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**La Rochelle showcase: Recommendation for the  
operation including safety issues**

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Author(s)	CRF
Co-author(s)	
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## **La Rochelle showcase: Recommendation for the operation including safety issues**

### **1 Executive Summary**

This report covers issues associated with the operation in La Rochelle of the Fiat vehicles, taking care of the non standard characteristics of the prototypes that are in charge of the demonstration.

### **2 Introduction**

This Deliverable reports the main recommendations for vehicle application into the circuit of demonstration, which are related to the not standard design of the vehicles.

The site of the testing is Place de Verdun, in La Rochelle (France), that shows a plate surface with an open space sufficiently far from the surrounding houses and building.

The prototypes being used for the demonstration have been built with non standard systems: in many cases they are prototypes themselves and have been tested only in closed areas, expressly conceived for testing with professional drivers and without any other external peoples.

Therefore the safety issues are mainly related to the necessity of avoiding any possible closeness of onlooker to the vehicles, when running or even when in stand-by, waiting for starting.

During the event, additionally, tests without driver are also avoided and any test with people on board must be performed taking care of the safety recommendation.

An insurance contract with Insurance Company, finally, covering all the safety aspects of the event, must be set adequately: it must be specified the potential risk of damages on the prototypes and of injuries to the onlookers, defining the corresponding level of financial intervention.

### **3 Vehicle design criteria**

The vehicles are prototypes intended for functional demonstrations, and have not been designed to fulfil the safety requirements according to the best design practices necessary for production cars.

Many vehicle functions are controlled on the base of by-wire technologies, which usually require a deep safety analysis supported by related methodologies, to define the system architecture and components and to assure the achievement of the required safety levels.

The vehicle electric/electronic architecture is partly based on consumer/industrial components not qualified for automotive applications neither fault-silent or fault-tolerant concepts have been applied.

Nevertheless some measures, as remote and on-board stop commands for traction and brakes (not related to vehicle functionalities), have been taken, which shall be combined with the organisation of demonstrations, to limit the risks.

### **4 Risks**

Unexpected vehicle behaviour is possible.

Possible risk of out-of-control functions:

- Traction: possible increase of motor torque and sudden vehicle acceleration;
- Steering: improper steering by automatic system, which causes vehicle running out of the right trajectory;
- Braking: improper braking or braking loss.

These failures can be recovered by a professional driver at low speed only, but may cause damages or injuries in the case of completely automatic driverless operation.

### **5 Safety recommendation**

It is necessary, therefore, to define the track and onlooker positions in order to set an adequate distance between them. For this 10 meters are suitable.

In particular, moreover, adequate barriers must be set in order to avoid people intrusions. These barriers must be higher more than 90 cm and additional barriers, not easily removable, should be put around those parts of the track that are more near to the public areas. In this case we can put the first ones in a position which maintain the onlookers at a

medium distance of 10 m from the track, the second ones, instead can be put in between, at a medium distance of about 4-5 m from the track.

It is also suitable to arrange a service for managing safety during demonstration.

Additionally it must be prepared and set an adequate insurance to cover possible damages and injuries.

It is necessary also to provide what required by traffic law for non-registered vehicles (e.g. provisional or testing licence plates).

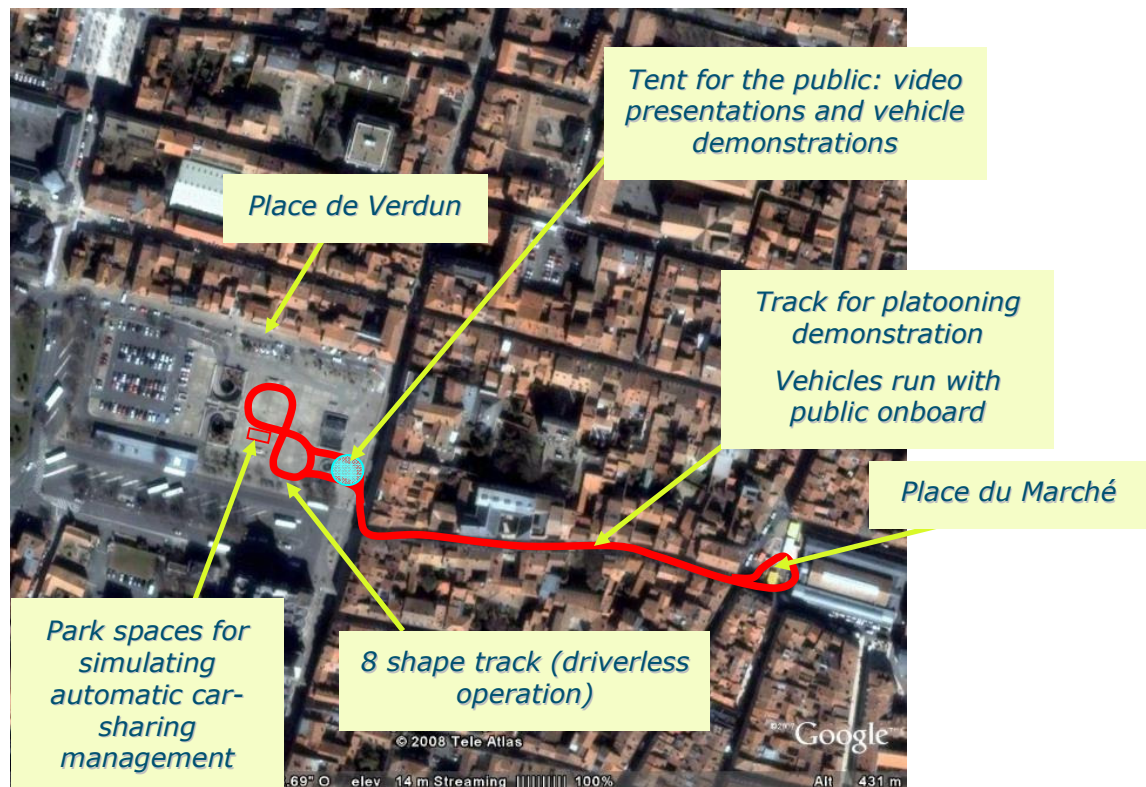
According to these indications it should be, finally, assured a frequent check about the integrity of the safety measures.

More in details, moreover, when managing driverless operations the onlookers must be kept out of the safety barriers and it must be also ready a system for stopping the vehicle by a remote control.

It must be assured that that only appointees are allowed to demonstrate risky functions (e.g. anti-collision).

During the demonstrations with drivers, the visitors have to be taken on board on rear seats and it must be assured and verified that they fasten the provided seat belts. Then all the recommendation already given for driverless operation must be also followed.

**Figure 1: Testing tracks and operational localisations in La Rochelle**



## 6 Operational cares

The safety issues are the main points related to this kind of performances, but also some organizational issues have to be taken into account.

Every day, after the demonstration job, the prototypes must be parked in a safe area, where nobody could access, also for safety reasons, but in particular for preserving their integrity. Moreover the site of parking must be equipped with electric supply facilities, in order to allow the recharging of the prototypes, as electric vehicles, during the night.

The safe area of parking, finally, must be also covered in order to preserve the prototypes from rain and hail, even during the demonstration.

The entire area of the demonstration must be monitored during the night and controlled for avoiding any possible external damages or even terroristic action. A Security Company could be in charge for this.

It must be also provided a network link (Wi-Fi), in order to allow the technician to connect their computers to e-mail services and to the web sites.

A tent must be set up for receiving onlookers, containing widescreen video monitors and materials for demonstration description and dissemination (brochures, papers, posters).

Some people should be in charge access control and of organizing the meetings with the public and the phases of the demonstration with the vehicles, selecting the participants for the tests on board, according to the availability of the prototypes and of the technicians in charge of driving.

The onlookers selected for the testing should be also asked about their acceptance of the technology experienced: a questionnaire should be defined for getting the information about the opinion of each passenger. The data collected from the passengers must be anonymous and kept reserved.