



Specification of the SCOOP Software for Vro-ITS-S

Deliverable 2.4.2.2_bis

Activity 2: Studies

Sub Activity 2.4 > Specifications

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Reference to the version administration

Version number to be composed of 3 digits > vR.XY

- **R** corresponds to the release number: it is upgraded each time SC Studies validates the diffusion of a new release,

- **X** is the major version number: it is upgraded each time SC Studies validates the deliverable,

- **Y** is the minor version number: it is upgraded each time a contributor changes anything.

Once the deliverable is approved, its version number is upgraded from vR.XY to vR.(X+1)0

Once the deliverable is release, its version number is upgraded from vR.XY to v(R+1).00

As illustration:

0.03 > Work in progress version

0.10 > Del. Approved by SC Studies but not released

2.00 > Del. approved & released (in release 2)

2.05 > Del. Updated - in progress version

Requirements identification & traceability

In this document, the following verbal forms are used to indicate requirements: **Shall / Shall not**

Recommendations shall be indicated by the verbal forms: **Should / Should not**

Permissions shall be indicated by the verbal forms: **May / May not**

Possibility and capability shall be indicated by the verbal forms: **Can / Cannot**

Inevitability used to describe behavior of systems beyond of the scope of this del. shall be indicated by: **Will / Will not**

Facts shall be indicated by the verbal forms: **Is / Is not**

In the table here below:

2.4.X.XX > is the number given to the deliverable (e.g. 2.4.4.8)

YYYY > for digit are given to identifying which component/entity the requirement is addressing (e.g. LTCA for long terme certificate authority)

ZZZ > is the numeration of the requirement

ID	2.4.X.XX-YYYY-ZZZ
Component(s)	(e.g) ITSS-VU, ITSS-VRO, ITSS-R, PKI
Requirement	(e.g) An ITS station SHALL be able to request and get a Long term Certificate (LTC) from the SCOOP Public Key Infrastructure (PKI).
Acceptance	(e.g) CA1 : ITSS-VU sends a LTC request to the LTCA CA2 : ITSS-R relays the LTC request CA3 : The LTCA verifies the request and sends a response CA4 : The ITSS-R relays the response CA5 : The response is received by the ITSS-VU and is valid
Additional information	

Acronyms & Terms

The following terms are defined in the glossary:

- API: Application Programming Interface.
- C-ITS Cooperative Intelligent Transport System: "By cooperative systems, we mean (definition adopted by the EC, unit C.5 - ICT for "ICT for Transport and the Environment"), "Road operators, infrastructure, vehicles, their drivers and other road users will co-operate to deliver the most efficient, safe, secure and comfortable journeys".
- C-ITS-S: C-ITS Station
- CAM: Cooperative Awareness Message provides information about the presence, positions and basic status of vehicles and road side units to the surrounding area
- CAN bus: Controller Area Network BUS is cabling inside a vehicle transmitting electronic data.
- DATEX II A data exchange protocol, structured in a set of technical annexes, containing also a database of road traffic related events, standardized by the CEN under the number 16157.
- DENM: Decentralized Environmental Notification Message is transmitted by a vehicle when it detects an event (see DENM standard).
- GNSS: Global Navigation Satellite System, system used for positioning and road segment identification.
- GPS: Global Positioning System ; American GNSS.
- HMI: Human-Machine Interface: a front-end user interface.
- ICPU: name for the basic part of a Vro-ITS-S.
- PFro: French Road operator's Platform.
- PKI: Public Key Infrastructure.
- R-ITS-S: Roadside ITS Station, ITS station implemented in the road infrastructure.
- TLOGS: Records related to Technical data.
- ULOGS: Records related to User data.
- Vro-ITS-S: Road Operator Vehicle ITS station; it is, in SCOOP, an after-market Vru-ITS-S specialized for traffic operator.
- Vru-ITS-S: an embedded ITS Station in a road user vehicle.

Specifics terms

Some terms are used in this document in a specific way:

- [i]. Persons who will use the SCOOP software are road operator employees, drivers or passengers, in or near the car with the Vro-ITS-S.
- [ii]. A “person”, a “human” or an “actor” have access rights, which allow them to do specific actions on the SCOOP software. (See 2.3.6 for details on rights).
- [iii]. A “user” is a person with access rights limiting him to the user mode (See 2.2.1 for details on user mode).
- [iv]. An “operator” is a person with access rights granting him access to the operator mode (See 0 for details on operator mode).
- [v]. A “super administrator” is a person with access rights allowing him to configure the entire SCOOP software from the server (See 5.3.1 and 2.3.6.1 for details on server administration).
- [vi]. A “tablet administrator” is a person with access rights allowing him to run the administrator mode on the tablet (See 5.3.1 and 2.3.6.1 for details on server administration).
- [vii]. A “business unit administrator” has access to the management of their business unit and the linked elements (vehicles, persons...) (See 5.3.1 and 2.3.6.1 for details on server administration).
- [viii]. In a requirement, the person mentioned has always the appropriate rights.
- [ix]. The “User use case” or “User DENM” corresponds to a DENM sent by an Vu-ITS-S. (See 2.2.1 for the list).
- [x]. The previous terms are used here in opposition with the terms “Operator use case” “Operator DENM”, which correspond to the DENM only sent from the Vro-ITS-S in the operator mode. (See 0 for the list).
- [xi]. A “linked” DENM is relative to the vehicle, and moves as the vehicle moves. Example “the vehicle is salting”.
- [xii]. An “exterior” DENM is not related to the vehicle even if the vehicle is the sender. Example “I declare that I see an animal on the road”.
- [xiii]. An external DENM is a DENM received by the considered ITS-S. In other terms, the sender of an external DENM is an other ITS-S.
- [xiv]. The “route” is a set of continuous roads that an operator has to follow during his activity, e.g. patrolling or salting. (in French: “circuit”) .
- [xv]. The “itinerary” is a set of continuous roads, which is calculated when the user entered a destination, and which he wants be guided on. (in French: “itinéraire”).

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1 Introduction

1.1 Purpose of the document

The document specifies a part of the SCOOP Vro-ITS-S: the SCOOP software.

The other parts of the SCOOP Vro-ITS-S are described in:

- 2.4.2.2: specification of the Vro-ITS-S hardware, the basic ICPU software and the Vro-ITS-S server.
- 2.4.2.2ter: Management of displays on the HMI of road operator Vro-ITS-S.

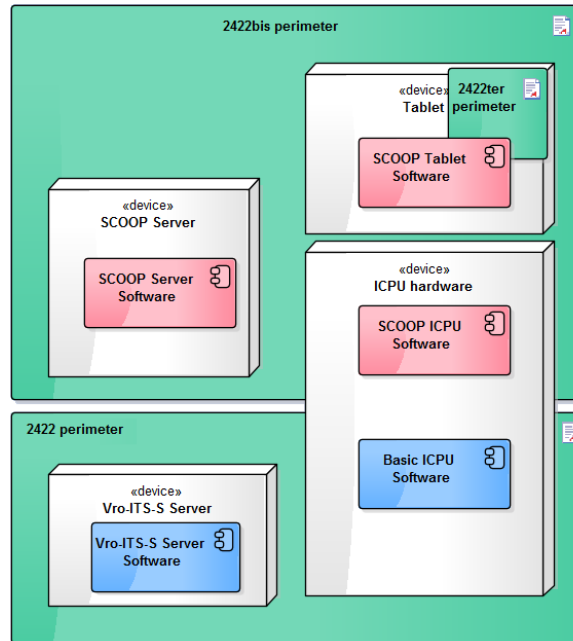


Figure 1: Vro-ITS-S software documentation

In this document, only functional requirements are mentioned and some technical requirements specific to the SCOOP software.

The technical requirements for the Vro-ITS-S are set in the 2.4.2.2.

The ergonomic, or display requirements that the SCOOP software shall comply with, are set in the deliverable 2.4.2.2ter.

1.2 Vro-ITS-S in the SCOOP system

The general description of the SCOOP system is set in the Deliverable 2.4.1.

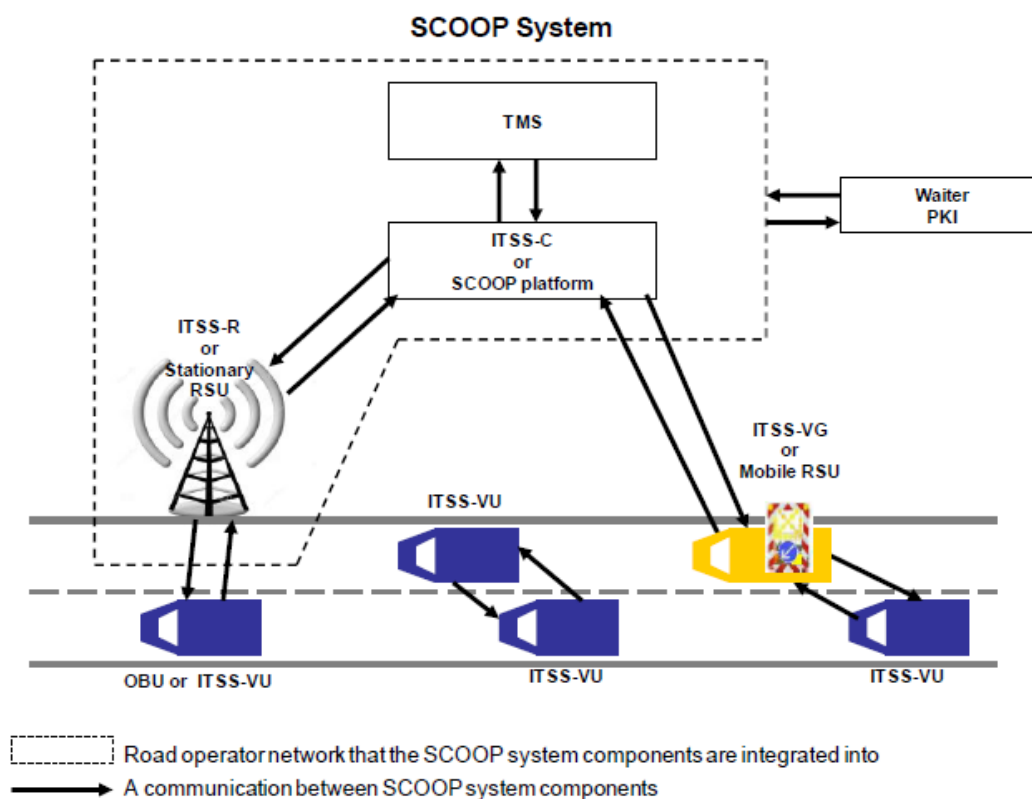


Figure 2: Diagram of the SCOOP system with the PKI (extract from 2.4.1-Release 2)

The Vro-ITS-S are part of the Road Operator Network. They communicate directly with the SCOOP platform, and with the other C-ITS stations.

SCOOP software will handle the SCOOP wave 1 services based on DENM exchanges (A2, A3, B, D, and E).

The deliverables 2.2, 2.4.1 and 2.4.1.2 detail these use cases.

Note: The basic ICPU software directly handles the emission of CAM (A1 use case in the deliverable 2.2). However, it does not aggregate the collected CAM as an R-ITS-S would do (See chapter 2.2.4 for details about the mobile R-ITS-S function).

1.3 The SCOOP software in the Vro-ITS-S

The main objective of the SCOOP software is to run mobile road operators uses cases specified in SCOOP. The management is done in the same way for each French road operators.

The deliverable 2.4.2.2 described the Vro-ITS-S:

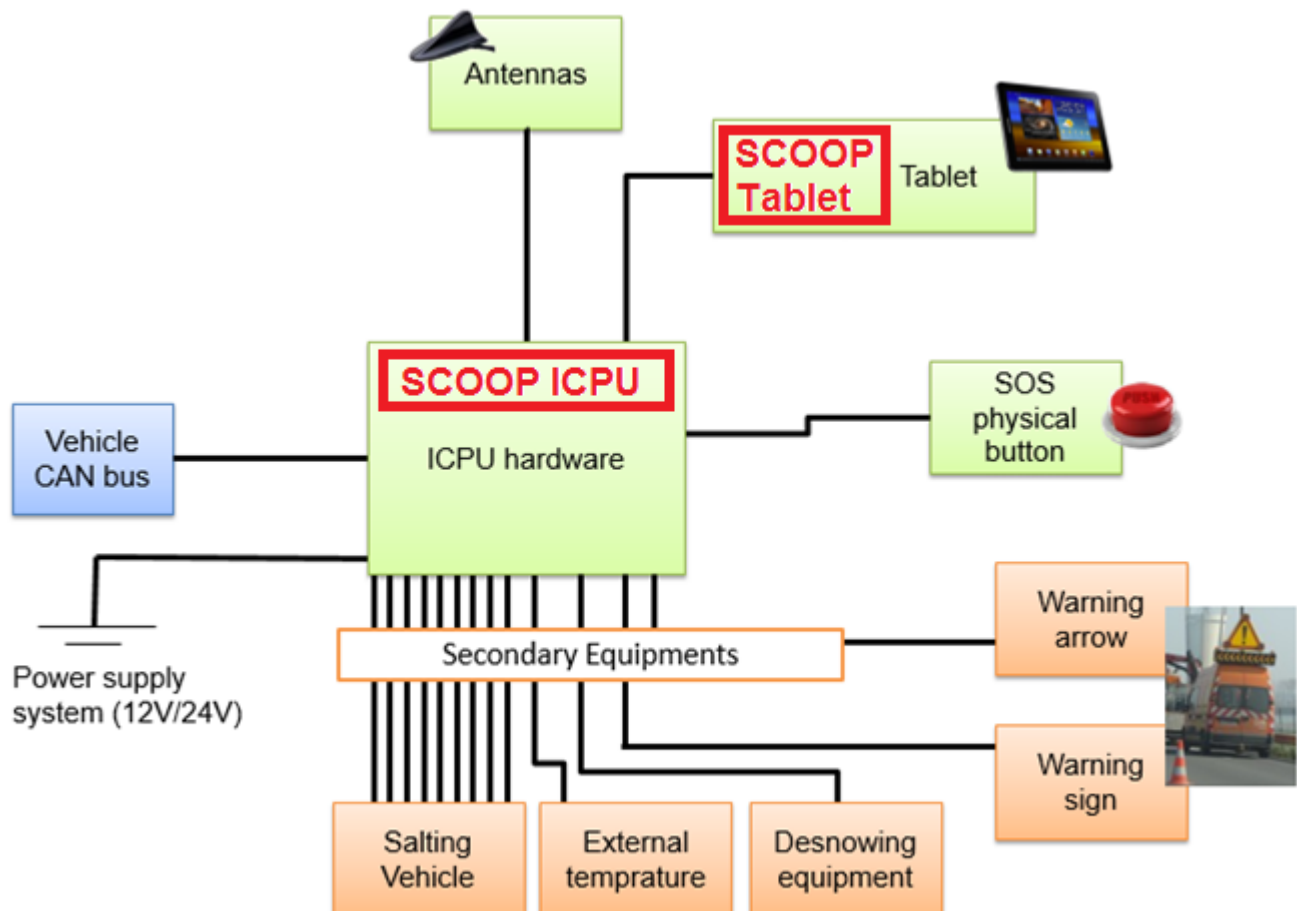


Figure 3: Overview of the Vro-ITS-S embedded hardware architecture (extract from 2.4.2.2)

The figure 3 is an extract from the 2.4.2.2 Deliverable, on which the SCOOP software is added in red.

This specification is written by considering a complete embedded Vro-ITS-S with an "ICPU associated with a tablet and a sim card". If some requirements of the SCOOP software need exceptions for different types of installation, the document will mention it.

2 SCOOP software

2.1 Technical architecture

ID	2.4.2.2bis-TECH-001
Component(s)	SCOOP software
Requirement	The SCOOP software shall be composed of 3 components, each installed on a different hardware.
Acceptance	CA1 –3 logical components and 3 hardware are present.
Additional information	<p>They are the following:</p> <ul style="list-style-type: none"> • The SCOOP tablet software: <ul style="list-style-type: none"> - is an android application set up on the touchpad or touchscreen tablet, - is the interface with the human actor. • The SCOOP ICPU software: <ul style="list-style-type: none"> - is an application installed on the ICPU, - handles all the processes of creation and translation of DENM and PFro-DATEX II messages in collaboration with the basic ICPU software, • The SCOOP server software: <ul style="list-style-type: none"> - is a software installed on the road operator information system, - handles the SCOOP software configuration files, administrates the SCOOP software, and manages the authentication of persons.

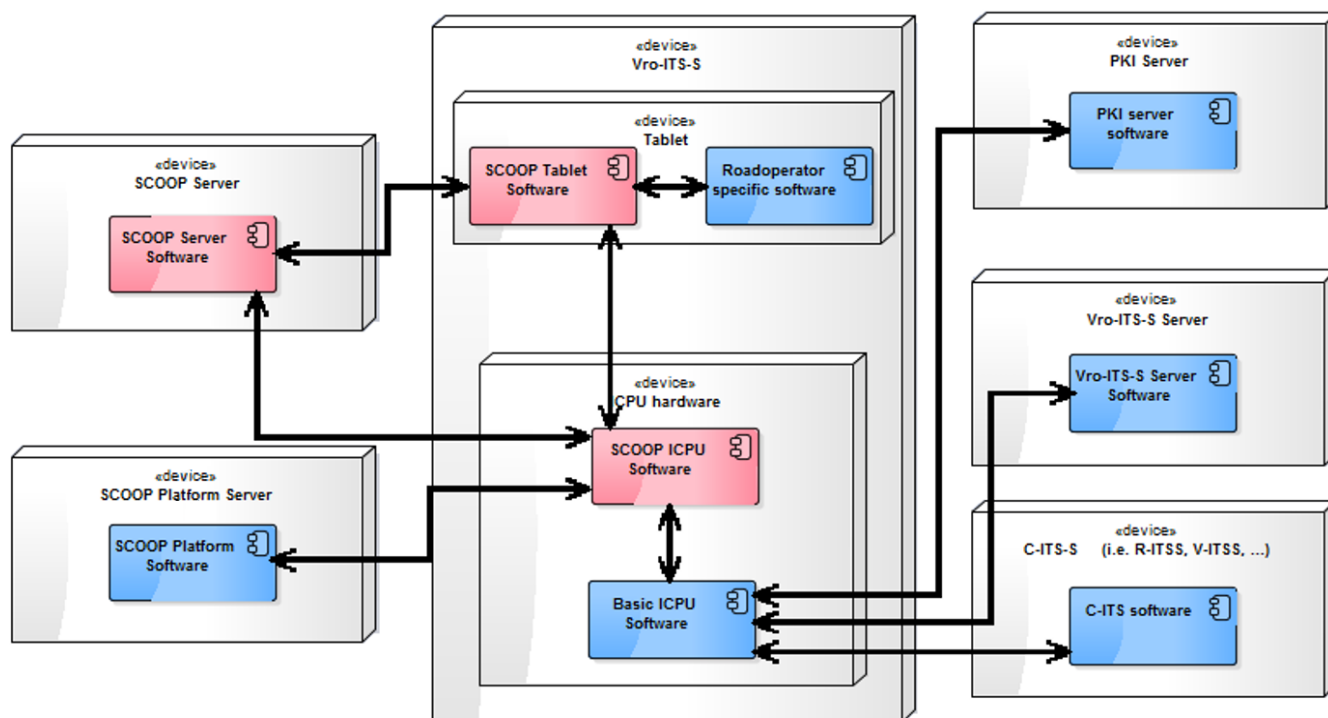


Figure 4: Functional flows concerning the SCOOP software.

Captions:

- Red component = part of the SCOOP software.
- Blue component = other software which interacts functionally with the SCOOP software.
- Grey component = device or hardware component.

ID	2.4.2.2bis-TECH-002
Component(s)	SCOOP software, basic ICPU software
Requirement	The basic ICPU software shall handle all the technical communication of the SCOOP software, in the normal setup.
Acceptance	CA1 - No SIM is required within the tablet in a complete version of the installation.
Additional information	Note: Each component of the SCOOP software can be several pieces of software and can need specific settings of supporting software. Thereafter, in this document, requirements are only functional, without presuming any implementation constraints.

Thereafter, in this document, the description of the exchanges are functional.

The SCOOP software aims to be deployed within every road operator vehicles, beginning by those involved in the C-ITS projects and the French national road operators.

This implies practical requirements such as:

ID	2.4.2.2bis-TECH-003
Component(s)	SCOOP software
Requirement	The human interface of the SCOOP software shall be in French.
Acceptance	CA1 – all words are in French language, even the Data Elements or Frames are translated.
Additional information	The text given in a message by another ITS station is not concerned by this requirement. (Ex: e-VMS)

ID	2.4.2.2bis-TECH-004
Component(s)	SCOOP software
Requirement	The applications involved in the SCOOP software shall be distributable to all the road operators.
Acceptance	
Additional information	The legacy propriety shall not be a constraint.

2.2 Functional requirements

The main functionalities of the SCOOP software are:

- To declare manual events and create the corresponding DENM, for both the regular user events (i.e. obstacle on the road) and the road operator events (i.e. mobile roadworks).
- To create automatic DENMs for the road operator events (i.e. intervention on the road).
- To display the received events from both the SCOOP platform and the other C-ITS stations, as well as their own events.
- To help the person to navigate.
- To offer the mobile R-ITS-S function (See chapter 2.2.4).
- To send an emergency call. (See Chapter 2.2.5).

These functions need supports functions to be operational including:

- Starting up the Vro-ITS-S.
- Switching off the Vro-ITS-S.
- Managing the persons rights.
- Updating the Vro-ITS-S.
- Monitoring the Vro-ITS-S.
- Administrating the Vro-ITS-S.
- Managing the cartography.

ID	2.4.2.2bis-FUNC-005
Component(s)	SCOOP software
Requirement	The SCOOP software shall operates under three modes on the tablet. Two are functional: user mode and operator mode, and the last, the administrator mode, is a supporting mode.
Acceptance	
Additional information	<p>Before the person chooses their mode, the basic ICPU software have to send CAM and can send automatic user DENM. So basic ICPU software sets the CAM and DENM values regarding the setting exchanged at the launch of the SCOOP software (e.g. vehiclerole, stationtype, certificates)</p> <p>As set in the 2.4.2.2, if the installation is “without tablet”, the Basic ICPU software shall use operator certificates for the CAM.</p>

Note: If the mobile R-ITS-S function is activated, the Vro-ITS-S acts as an R-ITS-S (receives DATEX messages from the SCOOP platform, translates them in DENM and sends them to other C-ITS stations, and vice-versa). See Chapter 2.2.4.

ID	2.4.2.2bis-FUNC-006
Component(s)	SCOOP software
Requirement	In the administrator mode on the tablet, the tablet administrator shall be able to configure the tablet settings and to consult the connections or modules status.
Acceptance	
Additional information	See 3.4.6.2 for details

ID	2.4.2.2bis-FUNC-007
Component(s)	SCOOP software, basic ICPU software
Requirement	SCOOP software shall send the chosen mode to the basic ICPU.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-008
Component(s)	SCOOP software, basic ICPU software
Requirement	As long as all the triggering conditions are fulfilled for a DENM, the SCOOP software shall send the corresponding DENM to other stations, and shall automatically display the corresponding DENM.
Acceptance	
Additional information	Triggering conditions can be: the chosen mode or activity, information from a connection, a pushed button, a time...

2.2.1 Run user mode

Description:

In this mode, the user is a driver, or a passenger, and so the Vro-ITS-S acts as a Vu-ITS-S.

Some of the operator mode functionalities can be set available for the user mode. See the detail of each operator mode in chapter 0.

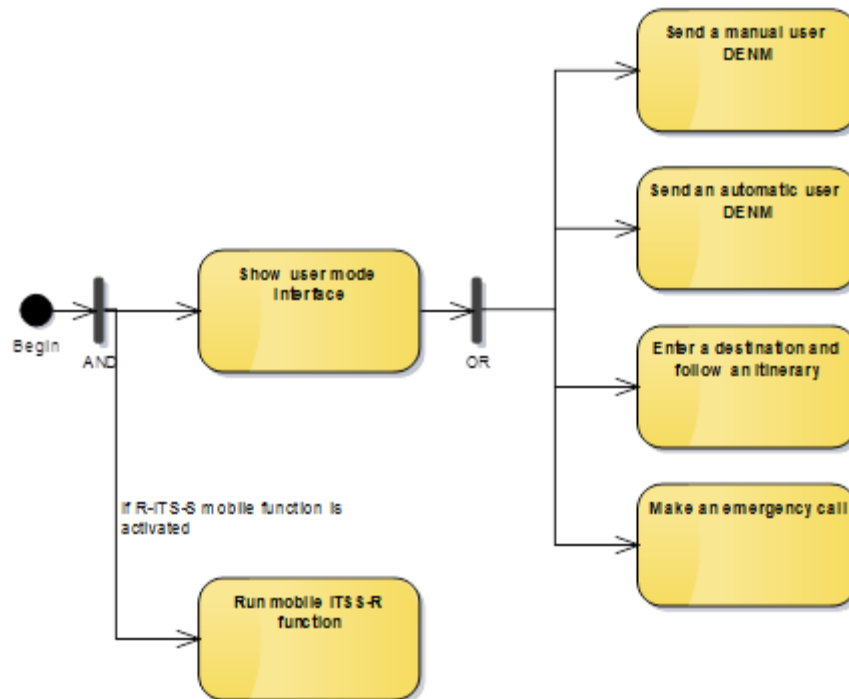


Figure 5: Actions a user can do in the user mode

ID	2.4.2.2bis-FUNC-009
Component(s)	SCOOP software, basic ICPU software
Requirement	In the user mode, the Vro-ITS-S shall act as a Vu-ITS-S.
Acceptance	<p>In user mode:</p> <ul style="list-style-type: none"> CA1: Vro-ITS-S sends, as an Vu-ITS-S, CAM. CA2: Vro-ITS-S allow a user to send, as an Vu-ITS-S, manual user DENM to other C-ITS stations. CA3: Vro-ITS-S sends, as an Vu-ITS-S, the automatic user DENM detected by the CAN bus connection. CA4: by default, there is no connection with the SCOOP platform. CA5: the Vro-ITS-S displays received events to the operator.
Additional information	

The use cases and the default DENM are set in the 2.4.1. The list is as follows:

- D1 - Temporary slippery road: 6/0
- D2a - Animal on the road: 11/0
- D2b - People on the road: 12/0
- D3 - Obstacle on the road: 10/0
- D4a - Stationary vehicle, breakdown: 94/0
- D4b - Stationary vehicle, breakdown: 94/2
- D5 - accident, (manual declaration): 2/0
- D5: ego vehicle in accident, (automatic detection): 94/3
- D6 - Reduced visibility: 18/0
- D8 - Unmanaged blockage of a road: 9/0
- D10 - warning - emergency brake: 99/1
- D11 - warning - end of queue: 27/0

See Chapter 2.2.6, for the value of the DENM data element.

ID	2.4.2.2bis-FUNC-010
Component(s)	SCOOP Software
Requirement	In the user mode, the sent DENM shall be associated with a user certificate.
Acceptance	
Additional information	The deliverable 2.4.4.8 Technical specifications of the IT security system lists the DENM SSPs for Vro-ITS-S in user mode.

ID	2.4.2.2bis-FUNC-011
Component(s)	SCOOP Software
Requirement	In the user mode, the user can enter a destination and follow an itinerary.
Acceptance	
Additional information	See Chapter 0.

ID	2.4.2.2bis-FUNC-012
Component(s)	SCOOP Software
Requirement	In the user mode, the user can send an emergency message.
Acceptance	
Additional information	See chapter 2.2.5.

2.2.1.1 Declare manual user DENM

Description:

The user can declare manual user DENM, by touching the tablet, for example: “I see an animal on the road”, or “I see an accident”.

The manual user DENM correspond to the five manual SCOOP use cases.

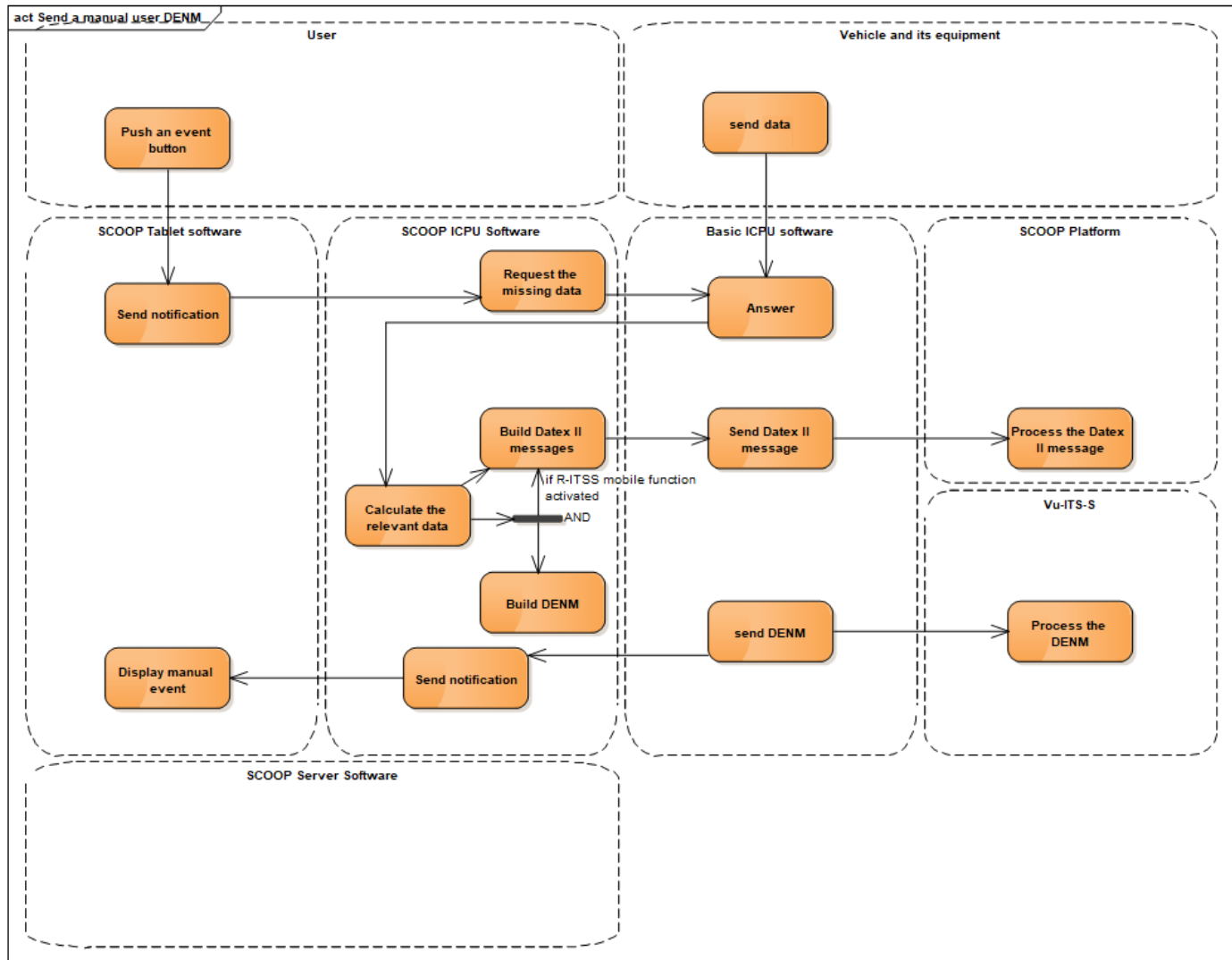


Figure 6: Internal SCOOP software process for manual user DENM

ID	2.4.2.2bis-FUNC-013
Component(s)	SCOOP Software
Requirement	The SCOOP software shall allow a user to declare the manual user DENM.
Acceptance	
Additional information	<p>The use cases are set in the 2.4.1. The list is:</p> <ul style="list-style-type: none"> • D2a: animal on the road: 11/0. • D2b: people on the road: 12/0. • D3: obstacle on the road: 10/0. • D5: accident, (manual declaration): 2/0. • D8: unmanaged blockage of a road: 9/0. <p>See Chapter 2.2.6, for the value of the DENM data element.</p>

ID	2.4.2.2bis-FUNC-014
Component(s)	SCOOP Software, basic ICPU software
Requirement	The SCOOP software shall allow a user to cancel manually his own manual user DENM. Then, the basic ICPU software can send the cancellation to other C-ITS stations.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-015
Component(s)	SCOOP Software
Requirement	The list of the manual user DENM is fixed, but a super administrator can modify the values of the data element of the manual user DENM.
Acceptance	
Additional information	The attributes default value of the manual user DENM are fixed in the 2.4.1.2

ID	2.4.2.2bis-FUNC-016
Component(s)	SCOOP Software
Requirement	The SCOOP software shall display to the user the events he declares.
Acceptance	
Additional information	This display is only an acknowledgment of sending their own events and not a display of external [xii] events for instance.

2.2.1.2 Create, send and display automatic user DENM

Description:

The Vro-ITS-S detects automatically events concerning their own car, inform the user and send the corresponding DENM, for example “My car is stationary”, “I had an accident”...

The automatic user use cases are set in the 2.4.1. The list is:

- D1: warning- temporary slippery road: 6/0.
- D4a: stationary vehicle: 94/0.
- D4b: vehicle breakdown: 94/2.
- D5: ego vehicle in accident, (automatic detection): 94/3.
- D6: reduced visibility: 18/0.
- D10: warning - emergency brake: 99/1.
- D11: warning - end of queue: 27/0.
- E6: exceptional weather conditions: 19/0.

See Chapter 2.2.6, for the value of the DENM data element.

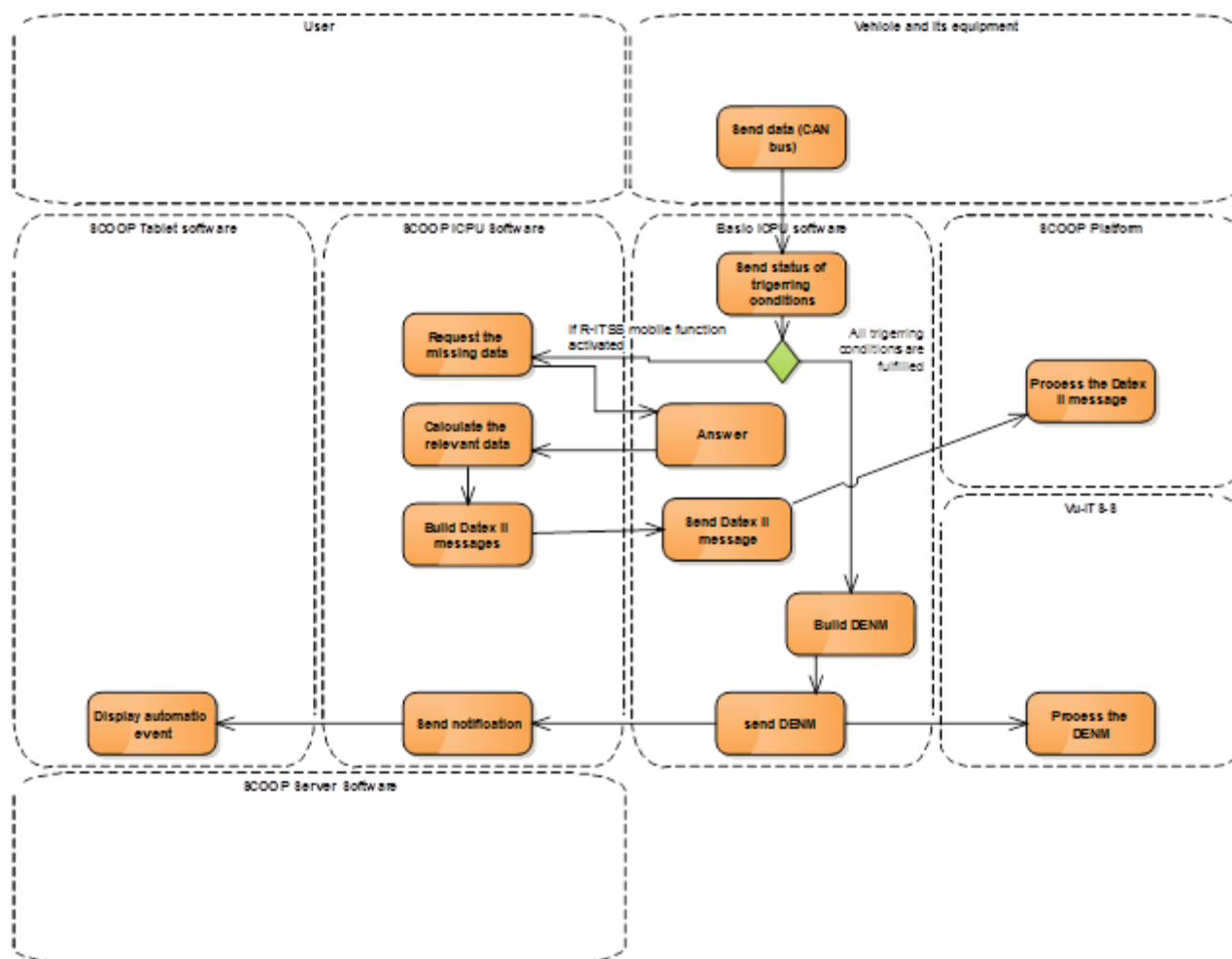


Figure 7: Internal SCOOP software process for automatic user DENM

ID	2.4.2.2bis-FUNC-017
Component(s)	SCOOP Software
Requirement	The SCOOP software shall inform the user when an automatic user DENM is sent by the Basic ICPU software.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-018
Component(s)	SCOOP Software
Requirement	The SCOOP software shall not allow manual cancel of automatic user DENM.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-019
Component(s)	SCOOP Software
Requirement	The list of the automatic user DENM is fixed.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-020
Component(s)	SCOOP Software
Requirement	A super administrator [v] can modify the values of the data element of the automatic user DENM.
Acceptance	
Additional information	The default values of the DENM data elements are fixed in the 2.4.1.2.

2.2.1.3 Display an external DENM

Description:

The Vro-ITS-S receives DENM from other C-ITS Stations, such events or DENM are called “external” [xiii].

ID	2.4.2.2bis-FUNC-021
Component(s)	SCOOP Software
Requirement	If it is relevant, the SCOOP software shall display those external events to the user.
Acceptance	
Additional information	The way to display a DENM is set in the deliverable 2.4.2.2ter.

2.2.2 Run operator mode

Description:

In this mode, the operator is a road operator employee carrying a specific activity . His vehicle might behave in a different way than other road user vehicles. For example, he may stop or go backward on the highway. The purpose of this operator mode is to alert other drivers of those specificities.

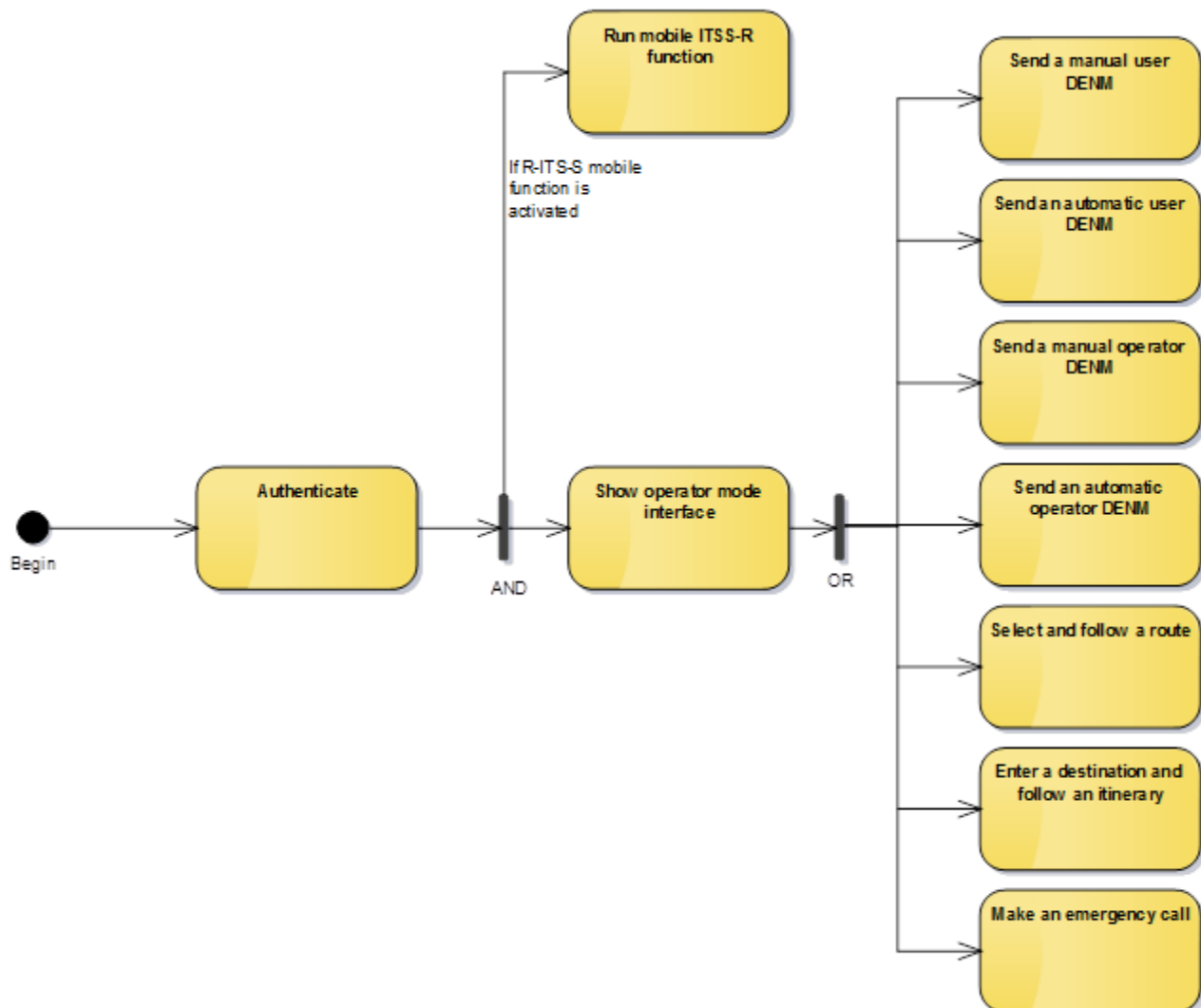


Figure 8: Actions an operator can do in the operator mode

ID	2.4.2.2bis-FUNC-022
Component(s)	SCOOP Software
Requirement	In the operator mode, the Vro-ITS-S shall act as an extension of the road operator SCOOP System.
Acceptance	<p>In the operator mode,</p> <ul style="list-style-type: none"> • CA1: the Vro-ITS-S sends CAM with road operator specific certificates. • CA2: the Vro-ITS-S allows a user to send, with road operator specific certificates, manual user DENM to other C-ITS stations. • CA3: the Vro-ITS-S sends, with road operator specific certificates, automatic user DENM to other C-ITS stations. • CA4: the Vro-ITS-S allows a user to send, with road operator specific certificates, manual operator DENM to other C-ITS stations. • CA5: the Vro-ITS-S sends, with road operator specific certificates, automatic operator DENM to other C-ITS stations. • CA6: the Vro-ITS-S displays received events to the operator.
Additional information	

In each activity, the operator can be in a different context, called sub activities. These correspond to a SCOOP use case, described in the deliverable 2.4.1.

Five default activities have be retained:

- Mobile roadworks:
 - In the sub activity “Mobile roadworks”, the operator is driving slowly, or manoeuvring along or on the road. Such activities includes cleaning the road, fixing restraint systems, mowing or spreading phytosanitary treatments,
 - Corresponds to SCOOP Use case “B1 warning scheduled roadwork – mobile”, which DENM EventType is “3/3”.
 - In the sub activity “marking”, the operator is driving slowly, or manoeuvring, along or on the road. Such activities includes marking up future roadworks, or marking off ended roadworks,
 - Corresponds to SCOOP Use case “B1 warning scheduled roadwork – stationary”, which DENM EventType is “15/0”.
 - In the sub activity “traffic jam”, the operator is driving slowly, or stopping at the end of a traffic jam, because he is alerting drivers of the end of queue.
 - Corresponds to SCOOP Use Case “A2-D11 warning end of queue”, which DENM EventType is “27/0”.
- Fixed roadworks
 - In the sub activity “Marking”, the operator is driving slowly, or manoeuvring, along or on the road. Such activities includes marking up future roadworks or marking off ended roadworks,
 - Corresponds to SCOOP Use case “B1 warning scheduled roadwork – stationary”, which DENM EventType is “15/0”.
 - In the sub activity “traffic jam”, the operator is driving slowly, or stopping at the end of a traffic jam, because he is alerting drivers of the end of queue.

- Corresponds to SCOOP Use Case “A2-D11 warning end of queue”, which DENM EventType is “27/0”.
- Intervention
 - In the sub activity called “Intervention vehicle approaching”, the operator drives to reach quickly an intervention zone, after an accident for example,
 - Corresponds to SCOOP Use case “B2 warning road operator intervention - operator vehicle out on service call”, which DENM EventType is “95/0”.
 - In the sub activity called “vehicle in intervention”, he is protecting a zone, including a damaged vehicle in some instance, while waiting for the tow truck or the police,
 - corresponds to SCOOP Use case “B2 warning road operator intervention - operator vehicle stopped in a protected mode”, which DENM EventType is “15/0”.
 - In the sub activity “traffic jam”, the operator is driving slowly, or stopping at the end of a traffic jam, because he is alerting drivers of the end of queue.
 - Corresponds to SCOOP Use Case “A2-D11 warning end of queue”, which DENM EventType is “27/0”.
- Patrol
 - In the sub activity called “Patrolling vehicle”, he is driving slowly along the road to see problems on the road,
 - Corresponds to SCOOP Use case “B2 warning road operator intervention - the operator vehicle on patrol”, which DENM EventType is “26/4”.
 - In the sub activity called “Vehicle in intervention”, the driver stops his vehicle and goes fixing a problem he has seen,
 - Corresponds to SCOOP Use case “B2 warning road operator intervention - operator vehicle stopped in a protected mode”, which DENM EventType is “15/0”.
 - In the sub activity “traffic jam”, the operator is driving slowly, or stopping at the end of a traffic jam, because he is alerting drivers of the end of queue.
 - Corresponds to SCOOP Use Case “A2-D11 warning end of queue”, which DENM EventType is “27/0”.
- Wintry viability: in this activity, the Vro-ITS-S is in a snowplough, a salting vehicle, or a truck with a large salting trailer.
 - In the sub activity called “Slow Moving Vehicle ”, the vehicle is just running, but might be larger (with the blade for example)
 - Corresponds to SCOOP Use case “B3 - Warning winter maintenance - winter road maintenance vehicle on road”, which DENM EventType is “3/6”.
 - In the sub activity called “Snow clearance in progress”, the vehicle pushes slowly the snow out of the road.
 - Corresponds to SCOOP Use case “B3 - Warning winter maintenance - winter road maintenance vehicle clearing snow”, which DENM EventType is “26/6”.
 - In the sub activity called “Salting in progress”, the vehicle is moving slowly and is spreading salt on the road.
 - Corresponds to SCOOP Use case “B3 - Warning winter maintenance - winter road maintenance vehicle is salting”, which DENM EventType is “26/8”.

These activities and sub activities are the default ones, and others can be added.

The settings of these activities and sub activities can be changed. (See chapter **Erreur ! Source du renvoi introuvable.** for activities configuration)

ID	2.4.2.2bis-FUNC-023
Component(s)	SCOOP Software
Requirement	The SCOOP software shall support these activities and these sub activities.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-024
Component(s)	SCOOP Software
Requirement	A super administrator [v] shall be able to add new activities and sub activities.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-025
Component(s)	SCOOP Software
Requirement	An activity is accessible only to operators with authorized rights.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-026
Component(s)	SCOOP Software
Requirement	In the operator mode, the sent DENM shall be associated with an operator certificate.
Acceptance	
Additional information	The deliverable 2.4.4.8 “Technical specifications of the IT security system” lists the DENM SSPs for Vro-ITS-S in operator mode.

Note: as set in the 2.4.2.2, in the operator mode, the sent CAM shall be associated with an operator

| certificate too.

The triggering conditions of cancelling are set in the deliverable 2.4.1.

ID	2.4.2.2bis-FUNC-027
Component(s)	SCOOP Software
Requirement	In the operator mode, the operator can send an emergency message.
Acceptance	
Additional information	See chapter 2.2.5.

2.2.2.1 Act as an Vu-ITS-S, under a road operator label

ID	2.4.2.2bis-FUNC-028
Component(s)	SCOOP Software
Requirement	In the operator mode, the SCOOP software shall manage the external [xii] DENM the same way as in the user mode.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-029
Component(s)	SCOOP Software
Requirement	<p>In the operator mode in all activities, the SCOOP software shall manage the manual and automatic user DENM as in the user mode, except for:</p> <ul style="list-style-type: none"> - StationType value of the DENM. - InformationQuality value of the DENM. - And the security certificate added to the DENM.
Acceptance	
Additional information	

Note: in the operator mode, the basic ICPU software will also adapt the CAM “vehicleRole” according to the 2.4.1 and the certificate according to the 2.4.4.8.

2.2.2.2 Manage an operator DENM

ID	2.4.2.2bis-FUNC-030
Component(s)	SCOOP Software
Requirement	Each sub-activity shall offer the possibility to send one and only one operator DENM.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-031
Component(s)	SCOOP Software
Requirement	The operator DENM and their links with sub activities are configurable.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-032
Component(s)	SCOOP Software
Requirement	In the operator mode, when the operator changes from one activity to another, the SCOOP software shall cancel all the operator DENM linked to the first activity.
Acceptance	
Additional information	In this case, the triggering conditions are not fulfilled anymore.

ID	2.4.2.2bis-FUNC-033
Component(s)	SCOOP Software
Requirement	Each operator DENM can be triggered manually or automatically.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-034
Component(s)	SCOOP Software
Requirement	If the Vro-ITS-S can automatically trigger a DENM, then the operator cannot send manually the same DENM.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-035
Component(s)	SCOOP Software
Requirement	If the Vro-ITS-S cannot automatically trigger a DENM, then the operator can send manually the same DENM.
Acceptance	
Additional information	This case happens if the secondary equipment is not detected by the Vro-ITS-S.

2.2.2.2.1 DECLARE A MANUAL OPERATOR DENM

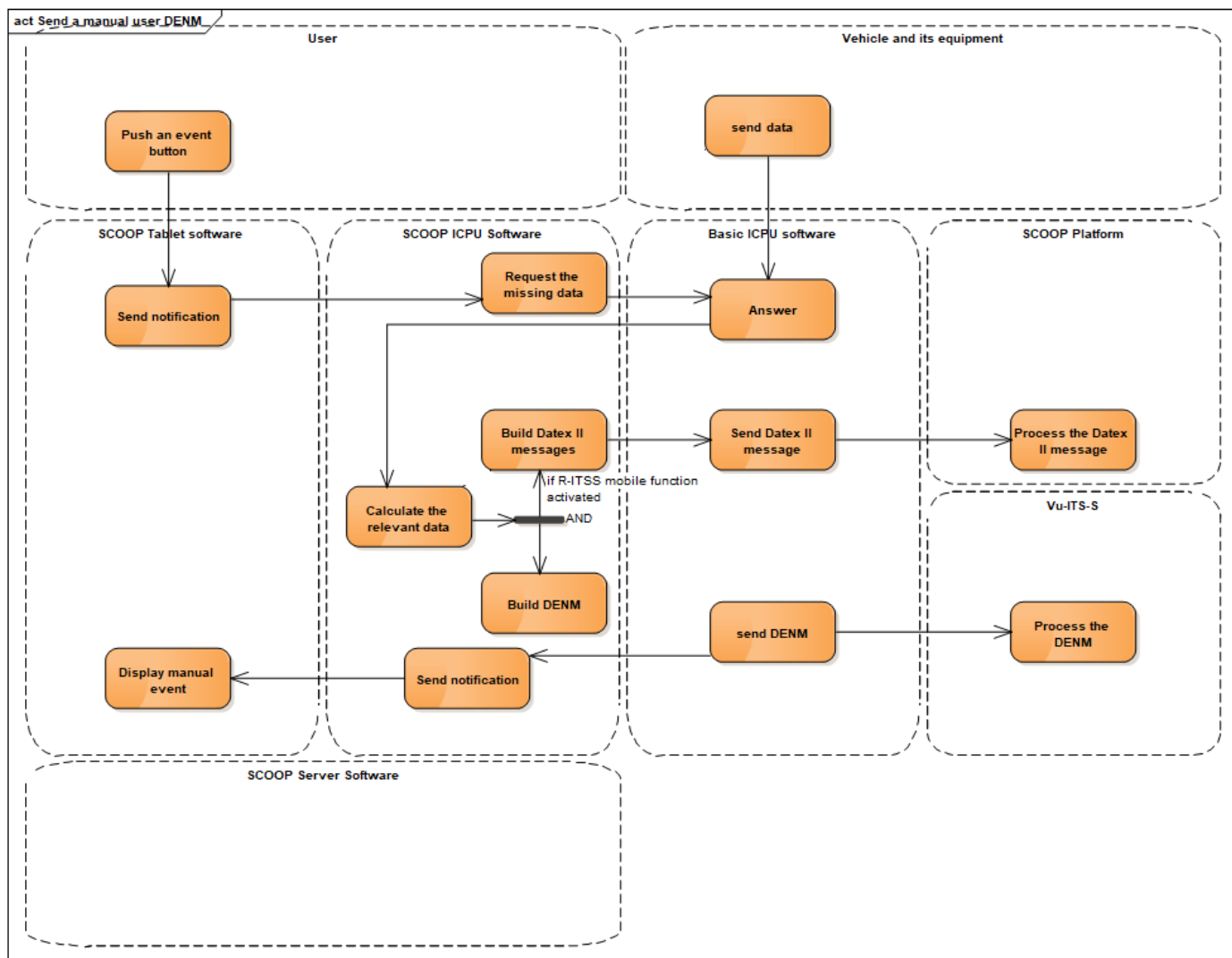


Figure 9: Internal SCOOP software process for manual operator DENM

ID	2.4.2.2bis-FUNC-036
Component(s)	SCOOP Software, basic ICPU software
Requirement	The SCOOP software shall allow an operator to declare the manual operator DENM, in order the basic ICPU software can send it to other C-ITS stations.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-037
Component(s)	SCOOP Software
Requirement	The SCOOP software shall display to the operator the DENM he declares.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-038
Component(s)	SCOOP Software
Requirement	The SCOOP software shall allow an operator to cancel the manual operator DENM.
Acceptance	
Additional information	

The default list of the manual operator DENM is set in the 2.4.1.2. The list is:

- Mobile roadworks
 - B1 warning scheduled roadwork – mobile 3/3
 - Marking B1 warning scheduled roadwork – stationary 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Fixed roadworks
 - Marking B1 warning scheduled roadwork – stationary 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Intervention
 - vehicle approaching B2 warning road operator intervention - operator vehicle out on service call 95/0
 - vehicle in intervention B2 warning road operator intervention - operator vehicle stopped in a protected mode 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Patrol
 - Patrolling vehicle B2 warning road operator intervention - the operator vehicle on patrol 26/4
 - Patrol Vehicle in intervention B2 warning road operator intervention - operator vehicle stopped in a protected mode 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Wintry viability:
 - Slow Moving Vehicle B3 - Warning winter maintenance - winter road maintenance vehicle on road 3/6
 - Snow clearance in progress B3 - Warning winter maintenance - winter road maintenance vehicle clearing snow 26/6
 - Salting in progress B3 - Warning winter maintenance - winter road maintenance vehicle is salting 26/8

ID	2.4.2.2bis-FUNC-039
Component(s)	SCOOP Software
Requirement	A super administrator can add new manual operator DENM.
Acceptance	
Additional information	See chapter 5.3.2.

ID	2.4.2.2bis-FUNC-040
Component(s)	SCOOP Software
Requirement	A super administrator can modify the values of the data element of any manual operator DENM.
Acceptance	
Additional information	<p>The default value of the manual operator DENM in the default list are fixed in the 2.4.1.2.</p> <p>Note: other sources can improve data for manual operator event. For example, some road operators have an already installed application on the tablet processing data that the SCOOP software can used to enhance a DENM. (See chapter 6.5 for the interface).</p>

2.2.2.2.2 MANAGE AN AUTOMATIC OPERATOR DENM

Description:

If secondary equipments are installed on the vehicle, and connected to the Vro-ITS-S, the Vro-ITS-S can detect their status or their electronic signal. According to the road operator rules and the Vro-ITS-S setting, the Vro-ITS-S can send an appropriate DENM.

Some secondary equipments, which can be connected to a VRO-ITS-S, are:

- Light arrows.
- Emergency arrows.
- Salt spreader.
- Dynamic warning triangle.
- Flashing lights.
- Rotating beacon.
- Snowplough;

Other equipments could be considered in the future.

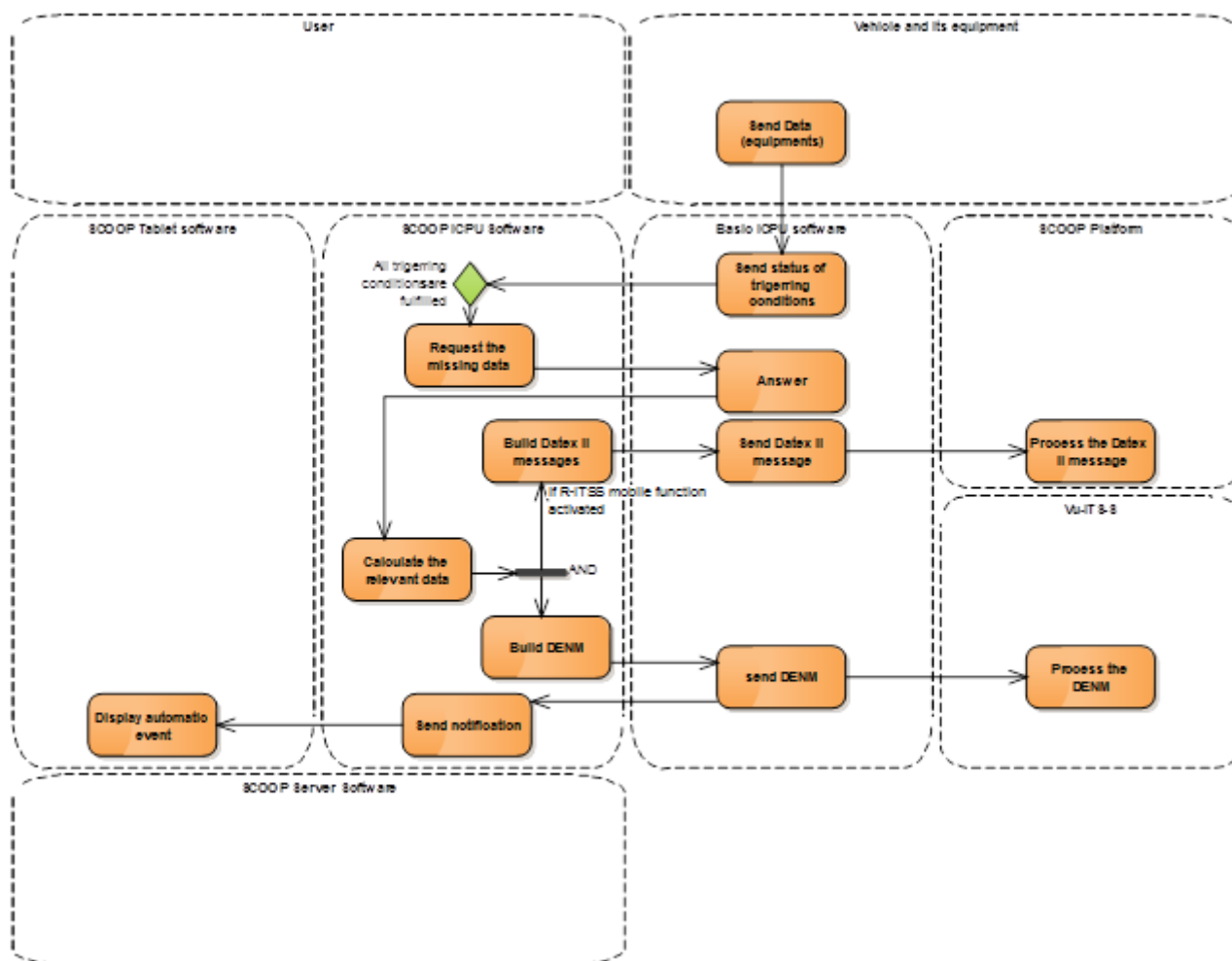


Figure 10: Internal SCOOP software process for automatic operator DENM

ID	2.4.2.2bis-FUNC-041
Component(s)	SCOOP Software
Requirement	A super administrator [v] can modify the triggering conditions for an automatic operator DENM.
Acceptance	
Additional information	The chapter 5.3.2 explains the triggering conditions for an automatic operator DENM.

ID	2.4.2.2bis-FUNC-042
Component(s)	SCOOP Software
Requirement	If the setting “automatic triggering” is disabled for a DENM, then the SCOOP software shall not send the corresponding automatic operator DENM.
Acceptance	
Additional information	

The default list of the operator DENM is set in the 2.4.1.2. Depending of the vehicle's equipment, every DENM could be an automatic one. The list is:

- Mobile roadworks
 - B1 warning scheduled roadwork – mobile 3/3
 - Marking B1 warning scheduled roadwork – stationary 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Fixed roadworks
 - Marking B1 warning scheduled roadwork – stationary 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Intervention
 - vehicle approaching B2 warning road operator intervention - operator vehicle out on service call 95/0
 - vehicle in intervention B2 warning road operator intervention - operator vehicle stopped in a protected mode 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Patrol
 - Patrolling vehicle B2 warning road operator intervention - the operator vehicle on patrol 26/4
 - Patrol Vehicle in intervention B2 warning road operator intervention - operator vehicle stopped in a protected mode 15/0
 - Traffic jam A2-D11 warning end of queue 27/0
- Wintry viability:
 - Slow Moving Vehicle B3 - Warning winter maintenance - winter road maintenance vehicle on road 3/6
 - Snow clearance in progress B3 - Warning winter maintenance - winter road maintenance vehicle clearing snow 26/6
 - Salting in progress B3 - Warning winter maintenance - winter road maintenance vehicle is salting 26/8

2.2.2.3 Contribution to a specific road operator software

Description:

In some cases, another business software is on the tablet. Operators use it for their activity such as:

- A geolocation software for snowploughs and salting vehicles, uploading their position, eventually the position of the blade, or the height of salt.
- A road-maintenance software, for a patrol, allowing a user to record the road status: hole in the coating, obstacle or dead animal on the road,
- etc.

The general principle is that SCOOP software is the leader. If relevant, SCOOP

software:

- Opens the other application on the appropriate page or form.
- Completes the required values that it knows.
- Lets the user complete the page or form.
- And after their validation, brings back to SCOOP software the relevant data to enrich the sent DENM.

ID	2.4.2.2bis-FUNC-043
Component(s)	SCOOP Software
Requirement	SCOOP software shall have a generic API to exchange data with a specific road operator software.
Acceptance	
Additional information	This can be used to determinate which services the SCOOP software shall offer. These exchanges only occurs in the operator mode.

ID	2.4.2.2bis-FUNC-044
Component(s)	SCOOP Software
Requirement	When a "In emission" use case is sent by SCOOP software and if a relevant specific road operator software is present, the SCOOP software sent the relevant data to the road operator software.
Acceptance	
Additional information	For example when the specific road operator software requires the user to complete a form for a event register, the following element could be asked: <ul style="list-style-type: none"> • Position of the event (in term of coordinates, of road name, road type, referent point...). • Type of event.

ID	2.4.2.2bis-FUNC-045
Component(s)	SCOOP Software
Requirement	If a geolocation road operator software is present, the SCOOP software shall send regularly the vehicle position to the specific software.
Acceptance	
Additional information	For example: the geolocation of salting vehicles.

ID	2.4.2.2bis-FUNC-046
Component(s)	SCOOP Software
Requirement	If requested by the road operator software, the SCOOP software shall send the itineraries authorized for the connected user.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-047
Component(s)	SCOOP Software
Requirement	If requested by the road operator software, the SCOOP software shall send the user data.
Acceptance	
Additional information	

2.2.3 Help the operator to navigate

Description:

The SCOOP software helps to navigate, in three ways:

- By giving him information about the road, his position and the event around him.
- By showing him the route that his chief ordered him to follow during his activity, and guiding him on this route.
- By calculating and displaying him an itinerary to a destination that he previously requested, and guiding him on this itinerary.

ID	2.4.2.2bis-FUNC-048
Component(s)	SCOOP Software
Requirement	The SCOOP software shall offer the possibility to consult the map, and to see the position of the vehicle.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-049
Component(s)	SCOOP Software
Requirement	A super administrator [v] shall be able to create, modify or delete routes.
Acceptance	
Additional information	

The available routes for an operator depends on the activity set in the Vro-ITS-S, and on the business unit of the operator.

ID	2.4.2.2bis-FUNC-050
Component(s)	SCOOP Software
Requirement	If requested by the operator, the SCOOP software shall display a route that the operator will follow.
Acceptance	
Additional information	This route is an uninterrupted path from a start point to an end point. The start point and the end point can be the same. Note: a specific application could send to the SCOOP software some routes or point of routes.

ID	2.4.2.2bis-FUNC-051
Component(s)	SCOOP Software
Requirement	If requested by the user, the SCOOP software shall calculate the fastest itinerary to reach a destination set by the user , and display it.
Acceptance	
Additional information	

2.2.4Run the mobile R-ITS-S function

Description: for the Vro-ITS-S, the “mobile R-ITS-S” function consists in offering some of the functionalities of a real R-ITS-S. These messages can contain one or more Situation publications. It can also be a snapshot, all the valid situations publications from the platform. A snapshot is considered as a message in the next requirements.

The deliverable 2.4.2.1 details:

- The Vro-ITS-S receives DATEX II messages in the PFro-DATEX II format (see 2.4.1.4_xsd file for details) from the SCOOP platform, translates these messages into a DENM format, and sends them to the other C-ITS stations,
 - See chapter “5.2.1 DENM from the platform” in the 2.4.2.1.
- *Note: The SCOOP software shall consider this message as an external [xiii] DENM, and, for example, it shall be displayed on the HMI.*
- The Vro-ITS-S receives DENM from the C-ITS stations, translates these messages into a PFro-DATEX II format, and sends them to the SCOOP Platform,
 - See chapter “5.1.2 Process DENM received from the ITS stations” in the 2.4.2.1.
- The Vro-ITS-S translates their own DENM into a PFro-DATEX II format, and sends them to the SCOOP Platform,
 - See chapter “5.1.2 Process DENM received from the C-ITS stations” in the 2.4.2.1.
- The Vro-ITS-S ask for snapshot to the SCOOP Platform and receives snapshot from the SCOOP platform.
- The Vro-ITS-S responds a snapshot to a snapshot request from the SCOOP platform.

ID	2.4.2.2bis-FUNC-052
Component(s)	SCOOP Software, PFro
Requirement	The mobile R-ITS-S shall comply the R-ITS-S requirements about software.
Acceptance	
Additional information	For example, the Vro-ITS-S could check the value “SOURCE” or “nationalIdentifier” in their database, before accepting a message.

ID	2.4.2.2bis-FUNC-053
Component(s)	SCOOP Software
Requirement	The mobile R-ITS-S function shall start following a human authentication which access rights allow him to activate the mobile R-ITS-S.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-054
Component(s)	SCOOP Software
Requirement	In the user mode, the mobile R-ITS-S function shall be deactivated by default but can be activated.
Acceptance	
Additional information	In consequence of the requirements, if the mobile R-ITS-S function is activated in the user mode, then the function shall be launched as soon as the SCOOP software starts.

ID	2.4.2.2bis-FUNC-055
Component(s)	SCOOP Software
Requirement	In the operator mode, the mobile R-ITS-S function shall be activated.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-056
Component(s)	SCOOP Software
Requirement	In the administrator mode, the mobile R-ITS-S function shall be deactivated and cannot be activated.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-057
Component(s)	SCOOP Software, PFro
Requirement	When the mobile R-ITS-S function starts, the SCOOP software shall send their position to the platform and, after, request a snapshot to the platform.
Acceptance	
Additional information	<p>In this function, and for technical purpose, the Vro-ITS-S sends their position to the platform regularly.</p> <p>The message used for the position is a PFro-DATEX II Message called "Transmission of road operators' vehicle position" which corresponds to the position of the vehicle.</p> <p>The rules for DATEX II translation are in the deliverable 2.4.1.4.</p>

ID	2.4.2.2bis-FUNC-058
Component(s)	SCOOP Software, PFro
Requirement	If the mobile R-ITS-S function is activated, then the SCOOP software sends the position of the vehicle to the SCOOP platform, every period set in the "period" parameter.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-059
Component(s)	SCOOP Software
Requirement	The SCOOP software shall allow an administrator to change the DATEX II messages attributes, remotely or locally.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-060
Component(s)	SCOOP Software
Requirement	In all sent PFro-DATEX II messages, the NationalIdentifier shall comply with SCOOP_ENTITE_SOURCE, each element shall be configurable independently from the others.
Acceptance	
Additional information	<p>The 2.4.1.4 sets the following convention:</p> <ul style="list-style-type: none"> PROJECT = SCOOP for the SCOOP project (Maybe CROADS (for C-ROADS) or INTERCOR (for InterCor) in the future.) ENTITY = Name in capitals of the organisation for the motorway companies, DExxx for the counties (=French “Départements”) where xxx is their INSEE number, DIRxxx, for DIRs, ... SOURCE = UBR12345 (or UBR_12345 or 12345UBR...) for an R-ITS-S, PF for a platform, SAGT or TGBretagne or name of the TCC ... <p>For example: SCOOP_DIRIF_UEVGEC301</p>

ID	2.4.2.2bis-FUNC-061
Component(s)	SCOOP Software
Requirement	In the SOS message, the “measurementSiteTableReference” shall comply with SCOOP_ENTITE_UEVG
Acceptance	
Additional information	For example: SCOOP_DIRIF_UEVG

ID	2.4.2.2bis-FUNC-062
Component(s)	SCOOP Software
Requirement	In the SOS message, “measurementSiteReference” shall comply with SOURCE.
Acceptance	
Additional information	For example: UEVGEC301

ID	2.4.2.2bis-FUNC-063
Component(s)	SCOOP Software
Requirement	For the position message, “sourceIdentification” shall comply with SCOOP_ENTITE_SOURCE.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-064
Component(s)	SCOOP Software
Requirement	In the position message, a super administrator [v] can change the sending period of the message.
Acceptance	
Additional information	By default the period is set to 30 seconds.

ID	2.4.2.2bis-FUNC-065
Component(s)	SCOOP Software, PFro
Requirement	If the mobile R-ITS-S function is active, the SCOOP software shall send the data in a PFro-DATEX II format to the SCOOP platform when Vro-ITS-S is sending a manual or automatic user or operator DENM.
Acceptance	
Additional information	<p>This translation shall be done according to the Deliverable 2.4.1.4. Some extracts mentioning some vigilance points are mentioned below:</p> <ul style="list-style-type: none"> • The “Linear” elements inside the “GroupofLocation” in the DATEX message sent by the platform will contain enough coordinates points for the R-ITS-S to send complete “trace” and “eventHistory” attributes in the DENM. • The units used are different (e.g. tenth of a micro-degree for DENM, decimal degree for DATEX II). • Whereas the different geographic locations, which are part of a trace or an event history, are defined in DENM by difference with the previous location (“deltas”), DATEX II defines point locations by geodetic coordinates (latitude and longitude) separately.

2.2.5 Send an emergency call

Description:

When the actor encountered a problem, for example in case of feeling of faintness, he may push a SOS button, which sends alerting messages to an already registered number and to the SCOOP Platform.

This button can be a physical one and is considered by the Vro-ITS-S as a secondary equipment or an implemented button on the software.

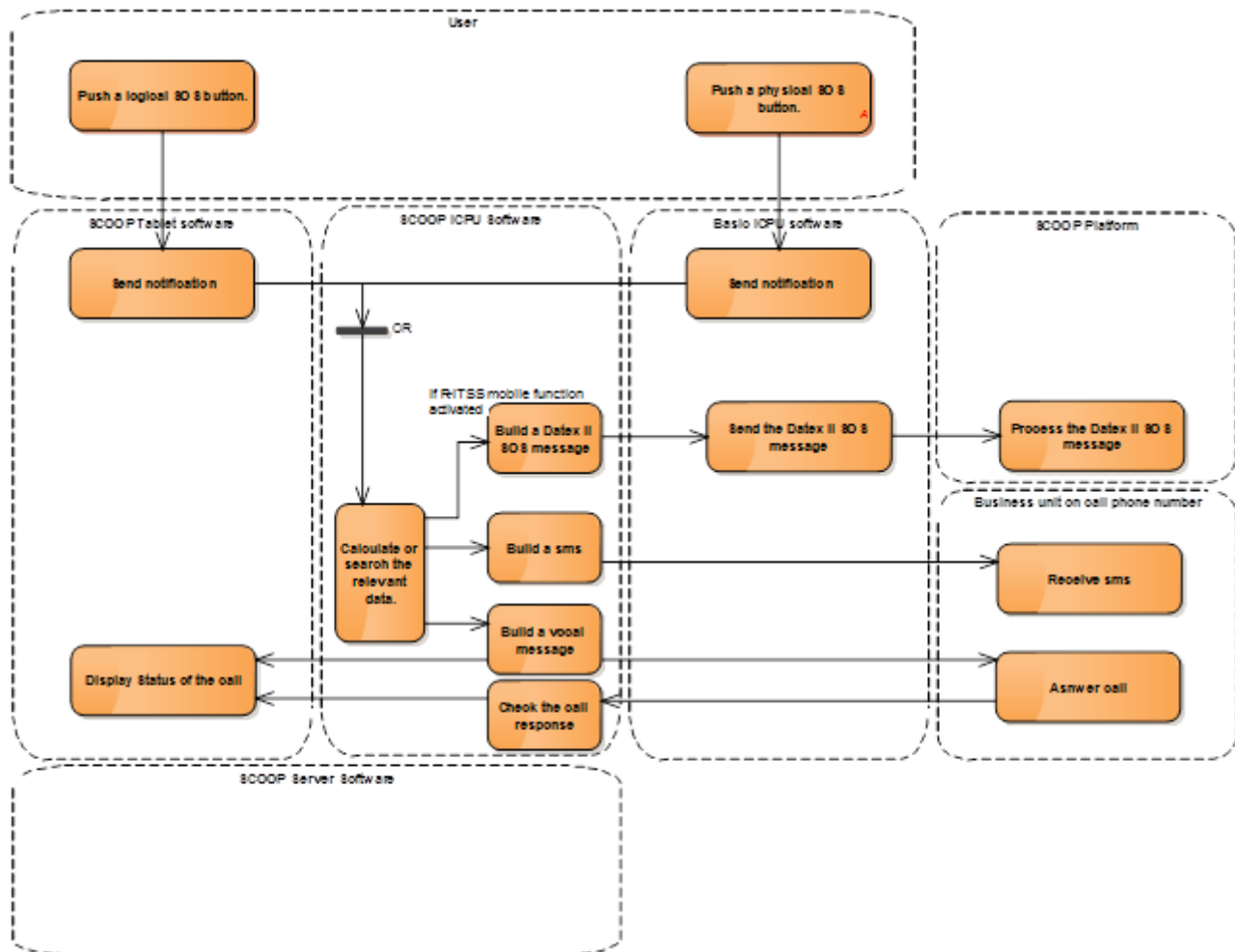


Figure 11: Internal SCOOP software process for emergency call

ID	2.4.2.2bis-FUNC-066
Component(s)	SCOOP Software
Requirement	Once a SOS button is triggered, the SCOOP software shall send a vocal SOS message to a number already registered.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-067
Component(s)	SCOOP Software
Requirement	Once a SOS button is triggered, the SCOOP software shall send a text message to a number already registered.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-068
Component(s)	SCOOP Software, PFro
Requirement	Once a SOS button is triggered and if the mobile R-ITS-S function is activated, the SCOOP software shall send an SOS message to the SCOOP Platform.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-069
Component(s)	SCOOP Software
Requirement	Once a SOS button is triggered, the SCOOP software shall display the status of his call.
Acceptance	
Additional information	

2.2.6 Requirements about DENM content

The requirements about the DENM content are set in the Deliverable 2.4.1 and 2.4.1.2.

Some elements are precised here for the Vro-ITS-S.

2.2.6.1 Traces Data Frame

Description:

The way to calculate the traces is not the same for Vro-ITS-S, than for the Vu-ITS-S. The road operator's vehicles have particularities:

- They drive on unauthorized roads to other users, such as roadworks areas, or in the service exit ramp...

- They maneuverer not in a usual and legal way: back off, drive in the wrong way, and make loops on the road, in a very short time...

These movements can happen in every mode.

ID	2.4.2.2bis-FUNC-070
Component(s)	SCOOP Software
Requirement	The SCOOP software shall calculate the traces for the DENM, based on the available data.
Acceptance	CA1: in each installation of the SCOOP software, the traces are the same for the same vehicle movement.
Additional information	The Basic UTIC Software can calculate the traces for the CAM.

ID	2.4.2.2bis-FUNC-071
Component(s)	SCOOP Software
Requirement	The traces shall be the way to the event, and not the representation of the movement of the vehicle, so SCOOP software shall take into account the particularities of the vehicle's movement.
Acceptance	CA1: the traces are a straight line to the vehicle position.
Additional information	A calculation is provided below. Another calculation, which fulfilled the requirements could be used.

Proposal of linear recurrence algorithm for traces:

- Initialisation: The vehicles starts.
 - The trace contains the GNSS position of the vehicle.
- Case 1: The vehicle moves forward.
 - The traces is enhanced by the next GNSS position that respects the Standards, and that is situated at a configurable distance from the precedent point. (The default parameter could be 25m or it could be based on the speed vehicle).
- Case 2: the vehicle moves backwards (For example: CAN detection, angle calculation...).
 - The points of the traces are deleted until the closest point of the GNSS position.
- Case3: in case of error (no more GNSS position, impossibility to detect backward movement...),

- The entire trace is deleted.

2.2.6.2 EventHistory Data Frame

The same process can occur during a linear DENM creation.

ID	2.4.2.2bis-FUNC-072
Component(s)	SCOOP Software
Requirement	The SCOOP software shall calculate the eventHistory for the DENM, based on the available data.
Acceptance	CA1: in each installation of the SCOOP software, the generated eventHistory are the same for the same vehicle movement.
Additional information	

ID	2.4.2.2bis-FUNC-073
Component(s)	SCOOP Software
Requirement	The eventHistory shall be a straight line describing the event, and not the representation of the movement of the vehicle, so SCOOP software shall take into account the particularities of the vehicle's movement.
Acceptance	CA1: the eventHistory contains a straight line to the vehicle position.
Additional information	A calculation is provided below. Another calculation, which fulfilled the requirements could be used.

Proposal of linear recurrence algorithm for EventHistory:

- Initialisation: the DENM is detected for the first time.
 - The EventHistory contains the GNSS position of the vehicle.
- Case 1: The vehicle moves forward.
 - The EventHistory is enhanced by the next GNSS position that respects the Standards, and that is situated at a configurable distance from the precedent point. (The default parameter could be 25m or it could be based on the speed vehicle).
- Case 2: the vehicle moves backwards.
 - The points of the EventHistory are deleted until the closest point of the GNSS position.
- Case3: in case of error (no more GNSS position, impossibility to detect backward movement...),
 - the entire EventHistory is deleted.

2.2.6.3 Road Type data element

According to the 2.4.1.4, the roadType may be provided in the PFro-DATEX II message:

ID	2.4.2.2bis-FUNC-074
Component(s)	SCOOP Software
Requirement	If the roadType is not present in the PFro-DATEX II message or for a “In emission” message, the SCOOP software shall calculate the roadType, in the on-bord part of the unit or in the SCOOP server.
Acceptance	
Additional information	

2.3 Support requirements

2.3.1 Start-up of the Vro-ITS-S

ID	2.4.2.2bis-SUPP-075
Component(s)	SCOOP Software, basic ICPU software
Requirement	<p>At each start up, the SCOOP software shall</p> <ul style="list-style-type: none"> • Displays the home page. • Downloads the configuration from the SCOOP server software, including: <ul style="list-style-type: none"> ○ The base map. ○ The business routes. ○ The activity, sub activity, use cases. ○ The rights database of all the persons of their business unit, from the scoop server. • Exchanges with basic ICPU software the relevant settings (e.g. installation mode). • Downloads update files if necessary.
Acceptance	

To optimise bandwidth, these downloads can only concerned the modified data.

ID	2.4.2.2bis-SUPP-076
Component(s)	
Requirement	The Vro-ITS-S shall not delete a downloaded database unless a new one is downloaded
Acceptance	
Additional information	

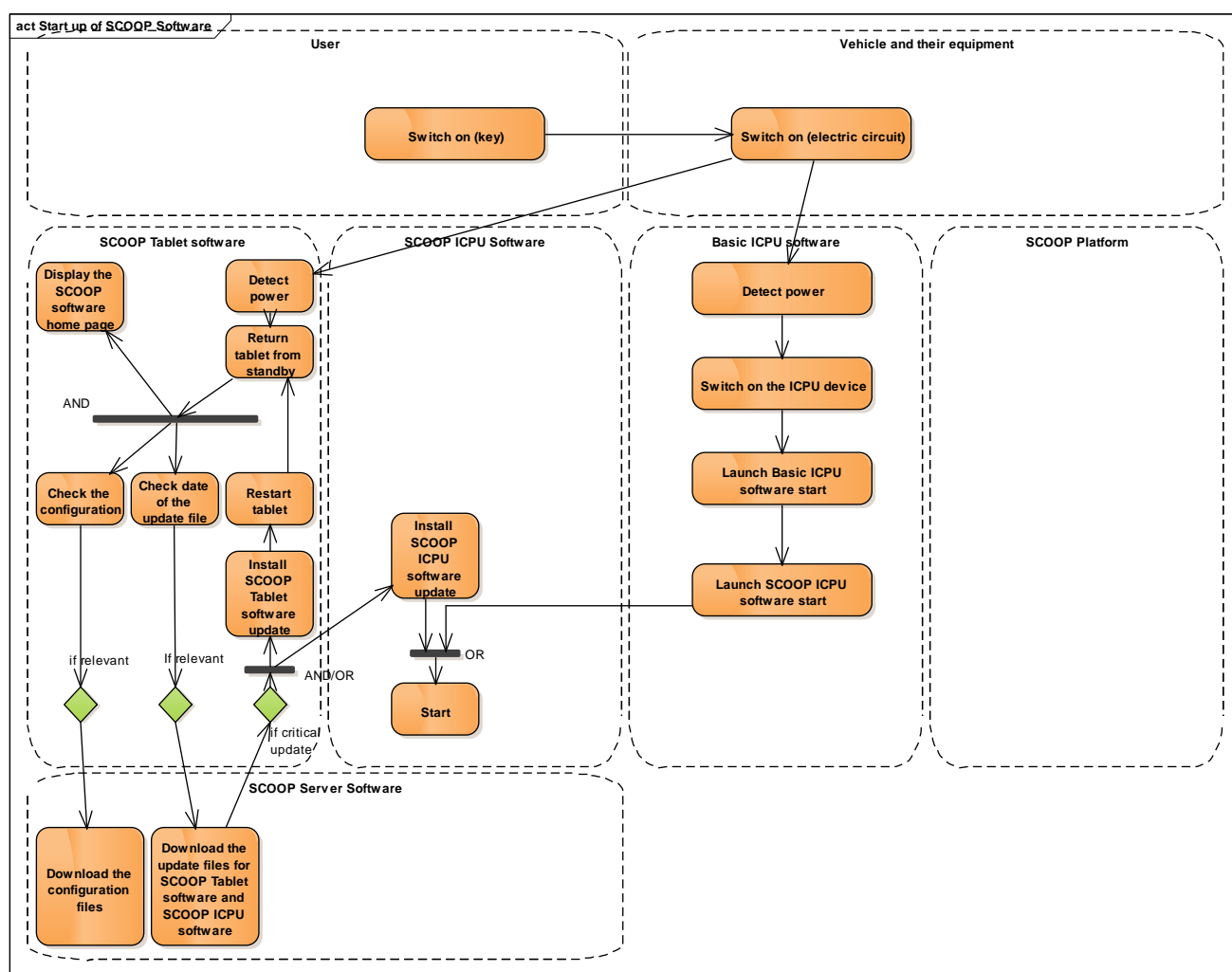


Figure 12: Internal SCOOP software process for starting up

2.3.2 Switch off

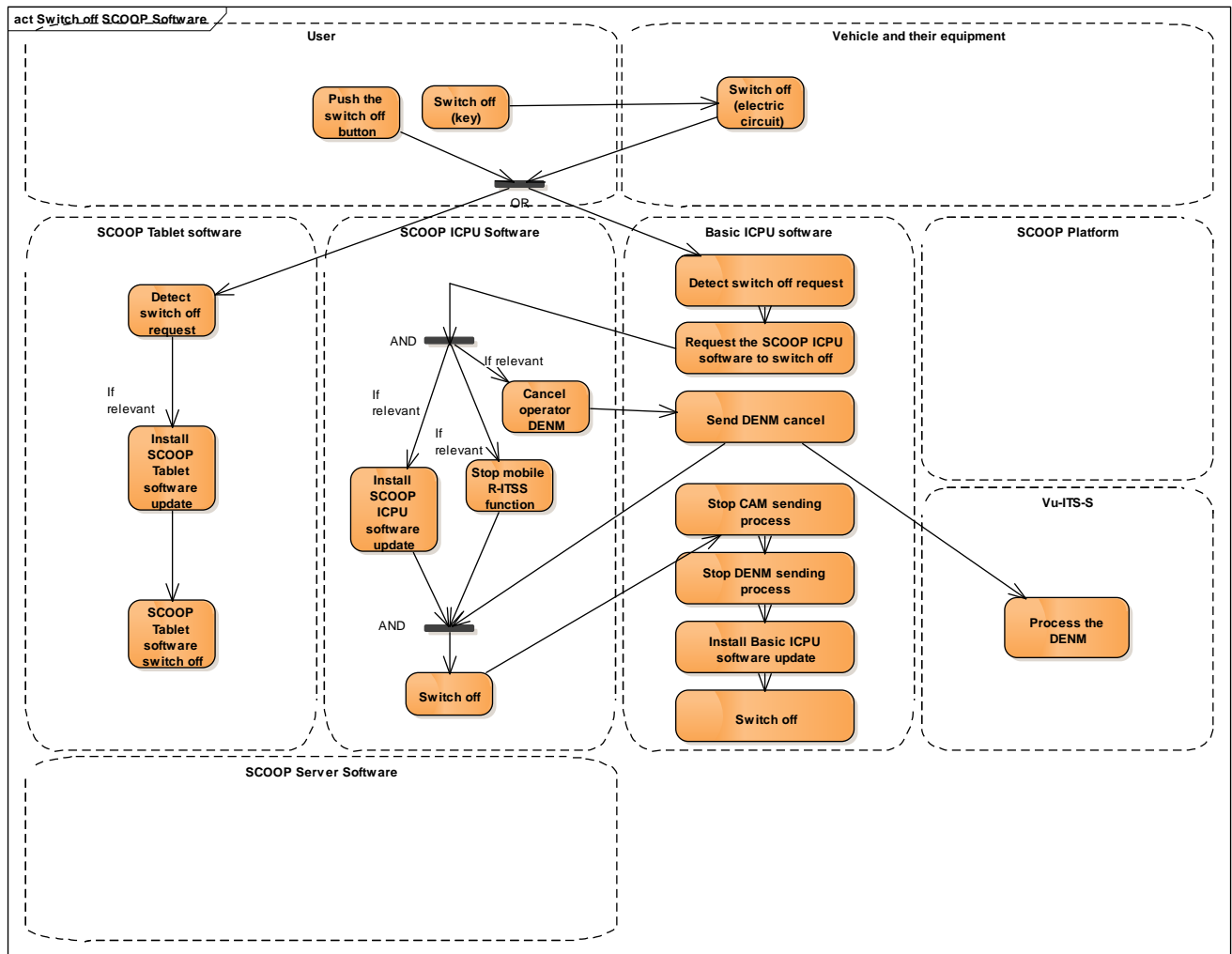


Figure 13: Internal SCOOP software process for switching off

ID	2.4.2.2bis-SUPP-077
Component(s)	SCOOP Software
Requirement	The SCOOP software shall offer the possibility to a person to switch off the Vro-ITS-S.
Acceptance	
Additional information	This is done in particular for privacy purpose.

ID	2.4.2.2bis-SUPP-078
Component(s)	SCOOP Software
Requirement	After the vehicle stops and the driver turns off the power, the SCOOP software shall switch off.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-079
Component(s)	SCOOP Software
Requirement	Before switching off, the SCOOP software can offer the possibility to confirm the switching off. Without confirmation within a configurable time, the SCOOP software shall switch off.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-080
Component(s)	SCOOP Software, basic ICPU software
Requirement	Before each Vro-ITS-S switches off, the SCOOP software shall ends all their process: <ul style="list-style-type: none"> • Cancel all their currently sent linked DENM. • Install the downloaded update files if necessary, .(See chapter 2.3.4) . • Stop the basic ICPU software device and put the tablet device to sleep.
Acceptance	
Additional information	

2.3.3Authentication

Description:

The authentication on the tablet is necessary for two types of users of the Vro-ITS-S:

- Operator users.
- Tablet administrator.

For some actions mentioned in this document, the person do not need to authenticate, for example send a manual DENM in a user mode.

ID	2.4.2.2bis-SUPP-081
Component(s)	SCOOP Software
Requirement	An operator user shall only access the activities allowed by his access rights.
Acceptance	
Additional information	

Example:

- A “patrolman”:
 - Can run the entire user mode.
 - Can have the mobile R-ITS-S function activated.
 - Can only run the activity “Patrol” in the operator mode.
 - And can use business routes.
- A “Roadworker”:
 - Can run the entire user mode.
 - Can have the mobile R-ITS-S function activated.
 - And can only run the activities “Fix roadworks” and “mobile roadworks” in the operator mode.

ID	2.4.2.2bis-SUPP-082
Component(s)	SCOOP Software
Requirement	A tablet administrator can administrate the SCOOP tablet locally.
Acceptance	
Additional information	It implies that a tablet administrator can <ul style="list-style-type: none"> • Install a Vro-ITS-S in a vehicle. • Configure the SCOOP software, accordingly to the vehicle.

ID	2.4.2.2bis-SUPP-083
Component(s)	SCOOP Software
Requirement	A super administrator [v] shall be able to modify all the system data within the SCOOP server software. These data are about persons, vehicles, tablets, business, SCOOP software versions available...
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-084
Component(s)	SCOOP Software
Requirement	A" business unit administrator [vii]" shall be able to modify the data that concern their own business unit: such as vehicle, tablet, user...
Acceptance	
Additional information	

The administrator configures the access rights, the authorized persons and allowed activities on the SCOOP server software.

At each launch, the Vro-ITS-S download the rights database of all the persons of their business unit, from the scoop server.

At each needed authentication, the SCOOP software verifies if a person is in the database, and if their access rights allow him to do what he asks for.

Note: for storage consideration, another mechanism may be provided.

- The Vro-ITS-S does not download the database at each start.
- Each time a user request an authentication, the SCOOP tablet software checks with their local database:
 - if the person is already present and information matches (same password, authorized activities...), then the authentication succeed,
 - if the information does not match or if the person is not present in the local database, then the SCOOP software updates their database and checks again..

ID	2.4.2.2bis-SUPP-085
Component(s)	SCOOP Software
Requirement	The SCOOP software shall inform the user if the authentication succeeds or fails.
Acceptance	
Additional information	

2.3.4 Update

ID	2.4.2.2bis-SUPP-086
Component(s)	SCOOP Software
Requirement	Each part of the SCOOP software can be updated independently from one to another.
Acceptance	
Additional information	

2.3.4.1 SCOOP tablet software and SCOOP ICPU software

Description:

The administrator drops update files for the SCOOP tablet software or for SCOOP ICPU software on the SCOOP server, into a specific directory.

At each launch, the SCOOP software checks the date of the last update for every part of the SCOOP software. If the SCOOP software version date comes after the one of the current version on the SCOOP server software, then the SCOOP software downloads the new release/ the most recent file from the SCOOP server software.

ID	2.4.2.2bis-SUPP-087
Component(s)	SCOOP Software
Requirement	The updates download process shall be hidden to the user, so he can use the SCOOP software while downloading.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-088
Component(s)	SCOOP Software
Requirement	At each switch off, if an update file on the Vro-ITS-S comes after the one of the installed software, then the SCOOP software shall automatically be launched so the SCOOP software can be effective to the next start-up.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-089
Component(s)	SCOOP Software
Requirement	During the updating process, a message shall be displayed on the tablet to inform the user of the current updating.
Acceptance	
Additional information	

2.3.4.2 SCOOP server software

ID	2.4.2.2bis-SUPP-090
Component(s)	SCOOP Software
Requirement	An administrator shall be able to update locally the SCOOP server software without losing the configuration (rights, use cases...).
Acceptance	
Additional information	

2.3.5 Monitoring Vro-ITS-S

ID	2.4.2.2bis-SUPP-091
Component(s)	SCOOP Software, PFro
Requirement	<p>The SCOOP software shall know the status of their internal components and of the connections:</p> <ul style="list-style-type: none"> • Power source status. • GPS Antenna status. • ITS G5 Antenna status. • Tablet battery level status, Basic ICPU software. • SCOOP server software connection status. • Vro-ITS-S server connection status. • SCOOP platform connection status. • Vehicle CAN bus connection status. • Any connected secondary equipment. • Tablet – ICPU link status.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-092
Component(s)	SCOOP Software
Requirement	A user, depending on his rights and the current running mode, can see global indicators.
Acceptance	
Additional information	The deliverable 2.4.2.2ter sets some of the global indicators and the displaying way.

ID	2.4.2.2bis-SUPP-093
Component(s)	SCOOP Software, basic ICPU software, PFro
Requirement	<p>Before choosing a mode, the SCOOP software shall inform the person of the essential status:</p> <ul style="list-style-type: none"> • Basic ICPU software is operational (this indicator shall gather all the status needed, at least: the WI-FI status between devices, the basic ICPU software status, and the SCOOP ICPU software) • Connection with SCOOP Platform is operational (this indicator shall gather all the status needed, at least: the Wi-Fi status between devices, the basic ICPU software status, the SCOOP ICPU software, the cellular connection with SCOOP Platform).
Acceptance	CA1: Two indicators are shown, and can take different aspects depending on the status.
Additional information	For example: red cross/green tick, or red sad smiley/green happy smiley...

ID	2.4.2.2bis-SUPP-094
Component(s)	SCOOP Software
Requirement	In the administrator mode, the tablet administrator can access all the detailed indicators and alerts.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-095
Component(s)	SCOOP Software
Requirement	<p>The SCOOP software shall create different types of data:</p> <ul style="list-style-type: none"> • T-logs, specified in the SCOOP project for technical evaluation purposes of the SCOOP system. • U-logs, specified in the SCOOP project for behaviour evaluation purposes of the SCOOP system. • Supervision data for errors analyses during the Vro-ITS-S normal use.
Acceptance	
Additional information	Basic ICPU shall provide the relevant data.

ID	2.4.2.2bis-SUPP-096
Component(s)	SCOOP Software, basic ICPU software
Requirement	When requested by basic ICPU software, the SCOOP software shall contribute to basic ICPU software logs or supervision data (Tlogs, Ulogs, and others data).
Acceptance	
Additional information	

2.3.6 Administrate the Vro-ITS-S

2.3.6.1 Configure the system from the SCOOP server software

Description:

A configuration file for the SCOOP software is recorded in a repository on the SCOOP server software. Each Vro-ITS-S scans this server at their start-up and downloads the concerning file.

Note: different repositories or different filenames can be used for different configurations

See the SCOOP server software chapter 5, for the details on the configuration file.

2.3.6.2 Run the administrator mode on the Vro-ITS-S

Description:

A tablet administrator, with appropriate rights, shall be able to modify on the tablet, the tablet settings.

This mode is particularly useful for the first installation of the Vro-ITS-S.

In the administrator mode, an administrator can also have access to all the details about each status of the connections set in the chapter 2.3.5.

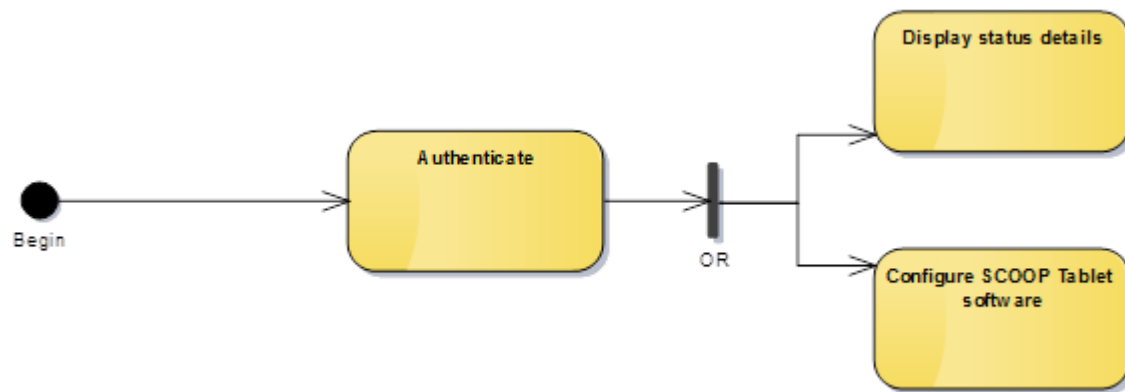


Figure 14: Actions an administrator can do in the administrator mode

ID	2.4.2.2bis-SUPP-097
Component(s)	SCOOP Software
Requirement	In the administrative mode, no DENM can be sent by the SCOOP software
Acceptance	
Additional information	

Note: Basic ICPU software can send the automatic user DENM, and shall send the CAM.

2.3.7 Manage the cartography

Description:

The SCOOP Platform manages the road network.

The SCOOP server software supplements the maps with the platform road network.

The SCOOP software displays a base map with a road reference frame.

See chapters 3.4.7 and 0 for details.

3 SCOOP tablet software

3.1 Description

The SCOOP tablet software is the interface of the SCOOP software with the user.

The HMI provided by the SCOOP tablet software allows a person to:

- Be informed of the events on a map.
- Be alerted of events he will encounter on his path.
- Declare a manual event.
- Be guided:
 - Through a predefined route.
 - on a calculated itinerary.
- Launch an emergency call.
- See the system indicators (state of components and connections).
- Configure the SCOOP software (vehicle settings, tablet).

Each of these functions will be available according to the user access rights.

3.2 Technical requirements

ID	2.4.2.2bis-TECH-098
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software shall be installed on the touchscreen tablet.
Acceptance	
Additional information	

ID	2.4.2.2bis-TECH-099
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software is an android application.
Acceptance	
Additional information	

For more details about materiel and integration of the tablet in the vehicle, see the 2.4.2.2 deliverable.

The tablet shall have enough storage space and computing capacity in order to run the SCOOP tablet software. The tablet shall be equipped with all the required elements: GNSS, 3G/4G-LTE and Wi-Fi access. The operating system shall be Lollipop android 5.0.1 version or more.

ID	2.4.2.2bis-TECH-100
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software shall disconnect automatically the administrator mode after a configurable time.
Acceptance	
Additional information	

ID	2.4.2.2bis-TECH-101
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software shall prevent the tablet stand-by and the disconnection when the user is using the SCOOP software under the user or operator mode, except when the tablet is not powered any more.
Acceptance	
Additional information	See the switch off chapter for more information about end of power.

3.3 Functional requirements

3.3.1 Run the user mode

ID	2.4.2.2bis-FUNC-102
Component(s)	SCOOP tablet software
Requirement	No authentication is needed to access the user mode in the SCOOP tablet software.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-103
Component(s)	SCOOP tablet software
Requirement	In the user mode, the user can see the map, and the navigation view. See Chapter 0.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-104
Component(s)	SCOOP tablet software
Requirement	In the user mode, the user shall be able to come back to the home page.
Acceptance	
Additional information	

3.3.2Run the operator mode

ID	2.4.2.2bis-FUNC-105
Component(s)	SCOOP tablet software
Requirement	The operator shall authenticate himself to access the operator mode.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-106
Component(s)	SCOOP tablet software
Requirement	There shall not be an automatic disconnection from the user account in the operator mode.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-107
Component(s)	SCOOP tablet software
Requirement	In the operator mode, the operator shall select, at the same time, only one activity among those granted by his access rights.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-108
Component(s)	SCOOP tablet software
Requirement	After the operator selects one activity, the SCOOP tablet software shall display the navigation view.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-109
Component(s)	SCOOP tablet software
Requirement	When the operator wants to declare an event, the SCOOP tablet software shall display- all the DENM he may send.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-110
Component(s)	SCOOP tablet software
Requirement	In the operator mode, the operator shall be able to modify the position and the relevanceTrafficDirection of a manual exterior [xi] event he previously declared.
Acceptance	
Additional information	When he does so, then the SCOOP software deletes the existing traces and, if relevant, the eventHistory, in the sent message.

ID	2.4.2.2bis-FUNC-111
Component(s)	SCOOP tablet software
Requirement	The operator shall have an icon allowing him to disconnect from the operator mode, to come back to the home page or the view displaying modes. When he does so, the operator shall be disconnected from the operator mode.
Acceptance	
Additional information	Note: As the triggering conditions of the operator DENM are not fulfilled any more, all operator DENM are cancelled and that the scoop software alert the driver of this cancellation.

ID	2.4.2.2bis-FUNC-112
Component(s)	SCOOP tablet software
Requirement	The operator shall have a possibility to switch directly to the user mode from the operator mode.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-113
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	In the operator mode, when the operator changes from one activity to another, the SCOOP tablet software shall send a notification to SCOOP ICPU software to cancel all the operator DENM linked to the first activity, and, the SCOOP tablet software shall alert the user of these cancellation.
Acceptance	
Additional information	

3.3.3 Common requirements in user and operator mode

3.3.3.1 Send a manual DENM

ID	2.4.2.2bis-FUNC-114
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	When the user declares a manual event, the SCOOP tablet software shall send the needed data to the SCOOP ICPU software.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-115
Component(s)	SCOOP tablet software
Requirement	When the user declares a manual DENM, the SCOOP tablet software shall display the event on the map, making it clear it is their own event.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-116
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	The user shall be aware that their DENM has really be sent.
Acceptance	
Additional information	Note: a technical answer can be that the event displaying changes during the confirmation processing of the message sent by the SCOOP ICPU software.

ID	2.4.2.2bis-FUNC-117
Component(s)	SCOOP tablet software
Requirement	When the user declares a manual event, he shall be able to cancel it in two different ways: <ul style="list-style-type: none"> • Immediately after the declaration, in case of mistake. • At the end of the event or if he considers it is not relevant anymore.
Acceptance	
Additional information	Functionally, there is two possibilities: <ul style="list-style-type: none"> • In case of an exterior DENM, the sender does not know when it ends (for example an animal: the sender can be far from the event at the end, when the event stop at the end of the validity duration of the DENM.). • In case of a linked DENM, the sender wants to stop the event, because his activity is ending (He stops salting for example.).

ID	2.4.2.2bis-FUNC-118
Component(s)	SCOOP tablet software
Requirement	For the cancel at the end of a linked DENM, the SCOOP software shall present an easy way to cancel. This specific status is set in the settings of the use case.
Acceptance	
Additional information	

3.3.3.2 Display an automatic DENM

ID	2.4.2.2bis-FUNC-119
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	When the SCOOP tablet software receives a notification of an automatic DENM from SCOOP ICPU software, the SCOOP tablet software shall display the event on the map in a specific way, identifying it is their own event, and an automatic one.
Acceptance	
Additional information	

3.3.3.3 Display an external DENM

ID	2.4.2.2bis-FUNC-120
Component(s)	SCOOP tablet software
Requirement	When the SCOOP tablet software receives a DENM from another C-ITS Station, the SCOOP tablet software shall display the event on the map.
Acceptance	
Additional information	This event displaying shall be different if the DENM is a DENM of the Vro-ITS-S itself, or an external [xii] DENM.

The “mapmatching function” gathered the following requirements:

ID	2.4.2.2bis-FUNC-121
Component(s)	SCOOP tablet software
Requirement	The SCOOP software shall locate the external [xii] events on the road network, except if the event is positioned further than a configurable distance.
Acceptance	
Additional information	For example, the software calculates a new position, called “mapmatched position” which is the projection of the event position on the road network, and uses this position to display this event and not the real one.

ID	2.4.2.2bis-FUNC-122
Component(s)	SCOOP tablet software
Requirement	When the user is arriving at the event concerning him, the SCOOP software shall display this event to him in an alerting way, with the InformationQuality, and the remaining distance to drive.
Acceptance	
Additional information	The alerting way is described in the 2.4.2.2 ter (for example a popup, a banner ...)

ID	2.4.2.2bis-FUNC-123
Component(s)	SCOOP tablet software
Requirement	When the user is arriving on one of their own events, the SCOOP tablet software shall not display this event to him in an alerting manner.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-124
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software shall calculate the remaining distance for the alert considering the real distance to go, and not in a straight line.
Acceptance	
Additional information	

3.3.4 Help the user to navigate

This function aims to guide the user. The SCOOP tablet software shall provide to the user:

- Routes, which the user has to follow during their activity.
- Itinerary, which the user can follow to reach his destination.

ID	2.4.2.2bis-FUNC-125
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software, at each starts of an activity including routes, shall download the concerned routes from the SCOOP Server.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-126
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software shall display the route when the operator requests it.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-127
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software, when a user requests an itinerary, shall display him an itinerary to the entered destination and shall guide him through the itinerary.
Acceptance	
Additional information	The calculation can be done in the SCOOP server software.

3.3.5 Mobile R-ITS-S function

3.3.5.1 Display an event from the platform

ID	2.4.2.2bis-FUNC-128
Component(s)	SCOOP tablet software, PFro, SCOOP ICPU software
Requirement	When the SCOOP ICPU software sends to the SCOOP tablet software an event from the SCOOP Platform, the SCOOP tablet software shall display the event on the map, the same as the external [xii] events.
Acceptance	
Additional information	

3.3.6 Detect a manual emergency call

The user can push a SOS button on his screen.

ID	2.4.2.2bis-FUNC-129
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	When the user pushes the SOS button displayed on the screen, the SCOOP tablet software shall notify the SCOOP ICPU software.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-130
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	When the SCOOP ICPU software informs the SCOOP tablet software of the sending status, the SCOOP tablet software shall inform the user.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-131
Component(s)	SCOOP tablet software
Requirement	During the call, or in case the call fails, the SCOOP tablet software shall show to the user the phone number used.
Acceptance	
Additional information	

3.4 Support requirements

3.4.1 Start up

ID	2.4.2.2bis-SUPP-132
Component(s)	SCOOP tablet software
Requirement	After the touchscreen tablet launch, the SCOOP tablet software shall allow the user to choose the mode to run.
Acceptance	
Additional information	

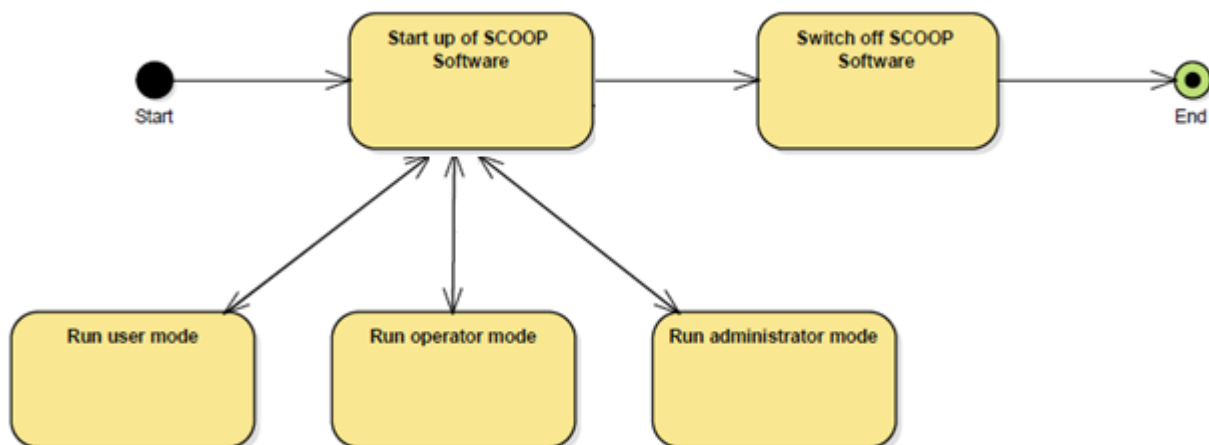


Figure 15: Authorized actions after the SCOOP tablet start up.

ID	2.4.2.2bis-SUPP-133
Component(s)	SCOOP tablet software
Requirement	At the launch, the user shall see the state of the indicators the more relevant for the user (state of the different connections ...).
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-134
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	When the user choose a mode, the SCOOP tablet software shall inform the SCOOP ICPU software which mode is operating.
Acceptance	
Additional information	Note: the mode information will be used by the basic ICPU to choose the appropriate certificate, and to update the messages attributes, such as stationType and vehicleRole.

3.4.2Switch off

ID	2.4.2.2bis-SUPP-135
Component(s)	SCOOP tablet software, SCOOP ICPU software
Requirement	At each switch off, the SCOOP tablet software shall: <ul style="list-style-type: none"> • Launch their updates. • Finish their operations. • Send a notification to the SCOOP ICPU software in order to stop the ICPU. • the tablet on standby.
Acceptance	
Additional information	

3.4.3 Authentication

ID	2.4.2.2bis-SUPP-136
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software shall include a function that limits the access only to authorized applications for specific users.
Acceptance	
Additional information	An administrator with an adapted rights could launched other applications, after his authentication.

3.4.4 Update

Basic ICPU software, as set in deliverable 2.4.2.2, checks at each start up the update file embedded on the tablet, compares it to the available ones and downloads from the SCOOP server software the most recent file.

ID	2.4.2.2bis-SUPP-137
Component(s)	SCOOP tablet software
Requirement	If the update is critical, then the installation for a new version of the SCOOP tablet software is automatic and launched immediately, the SCOOP tablet software alerts the user of the restart.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-138
Component(s)	SCOOP tablet software
Requirement	If the update is not critical, then the installation for a new version of the SCOOP tablet software is automatic, launched when the VRO-ITS-S switches off in order to be effective at the next start up.
Acceptance	
Additional information	

3.4.5 Monitoring Vro-ITS-S

ID	2.4.2.2bis-SUPP-139
Component(s)	SCOOP tablet software, SCOOP ICPU software, basic ICPU software
Requirement	<p>The SCOOP tablet software shall be able to send, when requested or in a periodic time, to the basic ICPU software the following events or information:</p> <ul style="list-style-type: none"> • SCOOP tablet software version. • Which GPS is used. • Vro-ITS-S position. • Connection to all the different components (SCOOP ICPU software, ...). • Level of tablet battery. • If the tablet is plugged or not. • Current activity.
Acceptance	
Additional information	Other indicators could be added, depending on the technical implementation of these specifications.

3.4.6 Run the administrator mode on the tablet

ID	2.4.2.2bis-SUPP-140
Component(s)	SCOOP tablet software
Requirement	The user shall authenticate himself to access the administrator mode.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-141
Component(s)	SCOOP tablet software
Requirement	The user in the administrator mode shall be disconnected after a configurable time without interactions.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-142
Component(s)	SCOOP tablet software
Requirement	In the administrator mode, the tablet administrator can manually install a new SCOOP tablet software.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-143
Component(s)	SCOOP tablet software
Requirement	In the administrator mode, the user can reinitialise the scoop tablet settings to the values of the initial settings.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-144
Component(s)	SCOOP tablet software
Requirement	In the administrator mode, the user shall be able to come back to the home page. When he does so, the administrator shall be disconnected from the administrator mode.
Acceptance	
Additional information	

3.4.7Manage the cartography

Description:

This function of the SCOOP tablet software provides geographical information to the user such as:

- Base map with a road reference frame.
- Their own position.
- The road events on the road map.

Moreover, this function allows the SCOOP software to decide whether an event has to be displayed in an alerting manner.

ID	2.4.2.2bis-SUPP-145
Component(s)	SCOOP tablet software
Requirement	When relevant (start, requests by the user...), the SCOOP tablet software shall download the road network from the SCOOP Server software.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-146
Component(s)	SCOOP tablet software
Requirement	When relevant (start, requests by the user...), the SCOOP tablet software shall download the tiles for the base map from the SCOOP server software.
Acceptance	
Additional information	The manual or automatic move of the map is considered as user request.

ID	2.4.2.2bis-SUPP-147
Component(s)	SCOOP tablet software
Requirement	The tiles shall be stored in the Vro-ITS-S in a relevant way, at least for the business unit considered.
Acceptance	
Additional information	For example, the tiles shall be stored for the entire road operator network, or for the user's business unit road network.

ID	2.4.2.2bis-SUPP-148
Component(s)	SCOOP tablet software
Requirement	The SCOOP tablet software shall keep in memory the road network during a configurable time.
Acceptance	
Additional information	This requirement is set in order to optimize downloads, in particular in zones without cellular connections.

4 SCOOP ICPU software

4.1 Description

The SCOOP ICPU software manages all the processes of creation and translation of DENM and PFro-DATEX II messages in collaboration with the basic ICPU software.

Main functions of the SCOOP ICPU software are:

- Creating DENM.
- Translating DENM into PFro-DATEX II messages, and vice versa,
- Materialising emergency messages.

4.2 Technical requirements

ID	2.4.2.2bis-TECH-149
Component(s)	SCOOP ICPU software
Requirement	The SCOOP ICPU software is installed on the ICPU.
Acceptance	
Additional information	

ID	2.4.2.2bis-TECH-150
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	The SCOOP ICPU software exchanges technically data with: <ul style="list-style-type: none"> • The basic ICPU software via an API (see 2.4.2.2). • And SCOOP tablet software.
Acceptance	
Additional information	

4.3 Functional requirements

4.3.1 DENM managing

4.3.1.1 Create a manual DENM and provide it to basic ICPU software

ID	2.4.2.2bis-FUNC-151
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When requested by the SCOOP tablet software, the SCOOP ICPU software shall create the requested manual DENM and request the basic ICPU software to send this DENM.
Acceptance	
Additional information	This creation shall be made according to DENM values configuration. This process concerns also the DENM of type "cancellation".

ID	2.4.2.2bis-FUNC-152
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	The SCOOP ICPU software shall fill all the DENM values, in particular the data frames "eventposition" and "traces", if necessary, by requested data to the relevant software, before creation.
Acceptance	
Additional information	As set in 2.4.2.2, the basic ICPU software shall answer to the SCOOP ICPU software when the DENM is being sent.

ID	2.4.2.2bis-FUNC-153
Component(s)	SCOOP ICPU software
Requirement	If mobile R-ITS-S function is activated, the SCOOP ICPU software shall create the PFro-DATEX II message corresponding to the requested manual DENM, and send it to the basic ICPU software.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-154
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	Once the basic ICPU software acknowledges the DENM sending, the SCOOP ICPU software shall inform the SCOOP tablet software that the manual DENM is sent.
Acceptance	
Additional information	

4.3.1.2 Inform the SCOOP tablet software of the sending of an automatic user DENM

ID	2.4.2.2bis-FUNC-155
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When the basic ICPU software informs SCOOP ICPU software of an automatic user DENM sending, SCOOP ICPU software shall send the data to the SCOOP tablet software.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-156
Component(s)	SCOOP ICPU software
Requirement	If mobile R-ITS-S function is activated, the SCOOP ICPU software shall create the PFro-DATEX II message corresponding to the notified automatic user DENM, and send it to the basic ICPU software.
Acceptance	
Additional information	

4.3.1.3 Create the automatic operator DENM and inform the SCOOP tablet software of the sending of an automatic operator DENM

ID	2.4.2.2bis-FUNC-157
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When the basic ICPU software informs SCOOP ICPU software of the values of triggering conditions linked to an automatic operator DENM, SCOOP ICPU software shall create the automatic operator DENM and shall request the basic ICPU software to send it.
Acceptance	
Additional information	<p>As set in the 2.4.2.2, the basic ICPU software shall inform the SCOOP ICPU software when the DENM is sent.</p> <p>This creation shall be made according to DENM values configuration.</p> <p>The SCOOP ICPU software shall fill all the required DENM value, in particular the data frames "eventposition" and "traces", if necessary by requested data to the relevant software, before creation.</p>

ID	2.4.2.2bis-FUNC-158
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When the basic ICPU software informs SCOOP ICPU software of an automatic operator DENM sending, SCOOP ICPU software shall send the data to the SCOOP tablet software.
Acceptance	
Additional information	

4.3.1.4 Inform the SCOOP tablet software of the reception of an external DENM

ID	2.4.2.2bis-FUNC-159
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When the basic ICPU software informs SCOOP ICPU software of the reception of a DENM from another C-ITS Station, SCOOP ICPU software shall send the data to the SCOOP tablet software.
Acceptance	
Additional information	

4.3.2 Mobile R-ITS-S function

If the mobile R-ITS-S function is activated, then SCOOP ICPU software will receive PFro-DATEX II messages from the platform, and sends PFro-DATEX II messages.

ID	2.4.2.2bis-FUNC-160
Component(s)	SCOOP ICPU software, basic ICPU software, PFro
Requirement	When the mobile R-ITS-S function is activated, the SCOOP ICPU software shall request a snapshot of all events to the basic ICPU.
Acceptance	
Additional information	The basic ICPU software then send it to the SCOOP Platform.

ID	2.4.2.2bis-FUNC-161
Component(s)	SCOOP ICPU software, basic ICPU software, PFro
Requirement	If the mobile R-ITS-S function is activated, when the SCOOP ICPU software creates a DENM, the SCOOP ICPU software shall translate it in PFro-DATEX II and send it to basic ICPU software.
Acceptance	
Additional information	The basic ICPU software then send it to the SCOOP Platform.

ID	2.4.2.2bis-FUNC-162
Component(s)	SCOOP ICPU software, basic ICPU software, PFro
Requirement	When the SCOOP tablet software receives a PFro-DATEX II message from the SCOOP platform, the SCOOP ICPU software shall transmit data to the SCOOP tablet software, translate it in DENM, accordingly to the deliverable 2.4.1.4, and send DENM to the basic ICPU software.
Acceptance	
Additional information	One PFro-DATEX II message can be translated in more than one DENM, for example in the case of a snapshot.

ID	2.4.2.2bis-FUNC-163
Component(s)	SCOOP ICPU software, basic ICPU software, PFro
Requirement	If the mobile R-ITS-S function is activated, when the SCOOP ICPU software receives a DENM from basic ICPU, the SCOOP ICPU software shall translate in PFro-DATEX II, accordingly to the deliverable 2.4.1.4, and send it to basic ICPU software.
Acceptance	
Additional information	The basic ICPU software sends it to the SCOOP Platform.

4.3.3 Send the emergency call

ID	2.4.2.2bis-FUNC-164
Component(s)	SCOOP ICPU software, basic ICPU software, PFro
Requirement	When the SCOOP tablet software or the basic ICPU software informs the SCOOP ICPU software of the pushing of a SOS button, the SCOOP ICPU software shall build a PFro-DATEX II message and send it to Basic ICPU software.
Acceptance	
Additional information	The Basic ICPU software sends it to the SCOOP Platform.

ID	2.4.2.2bis-FUNC-165
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When the SCOOP tablet software or the basic ICPU software informs the SCOOP ICPU software of the pushing of a SOS button, the SCOOP ICPU software shall build a vocal message and send the message to the Basic ICPU software.
Acceptance	
Additional information	The basic ICPU software sends it to the predefined number corresponding to the business unit of the user and send a notification to the SCOOP ICPU software.

ID	2.4.2.2bis-FUNC-166
Component(s)	SCOOP ICPU software, basic ICPU software

Requirement	When the SCOOP tablet software or the basic ICPU software informs the SCOOP ICPU software of the pushing of a SOS button, the SCOOP ICPU software shall build a sms message and the send the message to the Basic ICPU software.
Acceptance	
Additional information	The basic ICPU software sends it to the predefined number corresponding to the business unit of the user.

4.4 Support requirements

4.4.1 Start up

ID	2.4.2.2bis-SUPP-167
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	As set in the deliverable 2.4.2.2, before the basic ICPU software requests the SCOOP ICPU software to start up, the Basic ICPU software shall install the critical updates and then start up the SCOOP ICPU Software.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-168
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When the SCOOP ICPU software starts, it shall check the presence of the touchpad tablet. If there is a tablet, then the SCOOP ICPU software requests the basic ICPU software to function in a “user” mode. If there is no tablet, then the SCOOP ICPU software requests the basic ICPU software to function in an “operator” mode.
Acceptance	
Additional information	The user can after choose a different mode.

4.4.2 Switch off

ID	2.4.2.2bis-SUPP-169
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	<p>When the basic ICPU software requests the SCOOP ICPU software to switch off, the SCOOP ICPU software shall:</p> <ul style="list-style-type: none"> • if relevant, cancel the linked [x] DENM it created, • if relevant, stop the mobile R-ITS-S function, • and, after all, stop all their internal process.
Acceptance	
Additional information	

4.4.3 Update

The SCOOP ICPU software update files are available on the server.

At each start up, as set in the deliverable 2.4.2.2, basic ICPU software checks for pertinent update files.

The critical updates are installed just after the download.

The other update installation is launched when turning off the VRO-ITS-S, so as it will be effective at the next starting up.

4.4.4 Settings

SCOOP ICPU software is set, in local or with a remote access from the SCOOP server software by using configuration files including:

- Activities, sub activities, use cases and PFro-DATEX II messages settings.
- ICPU configuration.

Note: SCOOP ICPU software setting files are applicable for a set of Vro-ITS-S configured and defined on the server.

4.4.5 Monitoring the Vro-ITS-S

ID	2.4.2.2bis-SUPP-170
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When requested by the SCOOP tablet software, the SCOOP ICPU software shall request to Basic ICPU software the status of the connections and the components.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-171
Component(s)	SCOOP ICPU software, basic ICPU software
Requirement	When the basic ICPU software informs the SCOOP ICPU software of the status of the connections and the component, the SCOOP ICPU software shall send the response to the SCOOP tablet software.
Acceptance	
Additional information	

5 SCOOP server software

5.1 Description

SCOOP server software offer human interfaces to administrate the SCOOP software, sets persons, rights, vehicles, routes, tablets, etc. and allows configuring SCOOP messages.

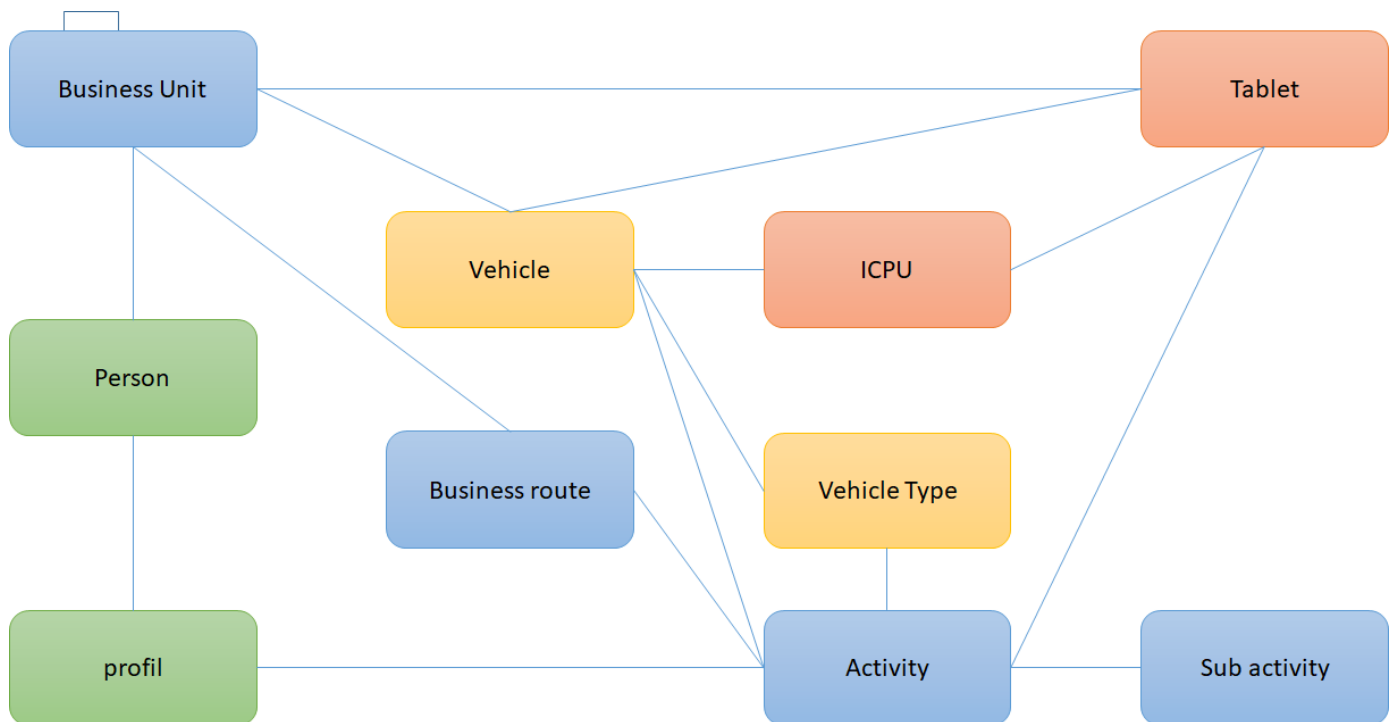


Figure 16: Links between some configurable elements of the SCOOP software

5.2 Technical requirements

ID	2.4.2.2bis-TECH-172
Component(s)	SCOOP server software
Requirement	The SCOOP server software shall, after a configurable time, disconnect the user to prevent misbehaviour including hacking.
Acceptance	
Additional information	

5.3 Functional requirements

5.3.1 Configure the Vro-ITS-S

5.3.1.1 Configure vehicles

A vehicle corresponds to a vehicle equipped with a Vro-ITS-S. It can be a car, a truck, or even a trailer.

ID	2.4.2.2bis-FUNC-173
Component(s)	SCOOP Server software
Requirement	For each vehicle, the following settings shall be changeable: <ul style="list-style-type: none"> • Registration number. • Vehicle type. • Brand/model. • CAN protocol type. • Business unit identification. • Installation type. • List of activities or tablets or ICPU.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-174
Component(s)	SCOOP Server software
Requirement	The vehicle identifier could be a park code with fleet number,
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-175
Component(s)	SCOOP Server software
Requirement	The vehicle identifier is a free short text. It shall be unique in the database.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-176
Component(s)	SCOOP Server software
Requirement	Registration number could be a park code with fleet number or the plate number and shall be unique in the database.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-177
Component(s)	SCOOP Server software
Requirement	The vehicle type shall contains a label, and a list of authorised activities.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-178
Component(s)	SCOOP Server software
Requirement	A default list of brands, models shall be set in the SCOOP server software.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-179
Component(s)	SCOOP Server software
Requirement	The CAN protocol type is a free short text.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-180
Component(s)	SCOOP Server software
Requirement	A vehicle is linked to one, and only one business unit.
Acceptance	

Additional information

ID 2.4.2.2bis-FUNC-181

Component(s) SCOOP Server software

Requirement The “installation type” shall be a choice in a list.

Acceptance

Additional information The installation type is the one authorised for installing the Vro-ITS-S in the vehicle: with tablet or not, with connected equipment...

See deliverable 2.4.2.2 for the different installation types.

ID 2.4.2.2bis-FUNC-182

Component(s) SCOOP Server software

Requirement Vehicle activity is chosen in the activities list and a vehicle can be have several activities.

Acceptance

Additional information

ID 2.4.2.2bis-FUNC-183

Component(s) SCOOP Server software

Requirement A business unit administrator [v] can create, delete or modify as many vehicles as he wants, in his business unit perimeter.

Acceptance

Additional information

ID	2.4.2.2bis-FUNC-184
Component(s)	SCOOP Server software
Requirement	A super administrator shall be able to add, modify or delete each elements in the list of the brands, models, vehicle types, and installation types.
Acceptance	
Additional information	

5.3.1.2 Configure hardware: tablets and ICPU

A tablet and an ICPU are installed in a vehicle equipped with a Vro-ITS-S.

ID	2.4.2.2bis-FUNC-185
Component(s)	SCOOP Server software
Requirement	For each touchpad tablet, at least the following settings shall be changeable: <ul style="list-style-type: none"> • Mac address as identifier. • List of activities or vehicles or business unit authorized. • Authorized software.
Acceptance	
Additional information	Mac address format is six groups of two hexadecimal digits, separated by hyphens, colons, or no separator.

ID	2.4.2.2bis-FUNC-186
Component(s)	SCOOP Server software
Requirement	For each authorized software component, at least the following setting shall be changeable: <ul style="list-style-type: none"> • Package. • Minimal version. • Actual version. • Installation file.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-187
Component(s)	SCOOP Server software
Requirement	One ICPU can be linked to several tablets and one tablet can be link to several ICPU.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-188
Component(s)	SCOOP Server software
Requirement	For each ICPU, the following element shall be changeable: <ul style="list-style-type: none"> • Serial number. • Mac address of the linked tablet. • Authorized vehicles. • Parameters of the linked vehicles, if relevant.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-189
Component(s)	SCOOP Server software
Requirement	A business unit administrator [v] can create, delete or modify as many ICPU or tablets as he wants, in his business unit perimeter.
Acceptance	
Additional information	

5.3.2 Administration of the databases

5.3.2.1 Manage business unit

ID	2.4.2.2bis-FUNC-190
Component(s)	SCOOP Server software
Requirement	A business unit can belong to another business unit.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-191
Component(s)	SCOOP Server software
Requirement	If a business unit belongs to another, then it can be moved, with or without all their components and settings, to another, or it can be released.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-192
Component(s)	SCOOP Server software
Requirement	For each business unit, the following settings shall be changeable: <ul style="list-style-type: none"> • Name. • Type . • Business unit on call phone number.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-193
Component(s)	SCOOP Server software
Requirement	A super administrator [v] can change the values of the list of business unit types.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-194
Component(s)	SCOOP Server software
Requirement	The types may not be ordered.
Acceptance	
Additional information	For example, the types can be "Department/Section/unit" for one business unit, Unit/Section/Group in a second, and in an other one "AGER/CEI/UEI" in the same company.

ID	2.4.2.2bis-FUNC-195
Component(s)	SCOOP Server software
Requirement	The phone number shall comply the international format: « +33 x xx xx xx xx » or « 00 33 x xx xx xx xx » or the national format « 0x xx xx xx xx »
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-196
Component(s)	SCOOP Server software
Requirement	A business unit administrator [v] can create, delete or modify as many business unit as he wants, in his business unit perimeter.
Acceptance	
Additional information	

5.3.2.2 Manage persons

ID	2.4.2.2bis-FUNC-197
Component(s)	SCOOP Server software
Requirement	<p>For each person, the following settings shall be changeable:</p> <ul style="list-style-type: none"> • Name/Surname. • Login. • Password. • Rights: <ul style="list-style-type: none"> ○ Super administrator. ○ Tablet administrator. ○ Business unit admin (and the business units he can manage). • Business Unit. • Profile.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-198
Component(s)	SCOOP Server software
Requirement	The Name/surname/login/password could be based on the existing system of the road operator.
Acceptance	
Additional information	<p>For example: the “CERBERE” authentication system of the Transport ministry or a existing directory ...</p> <p>Another example is to use the same database for a specific road operator software.</p>

ID	2.4.2.2bis-FUNC-199
Component(s)	SCOOP Server software
Requirement	A person is linked to one and only one business unit.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-200
Component(s)	SCOOP Server software
Requirement	A super administrator shall be able to assign the “business unit administrator” rights to another user.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-201
Component(s)	SCOOP Server software
Requirement	A business unit administrator shall be linked to business units. He grants access right to manage the data on SCOOP server software that only concerns their business units: their vehicles, their Vro-ITS-S, their users ...
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-202
Component(s)	SCOOP Server software
Requirement	The “Tablet administrator” rights allow to manage the tablets and the ICPU.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-203
Component(s)	SCOOP Server software
Requirement	A business unit administrator [v] can create, delete or modify as many persons as he wants, in his business unit perimeter.
Acceptance	
Additional information	

5.3.2.3 Configure the activities

ID	2.4.2.2bis-FUNC-204
Component(s)	SCOOP Server software
Requirement	<p>For each activity, at least the following settings shall be changeable:</p> <ul style="list-style-type: none"> • A name. • An icon. • A label (displayed text below the icon). • An indicator "Can business routes be associated to this activity?". • An indicator "authentication required?".
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-205
Component(s)	SCOOP Server software
Requirement	The name is a short free text.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-206
Component(s)	SCOOP Server software
Requirement	The icon is a mandatory small picture displayed when the user chose their activity.
Acceptance	
Additional information	<p>This icon shall be displayed to signal their own event on the map.</p> <p>If the use case is a sender use case, then the use case is associated to one icon that shall be used on the push button on the tablet and on the screen when the DENM is sent.</p>

5.3.2.4 Manage the use cases

A use case is the process related to sending or receiving data. In SCOOP1, these exchanges are based on a DENM.

Uses cases are functionally described in the deliverables 2.2, 2.4.1 and 2.4.1.2.

ID	2.4.2.2bis-FUNC-207
Component(s)	SCOOP Server software
Requirement	<p>For each use case, at least the following data shall be configurable:</p> <ul style="list-style-type: none"> • Use case name. • “In reception” or/and “In emission”. • “User” or “Operator”. • “Manual” or/and “Automatic”. • Indicator “immediate major special danger” (to display in a special popup, see 2.4.2.2_ter). • EventType. • Displayed icon and their icon label. • Button icon, for a “sender and receiver” and “manual” use case, and their icon label. • Linear event or punctual event. • Triggering conditions for an automatic use case. • If it is an exterior [xii] event or a linked [xi] event. • All the parameters set in the 2.4.2.2ter (such the distance to the event, the display distance to the event, distance to the event below which the event will not be displayed ...).
Acceptance	
Additional information	<p>For implementation reason, it is possible to split this data base, for example the “In reception use cases” and the “In emission use cases”.</p> <p>For details for the HMI parameters see 2.4.2.2ter.</p>

ID	2.4.2.2bis-FUNC-208
Component(s)	SCOOP Server software
Requirement	The use case name is a short text, and shall be unique in the database.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-209
Component(s)	SCOOP Server software
Requirement	If the use case is “in reception”, the Vro-ITS-S can display it. If the use case is “in emission”, the Vro-ITS-S can send it. Both are possible.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-210
Component(s)	SCOOP Server software
Requirement	If the Indicator “immediate major special danger” is true, the Vro-ITS-S shall display this use case in a special popup.
Acceptance	
Additional information	This concerns only use cases in reception.

ID	2.4.2.2bis-FUNC-211
Component(s)	SCOOP Server software
Requirement	The eventType shall be composed of two integer: the CauseCode, and the SubCauseCode.
Acceptance	
Additional information	The same event type can be used for different sender uses cases.

ID	2.4.2.2bis-FUNC-212
Component(s)	SCOOP Server software
Requirement	An event type shall be associated only to one receiver use case.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-213
Component(s)	SCOOP Server software
Requirement	For a “In reception” use case, the display icon is a mandatory small picture and shall be associated to an icon label.
Acceptance	
Additional information	The icon label can be displayed accordingly to the 2.4.2.2ter: below the icon in the choice list, or in the pop up...

ID	2.4.2.2bis-FUNC-214
Component(s)	SCOOP Server software
Requirement	For a “In emission” use case, the button icon: <ul style="list-style-type: none"> • Is a mandatory small picture. • Corresponds to the button to clic on to signal the use case. • Corresponds to the displayed icon on the map where the DENM is sent. • And shall be associated to a button label.
Acceptance	
Additional information	<p>This icon shall be display to signal their own event on the map.</p> <p>If the use case is a sender use case, then the use case is associated to one icon that shall be used on the push button on the tablet, and on the screen when the DENM is sent.</p>

ID	2.4.2.2bis-FUNC-215
Component(s)	SCOOP Server software
Requirement	For an “in emission” use case, the attribute “linear” or “punctual” event shall be precised.
Acceptance	
Additional information	<p>In case of a linear event, the scoop software completes the EventHistory.</p> <p>In case of a “in reception” use case, the SCOOP software uses the EventHistory presence (or not) to determinate the appropriate displaying way, and not this attribute.</p>

ID	2.4.2.2bis-FUNC-216
Component(s)	SCOOP Server software
Requirement	The triggering conditions shall be set for an automatic use case.
Acceptance	
Additional information	<p>These triggering conditions for the automatic operator and user DENM are set in the 2.4.1 and the 2.4.1.2.</p> <p>For example, in the activity “patrol”, the triggering conditions for the use case “Vehicle in intervention” (“15/0”) are (activity = patrol) AND ((automatic beacon is activated) OR (value transmitted by the “Equipment set by the road operator” [< or > or = or <>] “ref value”).</p> <p>For a manual use case, there are also basic triggering conditions such as: begin in the appropriate activity, clic on the button, ... that are not precised in this attribute.</p>

ID	2.4.2.2bis-FUNC-217
Component(s)	SCOOP Server software
Requirement	The “exterior” or “linked” event indicator shall be completed for an “in emission” use case.
Acceptance	
Additional information	<p>For an exterior event, the update is a manual, the position can change, it can be cancelled...</p> <p>For a linked event, the update is automatically linked to the position of the vehicle, traces and eventHistory are updated.</p>

ID	2.4.2.2bis-FUNC-218
Component(s)	SCOOP Server software
Requirement	Other data element values are related to the DENM, but are the same for all messages, such as ProtocolVersion, MessageID, TransmissionInterval, DefaultValidity. These data shall be configurable too.
Acceptance	
Additional information	They could be different for the futures uses cases.

ID	2.4.2.2bis-FUNC-219
Component(s)	SCOOP Server software
Requirement	A super administrator [v] shall be able to create, modify or delete use cases.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-220
Component(s)	SCOOP Server software
Requirement	A sub activity is linked to one and only one operator use case and an operator use case is linked to one and only one sub activity.
Acceptance	
Additional information	

5.3.2.5 Manage the sub activities

A sub activity is the link between the activities and the sent use cases.

ID	2.4.2.2bis-FUNC-221
Component(s)	SCOOP Server software
Requirement	At least the following settings shall be changeable: <ul style="list-style-type: none"> • Name. • Icon. • Label. • Id of the related activity. • Id of the related “in emission” use case.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-222
Component(s)	SCOOP Server software
Requirement	An activity can contain has many sub activities as necessary while sub activity is linked to one and only one activity.
Acceptance	
Additional information	See the displayable number of icon on HMI in 2.4.2.2ter for details.

ID	2.4.2.2bis-FUNC-223
Component(s)	SCOOP Server software
Requirement	A sub activity is linked to one and only one sent use case while a use case can be linked to several sub activities.
Acceptance	
Additional information	

5.3.3Vro-ITS-S Updates

ID	2.4.2.2bis-FUNC-224
Component(s)	SCOOP Server software
Requirement	A super administrator [v] can manually send to a specific SCOOP tablet software an update file.
Acceptance	
Additional information	This can be useful for local deployment for a new version.

ID	2.4.2.2bis-FUNC-225
Component(s)	SCOOP Server software
Requirement	A super administrator [v] can manually send to all the SCOOP tablet software an update file.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-226
Component(s)	SCOOP Server software, SCOOP ICPU software
Requirement	A super administrator [v] can manually send to a SCOOP ICPU software an update file.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-227
Component(s)	SCOOP Server software
Requirement	A super administrator [v] can manually send to all the ICPU tablet software an update file.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-228
Component(s)	SCOOP Server software
Requirement	A super administrator [v] can manually send to a SCOOP tablet software an update file for any software of the tablet.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-229
Component(s)	
Requirement	A super administrator [v] can manually send to all the SCOOP tablet software an update file for any software of the tablet
Acceptance	
Additional information	

5.3.4 Emergency call management

ID	2.4.2.2bis-FUNC-230
Component(s)	SCOOP Server software
Requirement	A business unit administrator shall be able to modify the local setting of an emergency call ie phone numbers.
Acceptance	
Additional information	

5.3.5 Help the user to navigate

5.3.5.1 Answer a road type request

ID	2.4.2.2bis-FUNC-231
Component(s)	SCOOP Server software, SCOOP ICPU software, basic ICPU software
Requirement	When the SCOOP ICPU software requests a road type, the SCOOP server software shall compute the road type and send it to the basic ICPU software to build the DENM.
Acceptance	
Additional information	An alternative possibility is that the SCOOP ICPU software computes the road type with local data.

5.3.5.2 Manage the business routes

A business route is the description of the path that the employee shall follow, for example, during his patrol.

ID	2.4.2.2bis-FUNC-232
Component(s)	SCOOP Server software
Requirement	For each business route, at least the following settings shall be changeable: <ul style="list-style-type: none"> • Name. • Geographical routes (a file or list of coordinates or geographical referents) • List of activities.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-233
Component(s)	SCOOP Server software
Requirement	Only the activities which business route indicator is true, shall appear in the choice list of activities.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-234
Component(s)	SCOOP Server software
Requirement	Only activities for which the business route indicator is true shall appear in the choice list of activities.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-235
Component(s)	SCOOP Server software
Requirement	Each business route shall be linked to one and only one business unit, and one business unit can have as many routes as necessary.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-236
Component(s)	SCOOP Server software
Requirement	A business route is link to one and only one geographical route, but the same geographical route can be associated to one or more business routes
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-237
Component(s)	SCOOP Server software
Requirement	A geographical route can be a “gpx” file (or another common open format).
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-238
Component(s)	SCOOP Server software
Requirement	A super administrator [v] shall be able to create or modify geographical routes.
Acceptance	
Additional information	

ID	2.4.2.2bis-FUNC-239
Component(s)	SCOOP Server software
Requirement	A super administrator [v] shall be able to import and export geographical routes from the SCOOP server software.
Acceptance	
Additional information	This is useful for road operators that have routes databases.

ID	2.4.2.2bis-FUNC-240
Component(s)	SCOOP Server software
Requirement	A super administrator [v] can create, delete or modify as many business road as he need.
Acceptance	
Additional information	

5.3.5.3 Compute an itinerary

ID	2.4.2.2bis-FUNC-241
Component(s)	SCOOP Server software
Requirement	When the SCOOP tablet software requests an itinerary computation, based on a destination, the SCOOP server software shall compute the best itinerary between the current position and the destination, and send it to the SCOOP tablet software.
Acceptance	
Additional information	An alternative is that the SCOOP ICPU software computes the itinerary. The SCOOP server software can keep in memory all the itineraries previously calculated and send an appropriate one instead of calculating again.

5.4 Support requirements

5.4.1 Respond to a Vro-IT-S request

ID	2.4.2.2bis-SUPP-242
Component(s)	SCOOP Server software, SCOOP ICPU software
Requirement	The SCOOP ICPU software or the SCOOP tablet software can request to download configuration files or database (such as person database, activities, vehicle,..) from the SCOOP server software.
Acceptance	
Additional information	Note: the “data sending” or the “download” can consist in placing the relevant data in a common repository in the SCOOP server software, or in using a web service, or other technical possibilities.

5.4.2 SCOOP server software authentication

ID	2.4.2.2bis-SUPP-243
Component(s)	SCOOP Server software
Requirement	A super administrator or a business unit administrator can access SCOOP server software.
Acceptance	
Additional information	

5.4.3 SCOOP Server software Updates

ID	2.4.2.2bis-SUPP-244
Component(s)	SCOOP Server software
Requirement	A super administrator [v] can manually update the SCOOP server software.
Acceptance	
Additional information	

5.4.4 Monitor the Vro-ITS-S

ID	2.4.2.2bis-SUPP-245
Component(s)	SCOOP Server software, basic ICPU software
Requirement	A business unit administrator can supervise all their Vro-ITS-S from the server.
Acceptance	
Additional information	This could be done by dynamic request on the supervision data on Basic ICPU software in "SNTP"

5.4.5 Manage the cartography

5.4.5.1 Configure the tiles for base map

The cartography on the SCOOP tablet software is composed of different tiles.

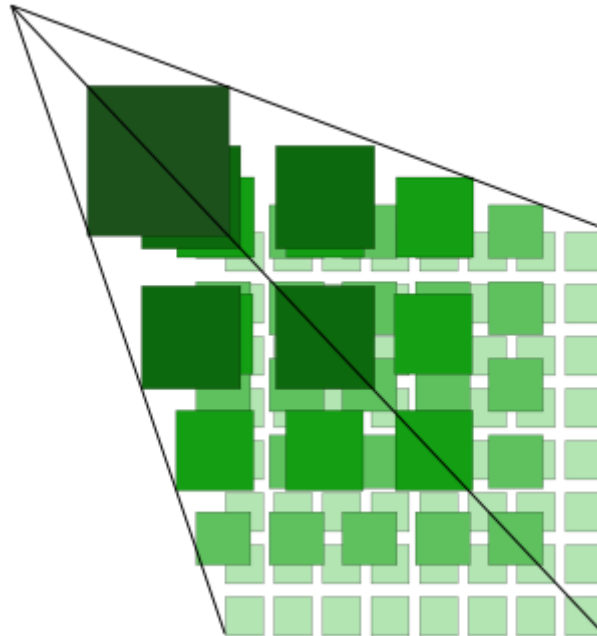


Figure 17: Illustration of tiles system

Tiles are a representation of the different zoom levels.

ID	2.4.2.2bis-SUP-246
Component(s)	SCOOP Server software
Requirement	The SCOOP server software shall manage tiles for the base map.
Acceptance	
Additional information	

ID	2.4.2.2bis-SUPP-247
Component(s)	
Requirement	A super administrator [v] shall be able to import or export tiles for base map.
Acceptance	
Additional information	The system can be based on OpenStreetMap.

ID	2.4.2.2bis-SUPP-248
Component(s)	SCOOP Server software
Requirement	When requested by the SCOOP tablet software, the SCOOP server software shall send the relevant tiles for the base map.
Acceptance	
Additional information	

5.4.5.2 Download the road network and provide enhanced maps

ID	2.4.2.2bis-SUP-249
Component(s)	SCOOP Server software, PFro
Requirement	The SCOOP server software shall download the road network from the SCOOP Platform.
Acceptance	
Additional information	This road network is not only the road operator one.

ID	2.4.2.2bis-SUP-250
Component(s)	SCOOP Server software
Requirement	The SCOOP server software shall integrate the road network into the geographical system, and provide a supplemented/enhanced cartography to the SCOOP Tablet software.
Acceptance	
Additional information	This road network is not only the road operator one.

ID	2.4.2.2bis-SUPP-251
Component(s)	SCOOP Server software
Requirement	The Vro-ITS-S shall download from SCOOP server software, an enhanced cartography in order to be accessed offline.
Acceptance	
Additional information	The download can be restrain to a relevant zone.

6 Overview of the functional exchanges

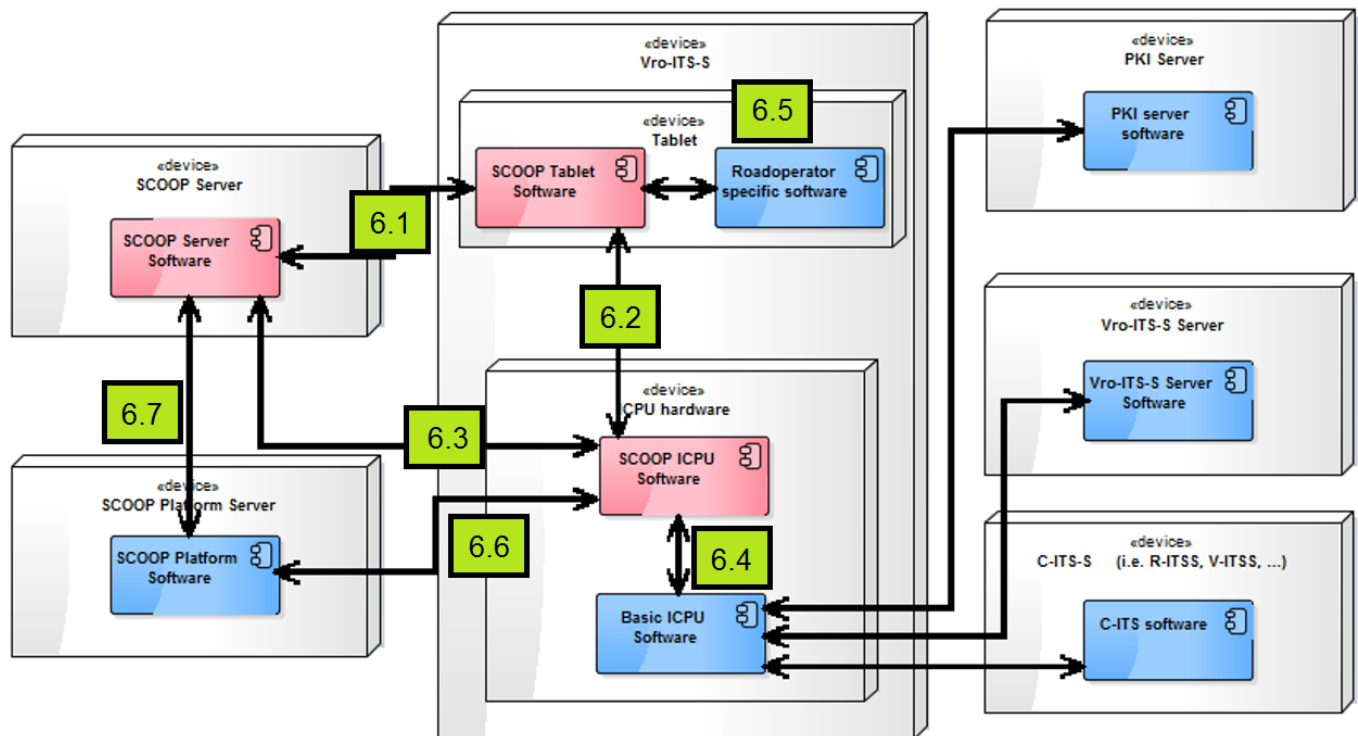


Figure 18: Chapters numbers for functional flows description

6.1 SCOOP tablet software and SCOOP server software

The SCOOP software configuration is exchanged from the SCOOP server software to the SCOOP tablet software. It includes:

- Relevant data on vehicles, tablets and ICPU.
- Personal access rights and profile.
- Activities, sub activities and uses cases.
- Relevant business routes.
- Itinerary between the current position and the destination.
- Cartographic tiles for the perimeter requested,.
- Enhanced maps.
- Business routes for the selected activity.

6.2 SCOOP tablet software and SCOOP ICPU software

From the SCOOP ICPU software to the SCOOP tablet software. It includes:

- State of the components.

| See chapter 2.3.5 for the list of components

- Current values of the specific vehicles settings.
- The list of events which can be automatically detected.

| This is a combination of the automatic use case configuration file and equipment really detected on the vehicle.

- Position, speed, vehicle heading of their own vehicle.
- GNSS time.
- Relevant data from the external [xiii] DENM.
- Relevant data from the PFro-DATEX II messages from the SCOOP platform.
- Notification when the physical SOS button is pushed.
- Status of the SOS call.
- Data of relevant secondary equipment.

From the SCOOP tablet software to the SCOOP ICPU software. It includes:

- The launch of a request.

| Note: SCOOP ICPU software answers a notification when it is ready.

- SCOOP tablet software data for TLogs, U-Logs, supervision data.

| Note: The basic ICPU will use it to build their logs, such as Tlogs or Ulogs.

- The type of the mode (user or operator or administrator),
- The stop of a request.

| Note: SCOOP ICPU software answers an immediate notification.

- SOS tablet button notification.
- Data and notification of an event manually declared.

6.3 SCOOP ICPU software and SCOOP server software

From the SCOOP ICPU software to the SCOOP server software:

- Supervision data

From the SCOOP server software to the SCOOP tablet software. It includes:

- The SCOOP software configuration
 - Relevant data on vehicles, tablet and ICPU.
 - Personal access rights and profile.
 - Activities, sub activities and uses cases.
 - Relevant business routes.
 - Itinerary between the current position and the destination.
 - Cartographic tiles for the perimeter requested.
 - Enhanced maps.
 - Business routes for the selected activity.
- SCOOP software update files, for the basic ICPU software.
- The road type for a DENM.
 - | As an answer to a SCOOP ICPU software request
- the elements of the SOS message.

6.4 SCOOP ICPU software and basic ICPU software

6.4.1 Data exchanged

From the basic ICPU software to the SCOOP ICPU software. It includes:

- Position, speed, vehicle heading of their own vehicle.
- GNSS time,.
- External [xiii] DENM.
- State of the secondary equipment.
- Notifications and messages from the SCOOP platform.
- Notification of the push of the physical button.

SCOOP ICPU software shall send to the basic ICPU software. It includes:

- Notifications and messages to the SCOOP platform.
- DENM to the C-ITS-S.
- Notification for their own automatic DENM.
- Data for logs (Tlogs, Ulogs...).
- Request to turn off the Vro-ITS-S.
- State of tablet communication.

6.4.2 SCOOP software API

As the SCOOP software and the basic ICPU software are two different components which can evolved undependably from one to another, exchanges shall be done according to a specify interface: the SCOOP software API.

See the 2.4.2.2 for details:

The SCOOP software API is composed of two types of exchanges: subscription to a service, or request.

- The subscription:
 - The first component sends a subscription to a service, and then the second component sends, to the first component, the required data each time it changes, until the first component unsubscribes.
 - e.g. for having data about each new external [xiii] DENM.
- The request:
 - The first element sends a request to the second, the second realizes the request and then answers a response.
 - Example: the SCOOP software requests the basic ICPU to send a define DENM. The basic ICPU sends the DENM, and then responds that the sending is done.

The SCOOP software API shall allow all the functional exchanges previously described in this document.

6.5 SCOOP tablet software and a specific road operator software

From the SCOOP tablet software to the specific road operator software. It includes:

- Position of the event.
- Type of event.

ID	2.4.2.2bis-EXCH-252
Component(s)	Scoop software, basic ICPU software
Requirement	A generic API shall be define to set all the relevant data exchanges
Acceptance	
Additional information	

6.6 SCOOP ICPU software and SCOOP Platform

The PFro-DATEX II messages are exchanged between these two elements.

6.7 SCOOP server software and SCOOP platform

From SCOOP platform to SCOOP server software

- The road operator road network.

7 Fail soft mode of the SCOOP software

Each problem on a Vro-ITS-S component that affects their normal behaviour implies a fail soft mode management.

ID	2.4.2.2bis-FAIL-253
Component(s)	SCOOP software
Requirement	<p>For all the problems, the Vro-ITS-S shall pass under a “fail soft mode”, it means:</p> <p>The Vro-ITS-S shall record the problem (in the relevant log).</p> <p>The Vro-ITS-S shall be under the status “an error is in progress”.</p> <p>The user shall be informed of the problem.</p>
Acceptance	
Additional information	

ID	2.4.2.2bis-FAIL-254
Component(s)	SCOOP software
Requirement	When the problems stops, the Vro-ITS-S shall make up their lacks during the problems, inform the user and then come back to their initial configuration.
Acceptance	
Additional information	

7.1 Default with the SCOOP server software connection

Description

In this case, all exchanges between SCOOP server software and the Vro-ITS-S will stop.

ID	2.4.2.2bis-FAIL-255
Component(s)	SCOOP software
Requirement	<p>In case of default with the SCOOP server software connection, the SCOOP ICPU software and the SCOOP tablet software have to delay their requests and their data sending during a configurable time.</p> <p>If the connection is re-established before this configurable time over, then the SCOOP ICPU software and the SCOOP tablet software shall kept all requests in memory, and take their exchanges up again with SCOOP server software.</p> <p>If the connection is not re-established after the configurable time, then the Vro-ITS-S pass under the “without server fail soft mode”. In this case, the SCOOP ICPU software and the SCOOP tablet software have</p> <ul style="list-style-type: none"> • To stop their requests and their sendings to SCOOP server software. • To trace the problem in the relevant files. • To stock in memory: <ul style="list-style-type: none"> ▪ the last tile download request, ▪ the last ▪ ... • To use, in case of a SOS request, the default SOS message, that do not need calculation from the SCOOP server software. <p> This implies that the SCOOP ICPU software at the last connection has recorded a business unit on call phone number.</p> <p>Once the connection is re-established, the SCOOP ICPU software and the SCOOP tablet software have to send their recorded requests and, after receiving answers, come back to the normal behaviour.</p>
Acceptance	
Additional information	

7.2 Default with the SCOOP platform connection

In this case, all exchanges between SCOOP platform and the Vro-ITS-S will stop.

But according to the 2.4.2.bis, this should be transparent for the SCOOP software, as the basic ICPU software should keep all request in memory and resent them when the connection is re-established.

ID	2.4.2.2bis-FAIL-256
Component(s)	SCOOP software, PFro
Requirement	In case of default with the SCOOP platform connection, a global indicator shall indicate to the user that the connection has a default.
Acceptance	
Additional information	The list of indicator is set in the 2.4.2.2ter.

ID	2.4.2.2bis-FAIL-257
Component(s)	SCOOP software, PFro
Requirement	In case of default with the SCOOP platform connection, the Vro-ITS-S shall continue to send the recorded platform messages during a configurable time to the other V-ITS-S.
Acceptance	
Additional information	If the connection is not re-etablised before this configurable time, only the sending of the DENM from the PFro-DATEX II messages from the platform shall be stop

ID	2.4.2.2bis-FAIL-258
Component(s)	SCOOP software
Requirement	In case of default with the SCOOP platform connection, the SCOOP software shall continue to create, if relevant, the PFro-DATEX II messages from the received DENM and to send it to the basic ICPU.
Acceptance	
Additional information	When the connection is re-etablised, the basic ICPU should request a PFro-DATEX II snapshot to the platform.

7.3 Default with the G5 connection

ID	2.4.2.2bis-FAIL-259
Component(s)	SCOOP tablet software, basic ICPU software
Requirement	If basic ICPU software informs SCOOP software of the impossibility to send messages on the G5 connection, then the SCOOP tablet software shall inform the user when he sends a manual message.
Acceptance	
Additional information	The Basic ICPU keeps the data and send it when the connection is re-established.

7.4 Default with the GNSS

In this case, the position of the vehicle and of their DENM could not be relevant.

ID	2.4.2.2bis-FAIL-260
Component(s)	SCOOP software
Requirement	After a configurable time without GNSS position, when the user sends a manual DENM, the SCOOP software shall ask him to position manually the event.
Acceptance	
Additional information	<p>The default configurable time is 1 minute.</p> <p>In this case, as set in the 2.4.2.2ter, the SCOOP software should not place the vehicle on the base map. (or place it in a different way)</p>

7.5 Default with the CAN bus connection

In this case, the automatic user DENM will not be detected.

ID	2.4.2.2bis-FAIL-261
Component(s)	SCOOP tablet software
Requirement	In case of default with the CAN, an indicator shall indicate to the user that the connection has a default.
Acceptance	
Additional information	This requirement only concerns a Vro-ITS-S with a CAN bus connection.

ID	2.4.2.2bis-FAIL-262
Component(s)	SCOOP software
Requirement	In case of default with the CAN, the user shall be allowed to send manually the automatic operator DENM linked to the CAN bus
Acceptance	
Additional information	This requirement only concerns a Vro-ITS-S with a CAN bus connection.

7.6 Default with the secondary equipment connection

In this case, the automatic operator DENM will not be detected.

ID	2.4.2.2bis-FAIL-263
Component(s)	SCOOP tablet software
Requirement	In case of default with the equipment, an indicator shall indicate to the user that the connection has a default.
Acceptance	
Additional information	This requirement only concerns a Vro-ITS-S with a equipment connection.

ID	2.4.2.2bis-FAIL-264
Component(s)	SCOOP software
Requirement	In case of default with the equipment, the corresponding operator DENM, according to his operator profile, shall be available manually.
Acceptance	
Additional information	

7.7 Default between tablet and ICPU

ID	2.4.2.2bis-FAIL-265
Component(s)	SCOOP tablet software
Requirement	In case of default between tablet and ICPU, an indicator shall indicate to the user that the connection has a default.
Acceptance	
Additional information	

ID	2.4.2.2bis-FAIL-266
Component(s)	SCOOP software
Requirement	In case of default between tablet and ICPU, the user shall not be able to send any message.
Acceptance	
Additional information	