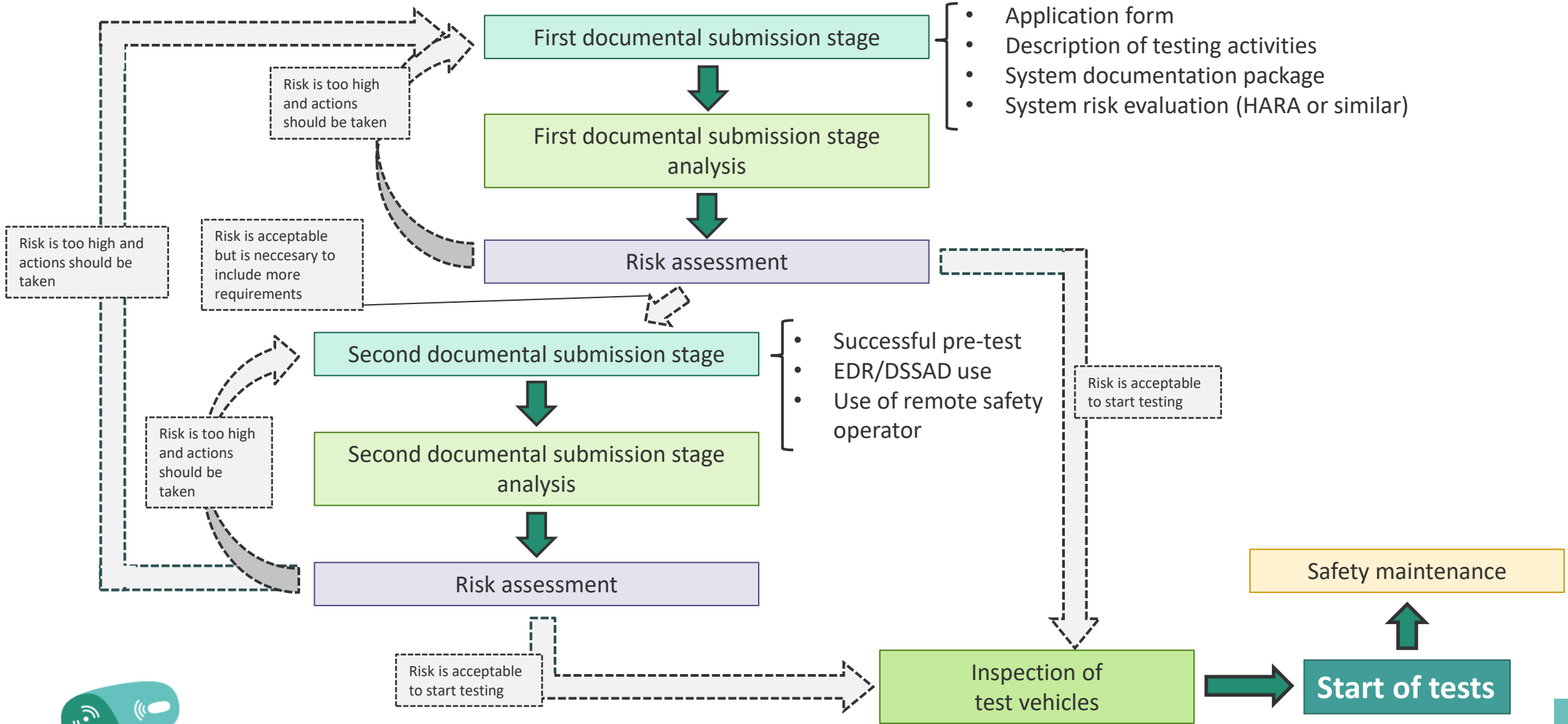
Task 5.4: Recommendations for a European framework for testing on public roads



OBJECTIVES

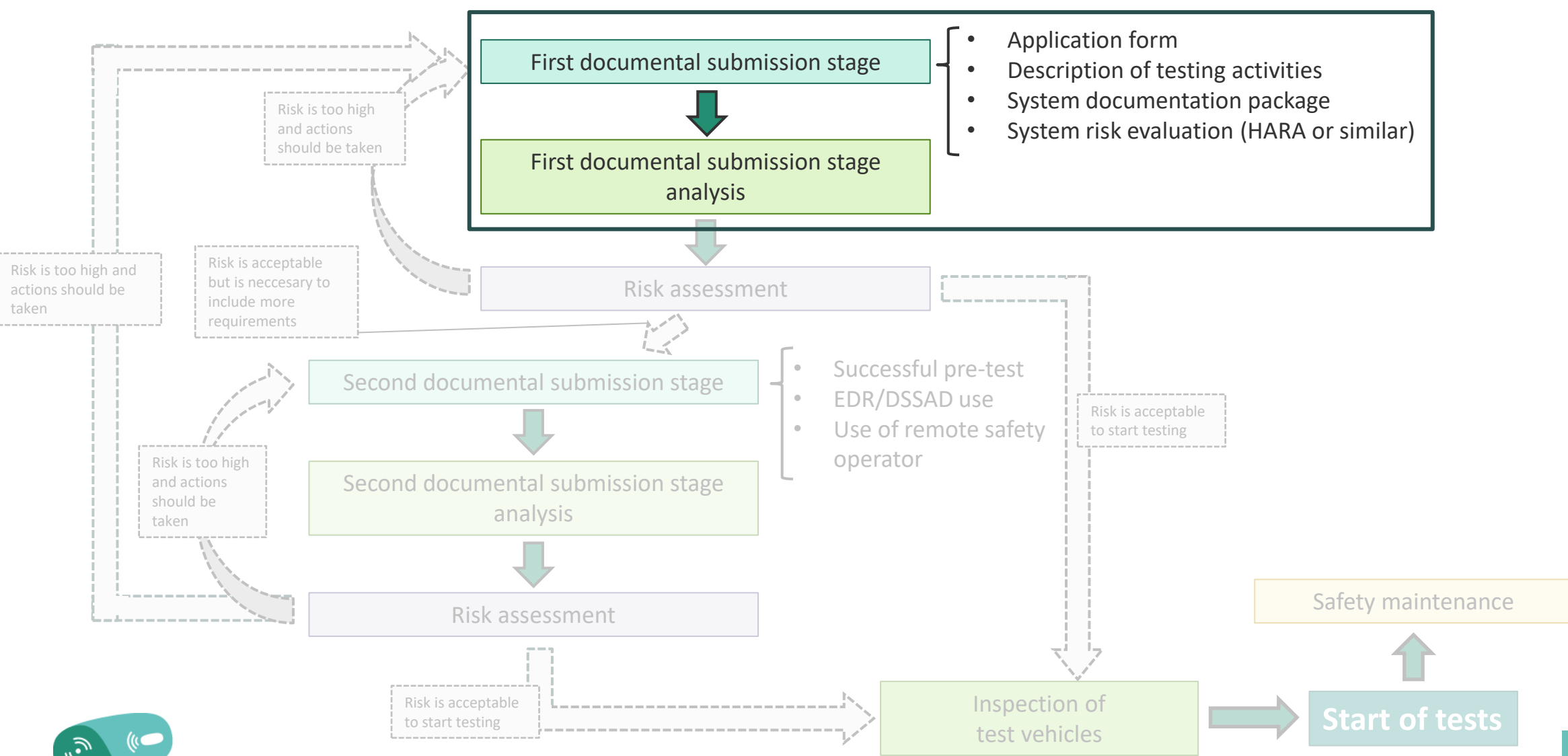
1. Provide recommendations for a harmonized European framework for **testing** in public roads including
 - Technical and legal aspects
 - Data Exchange (Reporting and Monitoring)
 - Ethics
2. To present outcomes and raise awareness to policy makers in different regulatory forums, e.g. UNECE, EC: CCAM, JRC.

SAFETY VALIDATION FLOWCHART



Legal requirements

1. First documental submission stage



Legal requirements

Application form

An application form should be submitted. Example on the content to be contained in the application:

1.DATA REGARDING THE ORGANIZATION SUBMITTING THE APPLICATION	
Business name	
C.I.F.	
Registered Office	
Telephone Number	
E-mail	

2.DATA REGARDING THE PERSON SUBMITTING THE APPLICATION	
Name	
Surname	
ID or Passport number	
Telephone Number	
E-mail	

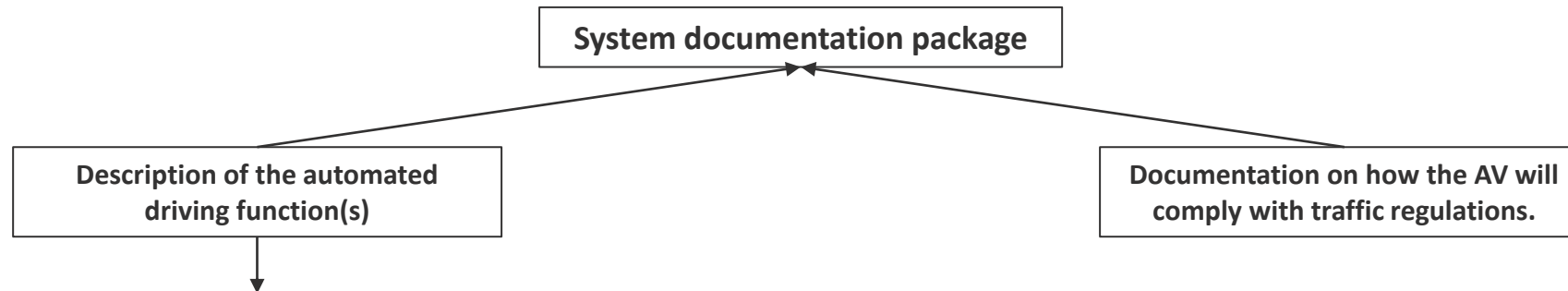
Description of testing activities

A comprehensive description of the tests activity to be carried out on open road, shall be attached to the application form, including:

- **Objectives** of the activity.
- Connected/automated **features** to be deployed.
- Description of the **activities** to be tested with each feature.
- Detailed **time schedule** for the activities of the testing plan.
- Identification and detailed description of the **area** requested to carry out the tests.
- Number and type of **vehicles**.
- Identification of the **affected populations**.
- **Number** and **characteristics** of vehicle(s):
 - Information allowing vehicle(s) **identification** such as VIN number.
 - **Type of vehicle**(s) including dimensions and masses.
 - **Base approval** and description of the modifications. (If based on type approved vehicle).
- **Processes and organizational responsibilities and measures** for managing the trial activity
 - **Data of safety operators** involved in testing activities (names, job's position, previous experience in AV testing)
 - Documentation describing the **safety operators training program** implemented to favor safety while testing shall be included.
 - **Responsible declaration** of the **attitudes of the designated operators**, certifying under applicant's responsibility that they know the technology and systems of the vehicle, and have received the described training.
 - **Reporting** responsibilities and action plan **in case of accident/serious incident**.
 - **Monitoring** processes and responsibilities.

System documentation package

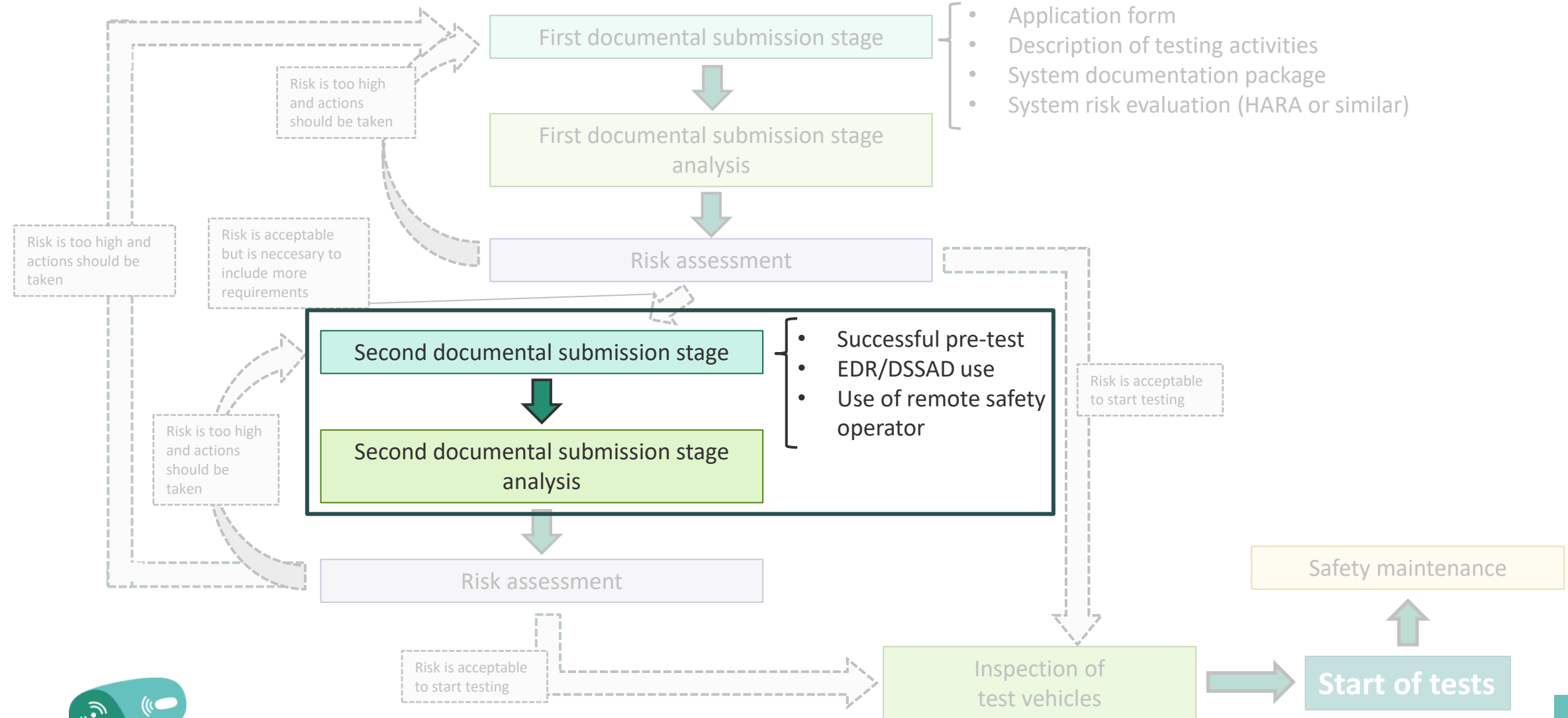
The applicant shall provide a documentation package which gives access to the basic design of the system.



- **Description of the automated driving function(s) including:**

1. Name of the function(s).
2. Software version of the function(s).
3. Scope of each function (including ODD overview, systems implemented to ensure safety, possible scenarios that it can face and that it cannot).
4. Emergency disconnection description.
5. Override implementation.
6. Cybersecurity.
7. EMC.

2. Second documental submission stage



Successful pre-test (based on Spanish approach)

Tests can be based on dynamic tests listed here and/or on additional scenarios not covered, the responsible authority may define new tests depending on the analysis of the documents in the first documental stage and the risk evaluation.

- Manual driving tests.
- Override:
 - Steering wheel override.
 - Brake pedal override.
 - Accelerator override.
 - Override by emergency disconnection.
- Longitudinal control tests
 - Braking tests.
 - Autonomous emergency braking.
- Lateral control tests:
 - Autonomous lane keeping in straight line.
 - Autonomous lane keeping in curve.
- Recognition and compliance with traffic signs.

EDR/DSSAD use

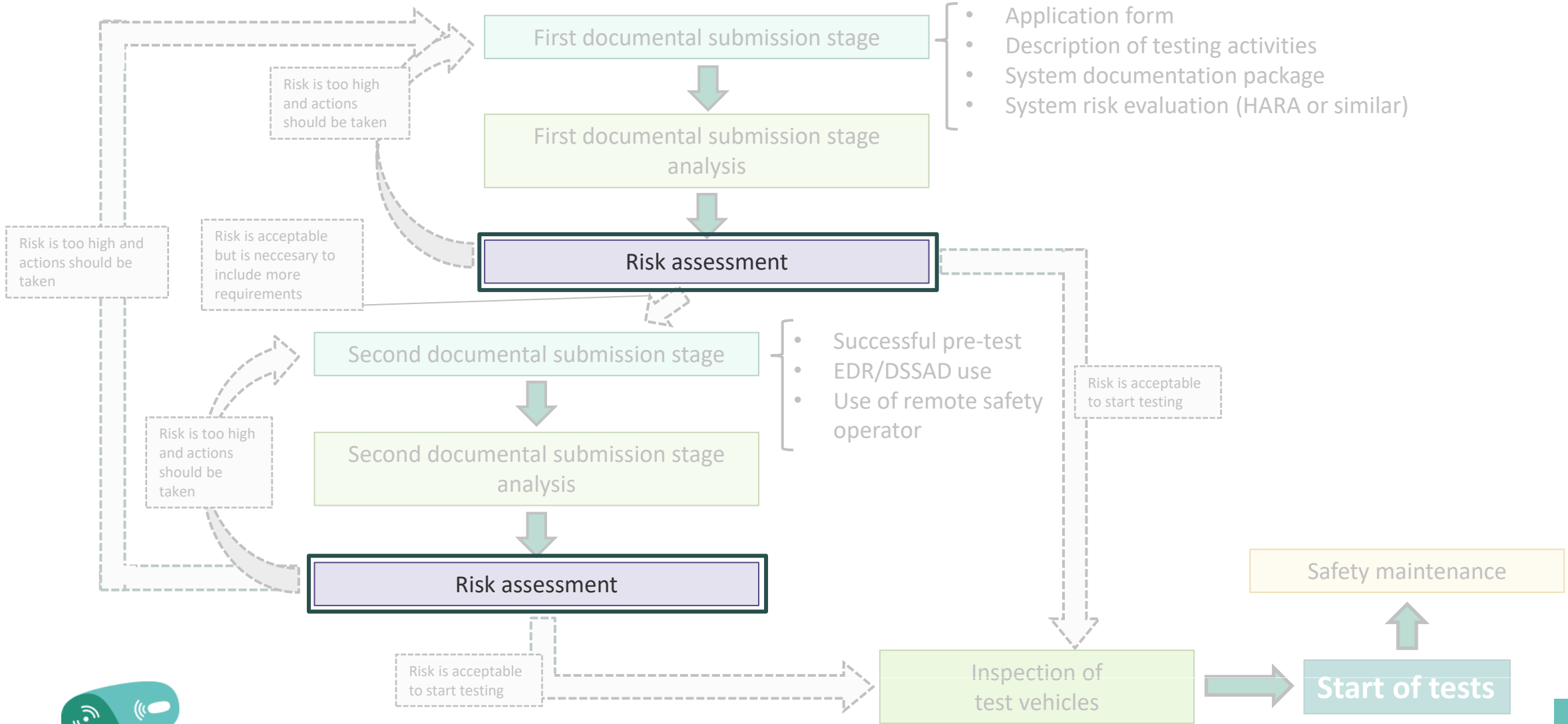
The safety validation responsible may request the applicant to include EDR and/or DSSAD system in the vehicle during testing.

Use of remote safety operator

The use of exclusively remote safety operator(s), shall be evaluated by the technical service, considering the information provided.



3. Risk Assessment



Risk Assessment

System risk evaluation (HARA or similar)

- Performed by the **applicant**

Activity risk evaluation

- Performed by the **safety validation responsible**.

The general Risk Assessment evaluation mark will be obtained adding to System risk evaluation the conclusions obtained in Activity risk evaluation.

E.g.:

System risk evaluation: 60% of the general risk assessment.

Activity risk evaluation: 40% of the general risk assessment.

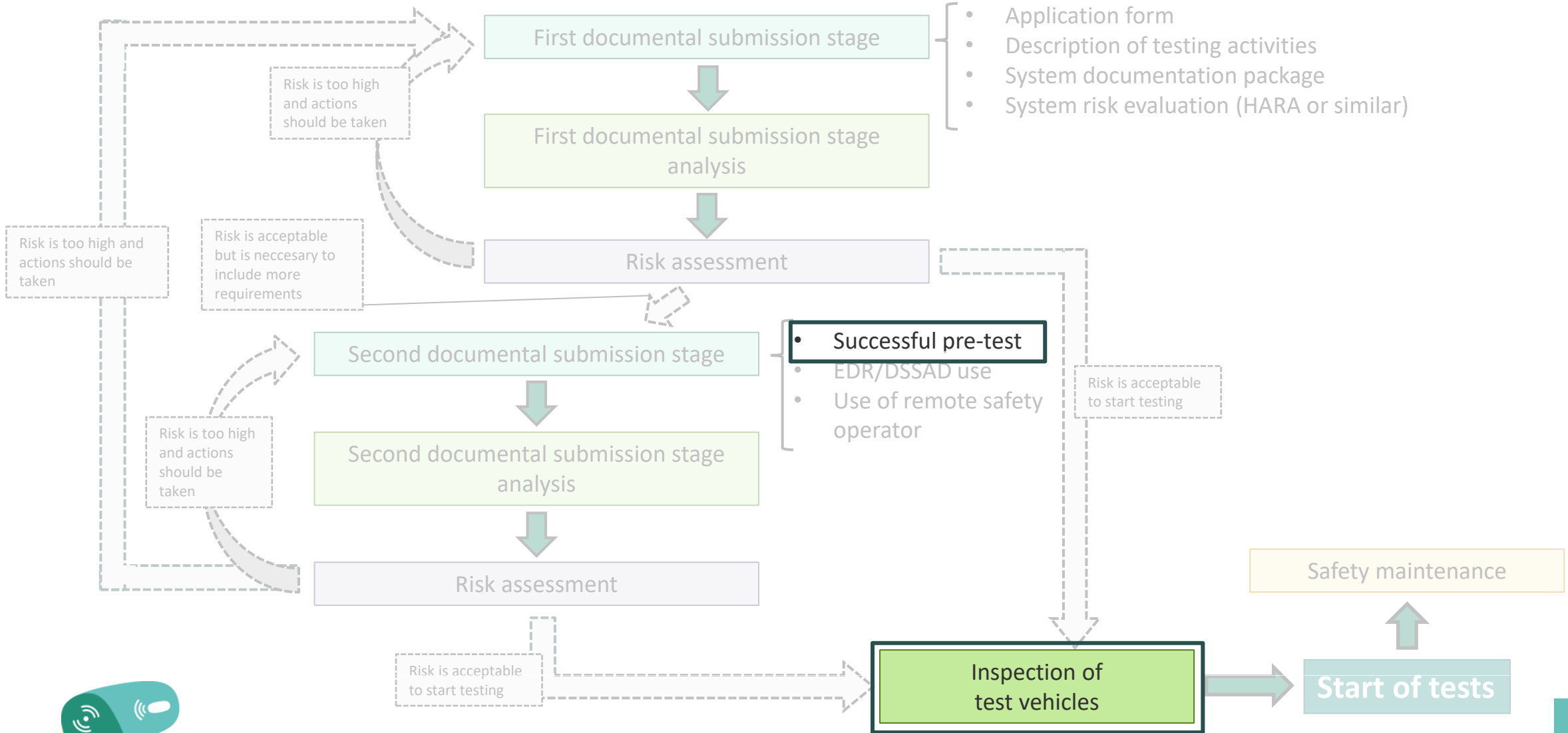
Risk AssessmentSystem risk evaluation (HARA or similar)

Item	Evaluation of risk (e.g. 1-4)	Ponderated System risk
X	X/4	X
X	X/4	
X	X/4	
X	X/4	
X	X/4	
X	X/4	
X	X/4	

Activity risk evaluation

Item	Evaluation of risk (e.g. 1-4)	Ponderated Activity risk
Applicant's previous experience	X/4	X
Activity complexity.	X/4	
Activity location and affected populations.	X/4	
Activity scale.	X/4	
Safety operators experience and training.	X/4	
Novelty/innovation of technologies or methodologies to be tested.	X/4	

4. Test vehicle(s) inspection



- Application form
- Description of testing activities
- System documentation package
- System risk evaluation (HARA or similar)

- **Successful pre-test**
- EDR/DSSAD use
- Use of remote safety operator



Legal requirements

- The safety validator shall corroborate in person that the vehicle(s) presented for open road testing corresponds to the documentation presented by the applicant.
- This inspection shall also verify safety aspects such as exterior projections, interior space, condition of the wheels or mounting of instrumentation/ballast (if applicable).
- When:
 - Prior to open-road testing activity starts.
 - or
 - In pre-testing phase (if apply).

Other important topics:

- **Safety operator**
- **Reporting and monitoring**
- **Software version traceability**
- **Safety validation responsible**
- **Mutual recognition**
- **Cross-border testing**

Taxonomy

(EU) 2022/1426	T.5.4 Recommendations
-	<p><u>Safety operator:</u> Person(s) who may, if applicable, activate/deactivate and perform the actions necessary for the safe execution of the testing activities including overriding the system and take control of the vehicle, if necessary, to avoid a situation that may entail unnecessary risks.</p>
<p><u>On-board operator:</u> Means, where applicable to the ADS safety concept, a person located inside the fully automated vehicle who may activate/deactivate the system, request an MRM and confirm a maneuver proposed by ADS. In the above situations, the on-board operator shall not drive the fully automated vehicle and the ADS shall continue to perform the DDT.</p>	<p><u>On-board safety operator:</u> Relating to a safety operator that does its task from inside the fully automated vehicle.</p>
<p><u>Remote intervention operator:</u> Means, where applicable to the ADS safety concept, person(s) located outside the fully automated vehicle who may remotely achieve the tasks of the on-board operator provided it is safe to do so. The remote intervention operator shall not drive the fully automated vehicle and the ADS shall continue to perform the DDT.</p>	<p><u>Remote safety operator:</u> Relating to a safety operator that does its task from outside the fully automated vehicle provided it is safe to do so.</p>

Requirements:

The safety validator shall analyze that the functions described in both documental submission stages fulfill with these following requirements:

- The use of exclusively **remote safety operator(s)**, shall be evaluated by the safety validator, considering the information provided.
- The vehicle safety operator will always be **responsible** for driving and handling the vehicle.
- The driver/operator shall be **able to always take full control** of the vehicle.
- The driver/operator will be **obliged** to take full control of the vehicle in the event of any eventuality that poses a **risk situation** for the occupants of the vehicle or for the rest of the road users.
- Each safety operator shall be **trained** enough to supervise or perform the testing activities in which they are involved. Including the execution of minimal risk maneuvers in case of incidents.
- Every safety operator shall have an in force **driving license** according to vehicle type.

Software version traceability.

The test permit shall be given just to a **specific software version of the system**. In the event that, during testing, changes are applied in the form of new software versions, **documents describing the changes** performed to the system and **evidence of continued fulfillment** of the requirements initially defined by the safety validator.

The **safety validator may request fulfillment with new requirements and update the risk evaluation** after reviewing the documents previously mentioned.

Reporting and monitoring

Purpose: Ensuring safe vehicles on the roads, and to understand user and societal acceptance of the technology.

1. To comply with permit for testing, accidents must be reported instantly to the issuer of the permit. Until the cause of the accident is clarified, a temporarily hold or the experiment could be enforced. To understand the cause of the accident, the following data categories should be logged :
 - vehicle operation mode
 - vehicle speed, acceleration
 - vehicle steering commands and their activation,
 - vehicle braking commands and their activation,
 - operation of vehicle lights and indicators,
 - sensor data about another road users or objects presence near the vehicle,
 - remote commands, (Latvia)
 - video and audio recordings (front, rear and inside). (Latvia)
 - Vehicle position (Czech Republic)
 - distance travelled (Italy)
 - yaw, roll, pitch values (Italy)
 - transmitted V2V and V2I messages, if applicable (Italy)
2. To understand the deployment rate, user acceptance societal acceptance, a set of KPIs should be reported periodically.

Main KPIs:

 - Number of kilometers driven with system activated
 - Average speed with system activated
 - Number of accidents and severity
 - Number of minimum risk maneuvers (including interventions of remote safety operator)
 - Additional KPIs specific per test

Safety validation responsible

The safety validation responsible shall be selected by each country authority between the following ones:

- Applicant self-assessment.
- The authority itself.
- A third-party assessor (e.g.: Technical service)

Taking in account two main objects:

- The capabilities of each safety validator option listed above.
- The activity to be validated

Examples:

- Low complexity small activity + Low capabilities of Authority: Applicant self-assessment.
- Low complexity small activity + High capabilities of Authority: Authority itself
- High complexity big activity + Low capabilities of Authority: Third-party.

Mutual recognition

- **Mutual recognition** of a license granted by a Member State by others is a key aspect of the Recommendations
- To facilitate trust in validations from other countries, a **short report template** will be included in Recommendations including:
 - **Statement of the permit's granting authority** affirming that the mentioned authorization has been granted in accordance with these recommendations for the listed parts.
 - **Check-list** of the parts of the recommendations that have been followed.
 - **Short description of decisions taken** for the permit granting taking into account the information provided by applicant. (e.g., inclusion/exemption of requirements, testing area agreed, reporting or monitoring decisions...)

Cross-border testing

- Activities involving **cross-border testing** will be taken into account as part of the Recommendations
- A simplified procedure to obtain authorization by **all the involved Member States** is required.
- **Mutual recognition** will facilitate the cross-border process

NEXT STEPS

1. Develop deeply specific requirements taking into account exception possibilities depending on the characteristics of the applications.
2. Provide guidelines on how to evaluate the activity complexity to make easier to the authorities to decide who is going to be the safety validator.
3. Define actions to take if, during reporting phase, undesirable system behaviors are identified.



Thank you!



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