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IEGULDĪJUMS TAVĀ NĀKOTNĒ

ABS + ARCHITECTURE DESCRIPTION AND IMPLEMENTATION PLAN

STATE FIRE AND RESCUE SERVICE

ASSESSMENT OF EARLY WARNING SOLUTIONS, DEVELOPMENT OF ABS + ARCHITECTURE AND TECHNICAL SPECIFICATIONS

VERSION 1.0

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RIGA

This document was developed by Corporate Consulting ("Performer") in accordance with the requirements of the agreement "Study on Early Warning Systems Based on Telecommunications Technologies, ECHO/SUB/2019/TRACK1/808194".

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Changes

Date	Version	Description
13.11.2020	0.1	Original version (draft) of the document submitted to the Customer for Harmonization
07.12.2020.	0.4	Version (draft) of the document supplemented with the implementation section submitted to the Customer for Harmonization
22.12.2020	1.0	The final version of the document, corrected according to the Customer's comments

CONTENT

1 Introduction

1.1 Context

Based on the order from the State Fire and Rescue Service Republic of Latvia (hereinafter "SFRS"), the "Corporate Consulting" within project of the European Commission Civil Protection Mechanism "Study on Early Warning Systems Based on Telecommunications Technologies, ECHO/SUB/2019/TRACK1/808194" carries out a feasibility study on most appropriate early warning solution for Latvia using mobile operator services (hereinafter - ABS +), which includes an evaluation of three public warning technological solutions (cell broadcasting, location-based SMS, mobile application) and the necessary development of operational processes, research, analysis and technical documentation for ABS + establishment (hereinafter - Project).

Article 110 of Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 on the establishment of the European Electronic Communications Code states that "By 21 June 2022, Member States shall ensure that, when public warning systems regarding imminent or developing major emergencies and disasters are in place, public warnings are transmitted by providers of mobile number-based interpersonal communications services to the end-users concerned".

The Public Warning System (PWS) is a system (set of procedures and solutions) through which public authorities can warn the public to imminent or imminent emergencies and disasters through various notification channels, including: mobile devices for the population, web solutions (social networks, etc.), radio, television, sirens, specialized public address systems, etc.

In compliance with the requirements of the Directive, an information system "Early Warning System plus" or ABS + is being developed in Latvia, which is intended for warning the public, both by identifying and assessing the impact of a potential or existing emergency event on the public and preventing its impact.

The project is intended to offer solutions and prepare a procurement specification for procurement, which includes the public warning functionality ABS +.

This document includes the results of the following tasks of the Project:

- 3.2. Analysis of identified ABS + solutions infrastructures and technical solutions, preparation of available ABS + technical descriptions;
- 3.3. ABS + data processing analysis;
- 4.1. Identify key implementation outcome indicators;
- 4.2. Developing the implementation (management) model for ABS +;
- 4.3. Define ABS + deployment activities;

- 4.4. To carry out an indicative calculation of the implementation and maintenance costs of ABS +;
- 4.5. Carry out an ABS + implementation risk analysis and prepare a risk management plan;
- 4.6. Developing an ABS + implementation model, defining in what order user training is organized in stages;
- 4.7. Prepare other information relevant to the setting and subsequent implementation of ABS + requirements, which will be specified during interviews.

The document is structured as a description of the architecture of the information system according to industry standards and guidelines[1] (including business processes, software, data, infrastructure and regulatory viewpoints).

1.2 Purpose and audience of the document

Objectives of the document:

- To determine the basic principles and conceptual solutions of the ABS + structure and development of the information system to be developed;
- Define possible solutions and provide the necessary information to the Customer in making relevant decisions;
- To serve as a basis for the development of technical specifications for ABS + procurement.

Part of the architecture description will be included in the ABS + Procurement Technical Specification Document (System Review, Principles for Creation, etc.).

Document Audience:

- SFRS as ABS + manager;
- The Information Centre of the Ministry of the Interior (MoI IC) as ABS + owner;
- Ministry of Interior as an industry policy planner;
- Other national regulatory authorities which may initiate public warning.

1.3 Assumptions and limitations

1. The description of the solutions contained in the document is reflected in accordance with the information available and the decisions taken when the document is drawn up. They may be specified and supplemented in the future of the Project.

[1]ISO/IEC/IEEE 42010: 2011. Systems and software engineering — Architecture description (https://www.iso.org/obp/ui/#iso:std:iso-iec-ieee: 42010: ed-1: v 1: en)

2. The document reflects the views and recommendations of consultants.

1.4 Terms and abbreviations

Table 1. Terms and abbreviations

Term, abbreviation	Explanation
ABS +	"Early warning system plus" (*latvian - "Agrīnās brīdināšanas sistēma plus"*). Information system ensuring public warnings in Latvia
Emergency situation	An event in which the public needs emergency assistance from the state (operational services). Emergency events may vary in impact on the general public. In the event of an emergency event with a significant impact on public safety, the State warns the public about the emergency event and the necessary action.
Warning	Information on the emergency event and the necessary action
CAP	Common Alerting Protocol
CPDML	Civil Protection and Disaster Management Law CPDML
CB	Cell Broadcasting (English-*Cell broadcast*)
CBC	*Cell Broadcast Center*. Part of the PWS solution integrated with mobile operator mobile communications equipment providing warning messages
CBE	*Cell Broadcast Entity*. Part of the PWS solution enabling dispatchers to prepare warning messages and initiate their transmission
Directive	Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code
ECM	Electronic Communications Merchant
ETSI	European Telecommunications Standards Institute
MoI	Ministry of the Interior
MoI IC	The Information Centre of the Ministry of the Interior
LB-SMS	Location-based text message (English - *Location-based SMS*)
LEGMC	State limited Liability Company "Latvian Environment, Geology and Meteorology Centre"
MBS	Mobile base station
Regulation No. 440	Republic of Latvia Cabinet Regulation No. 440 Adopted 8 August 2017 "Procedures for Establishing, Operating and Financing the National Early Warning System"

Term, abbreviation	Explanation
MNO	Mobile network operator
OMD	Operational Management Division of SFRS
PMECN	Public mobile electronic communications network
Project	Scope of the "Study on Early Warning Systems Based on Telecommunications Technologies, ECHO/SUB/2019/TRACK1/808194"
PWS	Public warning system. A set of procedures and solutions enabling public authorities to warn the public to direct or threatening emergency situations and disasters through a variety of communication channels, including mobile facilities, web solutions (social networks, etc.), radio, television, sirens, specialized communication equipment, etc.
System	Public warning system ABS +
SLA	Service Level Agreement, Service Quality Indicators agreed by the Parties before the service is provided/received
SASL	State Administration Structure Law
SFRS, Customer	State Fire and Rescue Service

1.5 Relation with other documents

Table 2. Relation with other documents

No.	Document Name
[1.]	Evaluation of ABS + technological solutions. Version 1.0, 15.10.2020

2 System Objectives and General Architecture

2.1 Objectives

Objectives of setting up the public warning system ABS +:

- To set up a system that uses the infrastructure of mobile operators to notify and alert the public on their mobile phones (in the future it might be possible to add other notification channels (web solutions, radio, television, sirens, specialized notification equipment, but this is not the current goal of ABS + system).

The implementation of ABS + is planned to be conducted in in several phases:

- Phase 1 - provide public warning through mobile communication equipment based on cell broadcasting technology (ensuring compliance with the requirements of the Directive)
- In the next project phases[2]: providing additional functionality (use of other warning channels, threat identification and notification support, integration with other warning systems, etc.).

2.2 Result and outcome indicators

The following project result indicators are defined according to the objectives of the ABS + establishment project:

1. Warning messages about emergency events, disasters and disaster threats are sent to the public on mobile phones.

The project foresees the following outcome indicators:

1. The national regulatory framework must determine the responsibilities and procedures for the transmission of warning messages.
2. The public warning system ABS + is integrated with the MNO for the transmission of warning messages to end-user mobile devices;
3. The production of the public warning system ABS +;

[2]ABS + future development planning is outside the scope of this work and is not reflected in this document.

2.3 General architecture

The overall architecture of the ABS + solution to be created is shown Figure 1.

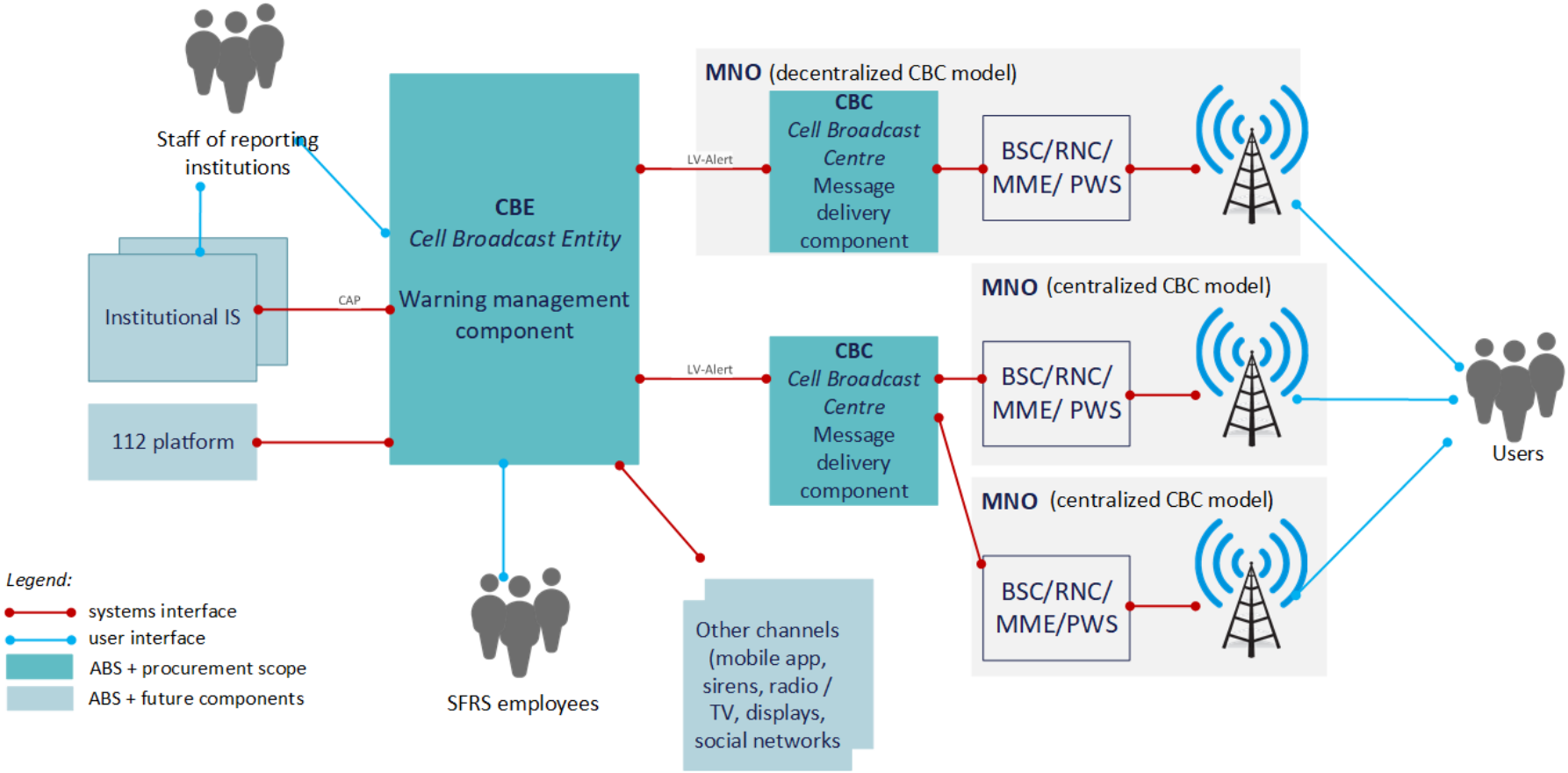


Figure 1. General ABS + architecture

The technical solutions for cell broadcasting are generally defined by a series of standards (for each generation of mobile communications) approved by 3GPP (*3rd Generation Partnership Project*):

- 2G CBC (BSC) - TS 48.049
- 3G CBC (RNC) - SET AT 25.419.
- 4G CBC (MME) - TS 29.168.
- 5G CBC (AMF) - TS 29.518.

The CBC-CBE interface is not standardized.

The message content is standardized by the CAP (*Common Alerting Protocol*) approved by OASIS[3]. On this basis, each country forming a national PWS adds specific elements to it by defining national standards. (e.g., AU-Alert, NL-Alert, LT-Alert).

The ABS + solution consists of the following main parts:

- **CBC (Cell Broadcast Center)** - the part of an PWS solution integrated with MNO mobile communications equipment that provides warning messages;
- **CBE (Cell Broadcast Entity)** - Part of the PWS solution that enables SFRS dispatchers or other authorized users to prepare, confirm warning messages, send messages, monitor the status/results of sending messages, etc.

As shown in Figure 1, there are 2 options for deploying the CBC component:

- The decentralized CBC – CBC component is deployed in the MNO infrastructure that ensures its operation;
- Centralized CBC – CBC is located outside the MNO infrastructure, operated by either the State or a third party.

2.4 Basic principles

ABS + shall be established on the basis of the following principles (ABS + development guidelines) which reflect the decisions taken and serve as the basis for the following solutions:

P1: Using Cell Broadcast

Public warning using mobile communication equipment is developed primarily using cell *Broadcast* technology in Latvia.

[3] https://www.oasis-open.org/

P2: Single procurement for CBE and CBC

Both the waring message preparation component (CBE) and the warning message transmission component (CBC) are purchased as a single/integrated solution, avoiding the risks of CBE-CBC integration.

P3: Delivery of warning messages using multiple channels

The public warning solution is designed with the possibility to connect other delivery channels in the future, such as sirens, mobile applications, social communication options, etc.

Creating other channels is outside the scope of the ABS + purchase. The possibility of future extensions of ABS + should be envisaged in the ABS + procurement.

P4: Integration with other information systems

When creating ABS +, it should be possible for other reporting authorities to prepare messages in the ABS + solution, as well as to send messages from their systems to ABS +.

For this purpose, an Application Programming Interface (API) should be provided to ensure the integration of other authorities' information systems and ABS +.

P5: ABS + not used only in case of exceptional events

Potentially ABS + should be used not only in exceptional cases but also in other situations of public interest (e.g., for the search of missing children).

P6: ABS + manager - SFRS, ABS + owner - Information Centre of the Ministry of Interior

The following roles are identified in relation to the creation of ABS +:

- SFRS — ABS + manager (ABS + customer):
  - define the requirements of ABS +, participate in the implementation of the system, accept the project deliverables and System implementation as a whole;
  - directing the necessary legislative amendments, justifying the need for ABS +;
  - directing national cooperation with MNO regarding the implementation of ABS +, determining the SLA indicators expected from the MNO;
  - planning ABS + functional development, adding new notification channels to ABS +;
  - the preparation, approval and sending of public warning messages by the ABS + user;

- authorizes the rights to ABS + users;
- ensures attraction of funding for the development, deployment and operation of ABS +.

- Information Centre of the Ministry of Interior - ABS + owner:
  - Responsible for ABS + funding process management and project implementation documentation;
  - conduct ABS + procurement, sign contracts with Suppliers regarding implementation and maintenance of ABS +;
  - manage the ABS + project, coordinate the involvement of the parties (MNO, ABS + supplier, SFRS, etc.);
  - Provide the necessary infrastructure for running ABS +;
  - Provide CBE/CBC connections to MNO networks;
  - Monitors the fulfillment of MNO services according to SLA;
  - Ensure that ABS + is up and running (administration, monitoring, etc.);
  - Planning technical development of ABS +, architecture of integration with other warning systems.

2.5 Open issues

In the context of the implementation of ABS +, significant unsolved issues have been identified, depending on the requirements to be included in the ABS + procurement, as well as the ABS + implementation approach and action.

- **A1: ABS + CBC architecture**
  - Centralized;
  - Decentralized.
- **A2: ABS + element provisioning model**
  - purchase of software licenses, accommodation on the Customer's[4] Infrastructure;
  - software lease, accommodation on the Customer's [4] infrastructure;
  - SaaS or software as a service on Supplier's [4] infrastructure;
  - full outsourcing of public functions.
- **A3: Model of cooperation with MNO**

[4]This is where the customer and Supplier understand the division of roles in the context of ABS + procurement: ABS + customer and ABS + vendor.

- Procurement agreements - an agreement signed as a result of the procurement of public warning messaging services on mobile devices, in which the parties agree on cooperation and obligations regarding sending CB messages to the public. An agreement for the provision of public warning services must be concluded with each MNO also specifying the SLA;
- Delegation of State tasks: The regulatory act establishes an obligation and it delegates the task to the MNO's ensuring the sending of CB messages to the public. A delegation agreement is concluded with each MNO, which also includes the SLA.

The issues mentioned above require a decision by the responsible authorities.

During the development of the ABS + architecture, the mentioned issues and alternatives for the implementation of the ABS + solution were discussed and evaluated with the Ministry of the Interior as a sector policy maker and MNO. No specific decisions have been made at the time of writing this document.

The following section sets out these open issues, possible alternatives to solutions, and their assessment.

2.5.1 A1: CBC architecture

As mentioned above, the following options are possible, depending on where the CBC component is located (see Figure 2):

- centralized CBC;
- decentralized CBC.

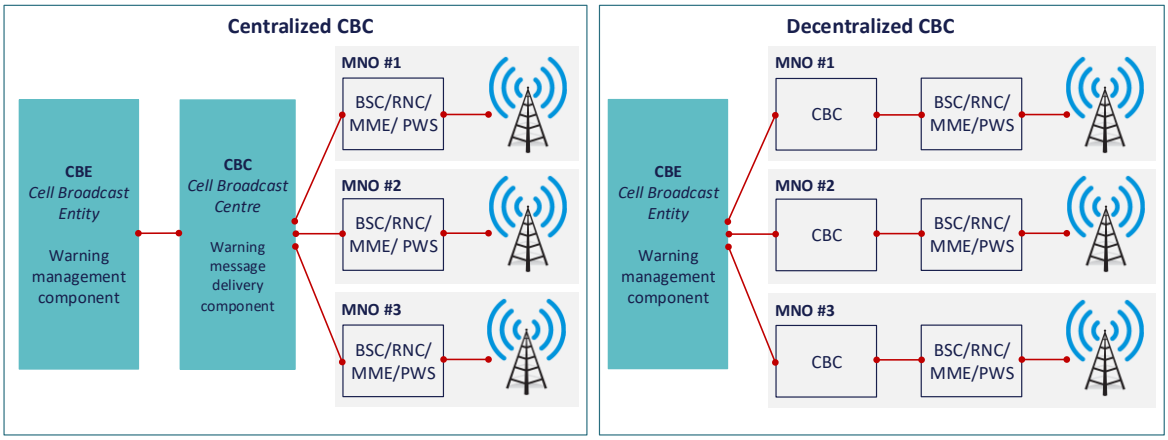


Figure 2. CBC architectural variants.

A: Centralized CBC

This option describes the following:

- The CBC is installed in the Customer's (States) infrastructure;

- Installation and operation of the CBC in the Customer infrastructure shall be provided by the Supplier;
- The MNO should provide access to its communication infrastructure (IP addresses, passwords, configurations) in order to be able to connect to the CBC.

B: Decentralized CBC

This option describes the following:

- The CBC is installed on the MNO infrastructure (MNO must provide it);
- The installation and operation of the CBC on the MNO infrastructure shall be provided by the Supplier;
- CBC operation (based on SLA) is provided by MNO.

Common features

In both cases:

- MNO provides a CB transmission capability in its communication infrastructure according to the specified SLA (additional equipment, licensing, etc. may be required)
- MNO provides to CBE information about their towers, their status (preferably in the form of API)
- MNO provides the transmission of CB messages received from CBE/CBC.

Cost comparison

Table 3 provides an overview of the costs of CBC centralized and decentralized models, based on the prices provided by 4 manufacturers of public warning systems solutions. According to the summary of potential costs, **the centralized model is more cost-effective**, with an average of €880 000 less investments needed over a period of 5 years. Both software and infrastructure costs increase if implementing CBC at each MNO.

Table 3. Comparison of costs of centralised CBC and decentralised CBC ABS + solution models, including EUR VAT.

Cost position	*Centralized CBC Model*			*Decentralized CBC Model*			Notes
	Lowest price	Highest price	Average price	Lowest price	Highest price	Average price	
ABS + implementation	2,396,000	4,740,000	3,705,500	2,416,000	5,743,000	4,338,000	
Purchase of CBE software	590,000	775,000	613,000	590,000	775,000	611,500	
Purchase of CBC Software	1,000,000	2,337,000	1,668,500	1,000,000	2,840,000	1,920,000	
CBE + CBC infrastructure (virtual resources)	180,000	220,000	200,000	200,000	430,000	315,000	
Implementation of CBE + CBC (installation, integration, training)	626,000	1,873,000	1,224,000	626,000	2,378,000	1,491,500	
ABS + maintenance, annual	321,000	730,000	525,500	321,000	830,000	575,500	
CBE software maintenance	81,000	200,000	140,500	81,000	200,000	140,500	
CBC software maintenance	180,000	470,000	325,000	180,000	570,000	375,000	
Maintenance of CBE + CBC infrastructure	60,000	60,000	60,000	60,000	60,000	60,000	Provided by MoI IC
ABS + maintenance for 5 years	1,605,000	3,650,000	2,627,500	1,605,000	4,150,000	2,877,500	
Implementation and maintenance of ABS + for 5 years	4,001,000	8,390,000	6,333,000	4,021,000	9,893,000	7,215,500	

Assessment of the architectural options

Table 4 provides a comparison of the two options in terms of their complexity, burden on MNO's, responsibilities, security aspects, costs and other aspects.

Table 4. Comparison of the architectural options of the CBC.

Aspect		Centralized CBC		Decentralized CBC
Complexity of creating	+	Relatively simpler solution (single CBC installation)	-	A relatively more sophisticated solution (three CBC installations)
Determination of passive geolocation of the population	-	Deployment of geolocation functionality is difficult	+	Introducing geolocation functionality is simple
Burden on MNO	+	Less burden/costs per MNO	-	Increased burden/costs on MNO
Security	+	Risks lower for the country and MNO because the country has full control of the solution, MNO networks do not have a component outside their control (CBC)	-	Risks higher for the country and MNO because the country does not have full control of the solution, MNO networks have components outside their control (CBC)
Costs	+	Costs less because 1 CBC component.	-	Costs are higher because 3 CBC components.
Other aspects	-	MNO less controls CBC connection RAN	+	MNO itself controls CBC connection to RAN

As follows from the comparison given in Table 4, **it is recommended that centralized CBC architecture is selected for ABS +**.

2.5.2 A2: Models for providing elements of the solution

The following approaches are available in relation to the provision of elements of the ABS + solution:

A: Purchase of software, installation on the Customer's infrastructure

In this case, software is purchased as part of the procurement (so-called permanent or *perpetual* license). It is installed and operated on the Customer's infrastructure.

The Customer ensures the operation and administration of the system.

When a software license is purchased, a certain amount is usually paid immediately and these costs are listed as investments (so called investments) CAPEX.

In terms of costs, this scenario is the most cost-effective, due to:

- the perpetual license price is 20-50% lower than the software lease. The Supplier of the software receives payment immediately and the State does not have to compensate for the Supplier's risks (cash flow, inflation, resource-intensive communication with the customer, etc.);
- installation in partly existing infrastructure reduces the necessary investment in infrastructure and for the preparation of the network;
- State costs for the maintenance of infrastructure are lower than the prices offered by commercial Suppliers (assuming that the safety requirements are met) because commercial service providers also include a profit margin in their prices.

B: Lease of software, installation on the Customer's infrastructure

As in the previously described model, the software is installed on the Customer's infrastructure, but there is a different type of license: the right to use the software is granted for a limited period of time (e.g., 5 years). In the case of software lease, regular annual payments are made. That is usually more convenient from the point of view of cash flow planning, but in terms of total costs, the lease costs are 20-50% more expensive than the purchase of a permanent license.

These costs are listed as maintenance costs (OPEX).

C: SaaS or software as a service installed on Supplier's infrastructure

In this case, the subject of the procurement is a software service provided by the Supplier on its infrastructure in accordance with the defined SLA conditions.

For security and accessibility purposes, software may be required to be installed in data centres in Latvia.

Unlike scenario D, the State is the enforcer of the public warning function, SFRS is the system manager.

As in option B, the SaaS option includes regular payments, which are listed as maintenance costs (OPEX).

D: Full outsourcing of public function

This option is similar to option C, but the subject of the procurement is the provision of a public administration function in general (providing public warning through mobile devices), which also includes cooperation with MNO etc., responsibility/risk taking. In this scenario, the role of the system manager and the system owner goes to the Supplier of the function.

Such contracts may also be used in the form of a public-private partnership in accordance with the relevant framework and implementation guidelines.

Cost comparison

Table 5 summarizes the costs of implementing the centralized CBC model for these four implementation alternatives:

- purchase of software licenses, installation on MoI IC infrastructure (Table 5 - *Perpetual license*);
- software lease, installation on MoI IC infrastructure (Table 5- SW lease);
- SaaS or software as a service on the ABS + Supplier's infrastructure (Table 5 - SaaS);
- full outsourcing of public function (100% outsourcing in Table 5).

The cost estimate is based on the prices provided by 4 manufacturers of public warning systems solutions. Average prices have been taken for transparency and comparability.

In the case of decentralized CBC, costs could vary.

Table 5. Comparison of ABS + implementation alternatives, including EUR VAT.

Cost position	Perpetual License	SW Lease	SaaS	100% outsourcing
ABS + deployment	**3,702,496**	**1,260,000**	**4,815,000.00**	**not known**
Purchase of CBE software	611,050			
Purchase of CBC software	1,667,531			
Implementation of CBE + CBC software	1,223,915	1,060,333		
CBE + CBC Infrastructure	200,000	200,000		
ABS + maintenance, annual	**525,500**	**1,081,000**	**685,000**	**not known**
CBE + CBC Software Maintenance (perpetual license)	465,500			
CBE + CBC Software Lease		1,021,000		
Maintenance of CBE + CBC infrastructure	60,000	60,000		
ABS + maintenance for 5 years	**2,627,500**	**5,405,000**	**3,425,000**	
Implementation and maintenance of ABS + for 5 years	**6,329,996**	**6,665,000**	**8,240,000**	

As a result of the cost estimate presented in Table 5, **the purchase of perpetual software licenses and installation on the MoI IC infrastructure is the most cost-effective scenario**.

Evaluation of alternatives

Table 6. Comparison of alternatives for providing elements of the solution.

Aspect		Perpetual License		SW Lease		SaaS		100% outsourcing
Burden on the customer	-	When hosting and operating a solution on the Customer's infrastructure (MoI IC), the Customer shall assume responsibility for operating and administrating the system (including accessibility). For this purpose, the Customer must ensure the competence and capacity of the relevant staff.	-	Analogous to the variant of the perpetual license.	+	All responsibility and risks for operating the system shall be borne by the Supplier	+	This option is similar to the SaaS option, only the full responsibility and risks (including the organization of cooperation with MNO) are borne by the Supplier, which formally creates the least burden on the Customer.
Costs	+	The lowest cost, because ▪ the price of a perpetual license is significantly lower than the software lease. ▪ installation on partly existing infrastructure reduces the necessary investment in infrastructure and for the preparation of the network;	-	The second cheapest option, since only license fees (+20-50% compared to the perpetual license) will be more expensive.	-	The third cheapest option, since the use of infrastructure will also be more expensive in addition to the lease of license.	-	The costs may be proportional to option C, since the MNO (if they are delegated) will include all investments, maintenance, depreciation and risk margins in the cost calculation.

Aspect		Perpetual License		SW Lease		SaaS		100% outsourcing
		▪ State costs for maintaining infrastructure are lower than the open market costs, as commercial service providers include profit margin.						
Security	+	ABS + is a critical system, it is important to minimize the risks associated with Suppliers (outside the customer's control)	-	Relying on an external Supplier that can be a potential threat	-	Relying on an external Supplier that can be a potential threat	-	Potential risk of integrity (spoofing/faking messages)

As follows from the comparison of models presented in the Table 6, **it is recommended that ABS + is purchased a permanent software license and it should be installed on the MoI IC infrastructure**.

2.5.3 A3: Model of cooperation with MNO

As the transmission of warning messages will be provided by the MNO, close cooperation between the MNO and the responsible national authorities (SFRS, MoI IC) is essential for the successful implementation of ABS +.

The MNO obligation to provide public warning through CB is to be determined by the regulatory framework (Electronic Communications Law; Civil Protection and Disaster Management Law; Cabinet of Ministers Regulation No. 440 "Procedures for Establishing, Operating and Financing the National Early Warning System"). Cooperation with specific MNO can be organized in two ways:

- **procurement contracts** with MNO for the provision of public warning services via CB;
- **delegation of tasks of public administration** to ensure public warnings through CB, through delegation agreements with each MNO.

A: Procurement contracts with MNO

In this case, the procedure for fulfilling the obligation of each MNO to provide public warnings through the CB is strengthened by a procurement contract between the State (MoI IC) and the MNO.

Such contract could be concluded in the framework of a negotiated procedure (with each MNO separately), which would cover all aspects of this cooperation - MNO services/obligations, SLA, fees, cooperation with the parties involved in MoI IC, SFRS, etc.

Since the conclusion of such contracts could take a relatively high amount of time and their content depends to a large extent on the specific selected ABS + supplier and solution, it would be appropriate, in order to ensure the successful preparation and realization of ABS + procurement, to enter into a pre-agreement with the MNO, which would lay down the conditions for overall cooperation, before the ABS + procurement.

B: Delegation of tasks from public administration

Public warning through CB is considered as a task delegated from public administration in accordance with State Administration Structure Law (hereinafter - SASL).

According to the SASL, the tasks of public administration may be delegated to a private individual by an external legislative act or contract (also by applying a public-private partnership approach).

In this variant, both the delegating tasks and its conditions (including payments) must be primarily established in an external regulatory enactment.

In both cases, a successful implementation of ABS + would require amendments/additions to the regulatory framework.

Evaluation of cooperation models

In order to decide on the most appropriate cooperation model, the consultants propose to use the following decision-making criteria:

- Complexity of legislative amendments: the complexity and content of the amendments;
- Deadline for introduction - the deadline required for the introduction of both models, ranging from the submission of an information report by the Ministry of Interior to contracts with MNO.
- Consistency with the interests of the parties – to what extent the interests/requirements of both the State and the MNO have been taken into account.

Table 7. Comparison of MNO cooperation models.

Aspect		Procurement agreements with MNO		Delegation of tasks of public administration
Legislative amendments	+	The legislative amendments are simpler	-	Legislative amendments could be more complicated because through them the State actually imposes additional obligations on MNO, which could lead to a discussion on the proportionality and legitimate expectations of such rules.
Time of introduction	-	This could be longer than in the delegation option because it requires complicated negotiating procedures with three participants	+	Given that the duration of the amendment of legislation is the same, the negotiated procedure does not exist in this option, the timing of the implementation could therefore be faster.
Compliance with the interests of the parties (MNO and national)	+	The agreement is the result of negotiations between the parties, which would take into account the interests of both parties.	-	There is a risk that delegation contract may undermine the interest of the MNO and their readiness to provide the services in question.

As an optimal solution, the consultants recommend **the delegation of tasks of public administration** as the optimal solution, but involving and taking into account the interests and requirements of the MNO.

3 Description of the System's solutions

3.1 Business Process

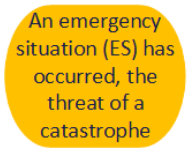
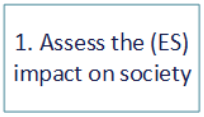
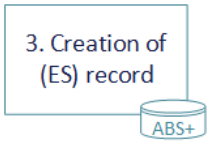
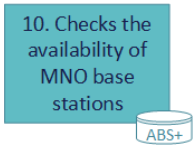
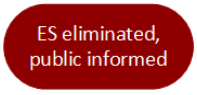
The public warning process shall be based on the following principles:

1. Cell broadcasting functionality is enabled on end-user mobile devices.
2. Roaming subscribers (foreign MNO subscribers), when entering Latvia, are informed that in emergency events the public warning is carried out via cell broadcasting and that it is necessary to make sure that cell broadcasting function is enabled on their mobile phones.

When referring to the Directive, the public warning process aims to ensure public warning in emergency events by sending CB messages to mobile devices.

The framework for the public warning process is shown in Figure 3. The process schema notation is provided in the Table 8.

Table 8. Process schema notation

	Designation	Explanation
1		Process initiation, Trigger
2		Manual action
3		Action performed by the user in a specified system
4		Action taken automatically by the system
5		The decision
6		End of process, result

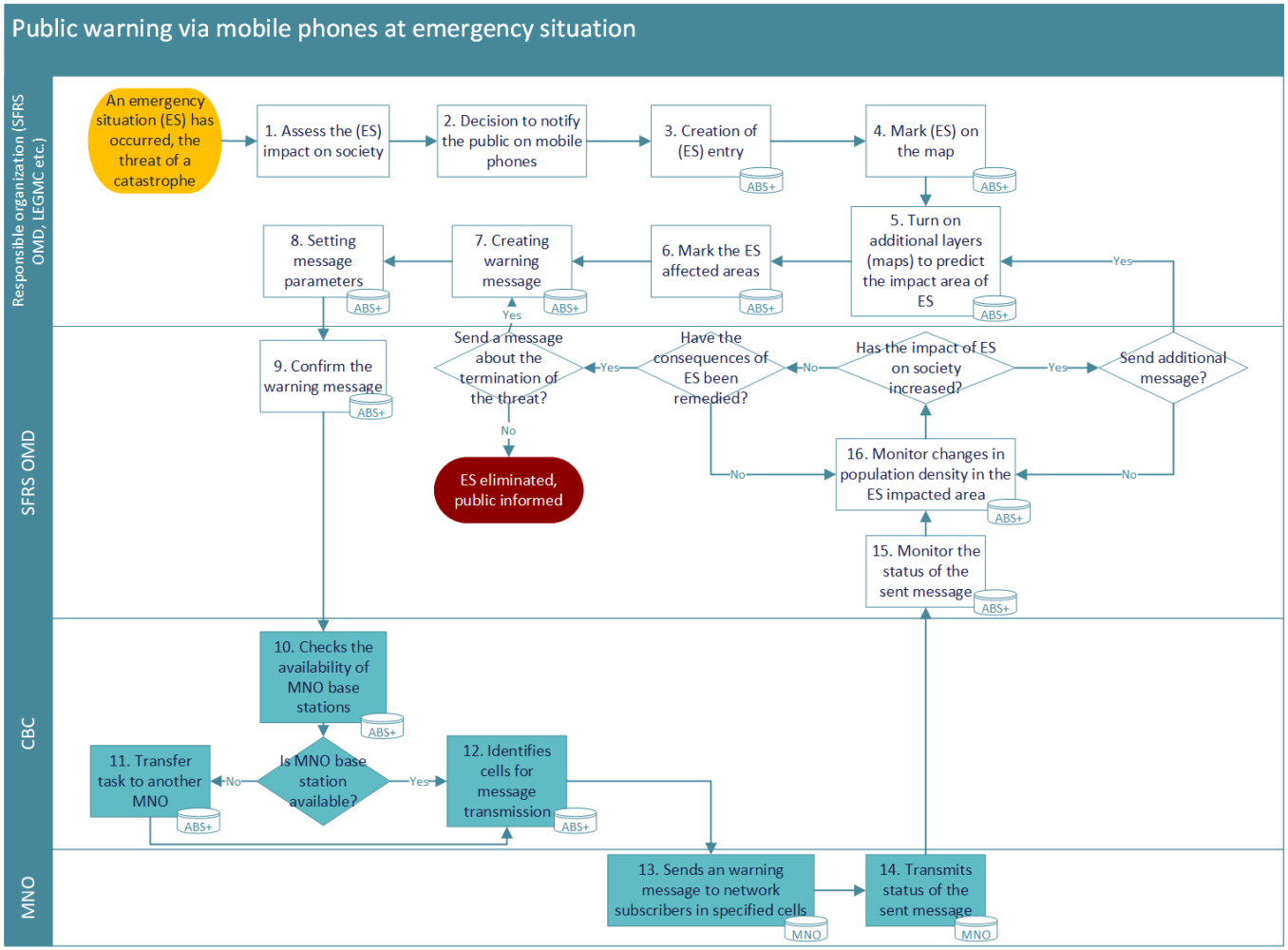


Figure 3. Framework for the public warning process

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Process description

No.	Phase	Phase Description	Performer	Information system
	Emergency situation (ES), threat of a catastrophe	A member of the appropriate authority shall identify or receive a message regarding an emergency situation or threat of catastrophe.	Responsible Authority (SFRS OMD, LEGMC, etc.)	-
1	Assess the (ES) impact on society	On the basis of the information received, the OMD dispatcher shall assess the potential impact of the emergency situation on public.	Responsible Authority (SFRS OMD, LEGMC, etc.)	-
2	Decision to notify the public on mobile phones	The OMD dispatcher makes a decision on the need to send a warning message to mobile phones.	Responsible Authority (SFRS OMD, LEGMC, etc.)	-
3	Creation of (ES) entry	The OMD dispatcher trough ABS + creates an event entry followed by one or more messages. Events can be selected from the predefined list (event types). When selecting an event from the list, the System provides a warning message template that can be specified for each situation.	Responsible Authority (SFRS OMD, LEGMC, etc.)	ABS + CBE
4	Mark (ES) on the map	The OMD dispatcher finds the location of the emergency situation on the map (for example, by address, by location name, by coordinates), and marks the location of the emergency situation.	Responsible Authority (SFRS OMD, LEGMC, etc.)	ABS + CBE

No.	Phase	Phase Description	Performer	Information system
5	Turn on additional layers (maps) to predict the impact area of ES	Depending on the type of emergency event, the OMD dispatcher can turn on additional layers on the map to perform an impact assessment (weather conditions (temperature, wind direction, wind speed, rainfall), roads, MNO subscriber density, etc.).	Responsible Authority (SFRS OMD, LEGMC, etc.)	ABS + CBE
6	Mark the ES affected areas	On the basis of the assessment, the OMD dispatcher highlights the impact area of the event (e.g., administrative area, polygon with a defined radius, area of free shape)	Responsible Authority (SFRS OMD, LEGMC, etc.)	ABS + CBE
7	Creating warning message	The OMD dispatcher creates a warning message (created from scratch or by using message template). If necessary, the message can be created in several languages.	Responsible Authority (SFRS OMD, LEGMC, etc.)	ABS + CBE
8	Setting message parameters	The OMD dispatcher specifies the parameters for sending the warning message: the time for sending the message, schedule the date and time for sending the message if the message has to be sent later.	Responsible Authority (SFRS OMD, LEGMC, etc.)	ABS + CBE
9	Confirm the warning message	The OMD dispatcher checks the prepared message and its parameters and approves it. Sending warning message to the public (MNO subscribers) is hereby initiated.	SFRS OMD	ABS + CBE
10	Checks the availability of MNO base stations	The CBC component automatically checks if all MNO relevant base stations are available.	CBC	ABS + CBC

No.	Phase	Phase Description	Performer	Information system
11	Transfer task to another MNO	If affected MNO's base station is not available, the CBC component must transfer the task of sending the message to another MNO by jurisdiction.	CBC	ABS + CBC
12	Identifies cells for message transmission	Available MNO base stations identify cells where the message has to be transmitted.	CBC	ABS + CBC
13	Sends a warning message to network subscribers in specified cells	MNO performs a message transmission in the predefined mode (see page Phase 8).	MNO	MNO system
14	Transmits status of the sent message	MNO sends data to ABS + about the status of message transmission.	MNO	MNO system
15	Monitor the status of the sent message	The OMD dispatcher can see in real time whether the message transmission has been initiated from all the relevant base stations.	SFRS OMD	ABS + CBE
16	Monitor changes in population density in the ES impacted area	The OMD dispatcher in real time monitors the change in population density in the highlighted impact area of the event . If the impact of event on public increases, OMD dispatcher may decide to send additional warning message to the	SFRS OMD	ABS + CBE

No.	Phase	Phase Description	Performer	Information system
		public – further action described in this process starting in phase 5. If the consequences of the event have been eliminated, the OMD dispatcher may decide to send additional message to the public explaining that situation now is safe and under control - the follow-up is described in this process starting in phase 7.		

3.2 Software

In order to support the public warning process described in Subpart 3.1 of this document, ABS + should include software functional modules as shown in Figure 4.

The ABS + solution consists of two main parts:

- CBE (Cell Broadcast Entity) - part of ABS + enabling SFRS OMD dispatchers or other authorized users to prepare, confirm warning messages, send warning messages, monitor the status/results of sent messages, etc.
- CBC (Cell Broadcast Center) - part of ABS + that is integrated with MNO communications equipment and supports warning message transmission.

3.2.1 System users

ABS + users according to the intended ABS + procurement are:

- SFRS OMD – ensured the creation, processing and transmission of warning messages using the ABS + CBE component.
- SFRS management – ensured access to ABS + operational and historical activity reports.
- MoI IC IT administrators - provide technical support for ABS + operations.

The development of ABS + (e.g., integration with 112 platform and LEGMC system, adding new warning channels) may in addition lead to necessity to add new users according to functional scenarios, such as rescue managers, therefore it must be possible to add new users and user groups in ABS + in the future.

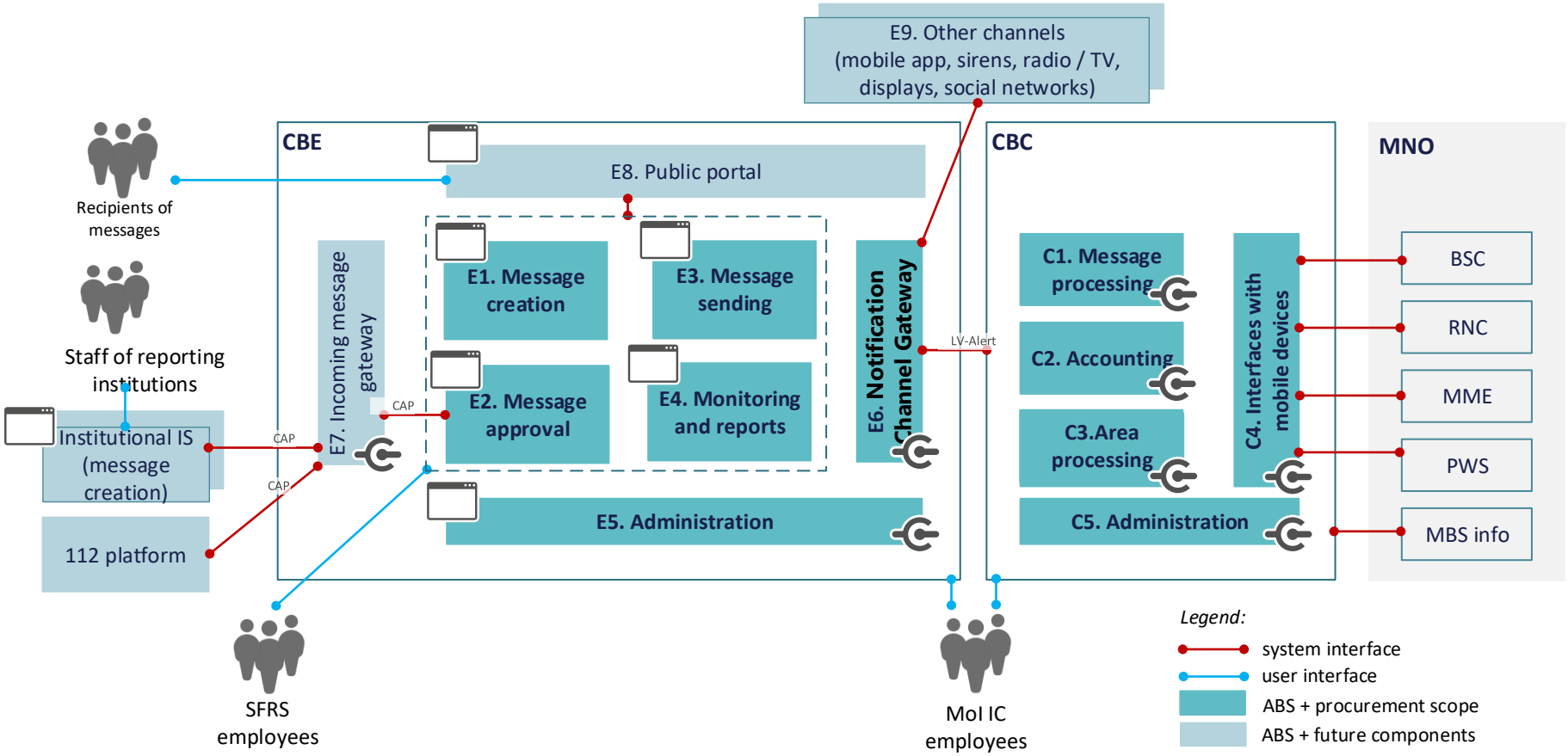

Figure 4. Overview of ABS + software functional modules

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3.2.2 CBE component

The CBE component enables users to create and send warning messages to the CBC to selected notification area. The CBE is the user interface used by the warning message creator to prepare the warning message and indicate the area (polygon) on the map, after which the warning message is sent to the CBC, which ensures the transmission of the warning message over the MNO network. The CBE must primarily provide an interface with the CBC and this interface must provide at least the following capabilities:

- CBE interface must be able to access the CBC functions.
- CBC receives a signal from the CBE and addresses cell controllers without MNO intervention.
- Incoming CBE traffic throughput is controlled from the CBC platform.
- CBE provides a map for the determination of notification areas.
- CBC must be able to report the status of warning messages to the CBE at least within 3 minutes of sending the message.

ABS + should be provided as an integrated solution, thereby avoiding the risks of CBE-CBC integration.

Table 9 gives a brief overview of the main CBE functional blocks.

Table 9. CBE functional units

No.	Functional unit	Description	Main users	Implementation priority
E1.	Message creation	The message creation functionality provides the following: ▪ Enter, edit, and delete the text of the warning message to be transmitted. ▪ Prepare the text of the warning message in several languages - at least Latvian and English; ▪ Use pre-defined warning message templates; ▪ Mark the location of the event on a digital map of Latvia in at least the following ways: o entering the event sites using coordinates on the digital map; o by entering the name of the site in the digital map seeker; o manually marking the location of the event on the digital map. ▪ Mark the notification area (polygon) in a digital map of the territory of Latvia where a warning message should be transmitted; ▪ Automatically display in the digital map of the territory of Latvia which mobile operator towers are located in the chosen notification area; ▪ Display mobile network operators base stations (tower locations) on the digital map of the territory of Latvia; ▪ One the digital map of the territory of Latvia show objects of increased danger (high risk objects); ▪ To carry out the following actions on the digital map of Latvia: o zoom, o measure distances, o automatic determination of the size of the selected area; o identification of the sites and objects;	SFRS OMD National regulatory authorities with the possibility of creating warning messages in the ABS + system	1st phase

No.	Functional unit	Description	Main users	Implementation priority
		○ manage the layers of map. ▪ Choose the message sending channel (the cell broadcasting channel is used as the default channel) ▪ Select the time when the message has to be sent, either immediately or at a specific time; ▪ Select the frequency and interval for sending the message.		
E2.	Message approval	The message confirmation functionality enables the responsible SFRS employee to get acquainted with the parameters of the prepared warning message (message text, notification area, message sending time, notification channels) and to provide the possibility to confirm or reject sending this warning message in the same system interface window. In case of message rejection, the System must allow the user to add a comment on the reason for rejection of the message.	SFRS OMD	1st phase
E3.	Message sending	The message sending functionality requires the automatic sending of approved warning messages to the CBC for further transmission to the public.	SFRS OMD	1st phase
E4.	Monitoring and reports	The monitoring and reporting function provides the possibility to: ▪ View the prepared but not yet sent warning messages; ▪ View the sent warning messages. ▪ View the status of warning messages. ▪ View information about the warning message sender: the ability to filter information on messages sent by each system user. ▪ View the status of the delivery of warning messages (how many of the selected MNO towers have transmitted a warning message); ▪ View warning message time reports: ○ the length of time in which the message was confirmed; ○ In how long time the message was sent out after approval.	SFRS OMD SFRS management	1st phase

No.	Functional unit	Description	Main users	Implementation priority
E5.	Administration	The functionality provides administration of ABS + user accounts, accumulation of audit records and maintenance of the System's classifiers and reference data. Access levels to be provided: ▪ administrators; ▪ privileged users (can see reports and monitoring information); ▪ users. It has to be possible to create user groups. It has to be possible for each user group to determine: ▪ the notification channels to be used; ▪ the notification area (for example, if in future local governments will be able to connect to ABS + and send out warning messages, then for such local government ABS + it has to be possible to limit their reporting area within the specific municipalities).	MoI IC IT administrators	1st phase
E6.	Notification Channel Gateway	The notification channel gateway allows to send a warning message through the pre-selected notification channel (selected in the message creation phase). By default, warning messages are sent using the CB channel.	MoI IC IT administrators	1st phase
E7.	Incoming message gateway	The functionality provides a gateway for incoming messages designed to integrate information systems from other public administration organizations with ABS + to the extent that it is possible to send warning message information from other information system to ABS +.	State authorities from which information systems are intended to send messages to ABS +	1st phase

No.	Functional unit	Description	Main users	Implementation priority
E9.	Public Portal	The public portal automatically display's warning messages after they are sent to public. It is possible to publish more detailed explanations about each warning message on the portal, as well as to provide additional information on the required action. It is also possible to include instructions on how to activate the cell broadcast function in different mobile phone models in a separate section of the portal. In addition, it is possible to publish on the portal general information about the necessary actions in various dangerous situations.		Future phase
E9.	Other channels	In addition to a cell broadcasting channel, it is required that in ABS + it is possible to choose other channels for sending warning messages, such as: • Mobile app; • Radio; • Television; • Social networks; • Internet portals; • LB-SM. The System must provide the possibility to add the LB-SMS function as needed in the future.	SFRS OMD	Provision should be made for the possibility to add functionality in future

3.2.3 Message delivery component (CBC)

CBC or cell broadcast centre, is a network element connected to MNO using a secure connection that transmits warning messages to the relevant elements of the MNO network and maintains all relevant information about the location of each MNO radio cell.

The CBC is the central point from which cell broadcast messages are distributed over the public land mobile radio network.

The solution for the Cell Broadcasting Centre (CBC) should ensure that warning messages are transmitted to MNO subscribers on 2G (GSM), 3G (UMTS), 4G (LTE) and 5G (non-standalone) networks. Warning messages should be distributed on mobile phones at the selected notification areas. The smallest area to be addressed is one radio cell, while the largest notification area is a complete 2G (GSM), 3G (UMTS), 4G (LTE), 5G mobile network. Messages to be transmitted may be in text and binary form and messages must be transmitted from 1 to 15 pages with 82 octets.

Table 5 gives a brief overview of the main CBC functional blocks.

Table 10. CBC functional units.

No.	Functional unit	Description	Main users	Implementation priority
C1	Message processing	Functionality providing an interface with CBC, including: ▪ Create messages ▪ Edit messages ▪ Delete messages ▪ Initiation of sending messages (immediate and scheduled) ▪ etc.	Service	1st phase
C2	Accounting	Functionality for keeping track of sent messages ▪ information/audit records about sent messages ▪ information about sent messages using different filters ▪ etc.	Service	1st phase
C3	Area Processing	Functionality that supports sending messages to a specific area based on available mobile base station (MBS) deployment and status information.	Service	1st phase
C4	Interfaces with mobile devices	Functionality that provides standardized interfaces with mobile devices specific to each generation: ▪ 2G-BSC ▪ 3G - RNC ▪ 4G - MME ▪ 5G - AMF/PW The interface may also be specific to a specific hardware manufacturer (Nokia, Huawei, etc.)	Service	1st phase

No.	Functional unit	Description	Main users	Implementation priority
C5	Administration	Functionality that provides administration and configuration of the CBC component, including: ▪ User and rights management; ▪ CBC parametrizing and configuration; ▪ Creating/browsing audit records; ▪ Ensuring monitoring capabilities; ▪ etc.	I IC IT Administrators	1 st round

3.2.4 MNO components

Mobile network operators should ensure that cell broadcasting functionality is enabled on mobile devices (depending on generation BSC, RNC, MME, AMF/PWS).

For this purpose, MNO may need to purchase additional components and/or licenses from the manufacturer of the equipment concerned.

The MNO should also provide an interface for obtaining information on MBS locations and their status (MBS info component).

In order to implement the population density determination functionality in the chosen area, which ensures the list of last known location (cache) of MNO subscribers, an additional component for the MNO must be provided.

3.3 Data

3.3.1 CAP and EU-Alert

The main data item to be processed by ABS + is a warning message. It must be developed in accordance with the following standards:

- CAP (Common Alerting Protocol), version1.2[1] (OASIS[2] standard);
- European Public Warning System (EU-ALERT) using the Cell Broadcast Service. ETSI[3] TS 102 900, version1.3.1

The CAP standard defines a common warning message format in XML format, which provides data exchange between different elements of the public alert system (including different channels).

EU-ALERT defines common and standardized elements of warning messages (including message types) that, also ensure a uniform and predictable display of warning messages on mobile devices. The US analogue of EU-ALERT is the Wireless Emergency Alerts (WEA) standard (formerly known as the Commercial Mobile Alert System (CMAS), which is generally compatible with EU-ALERT (they have different coding for different types of warning messages, e.g., EU-ALERT does not have "Presidential Alert" message).

The EU-ALERT standard requires each country to update / supplement it according to its specific data elements, such as NL-Alert, LT-Alert, UK-Alert.

[1] http://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2.html

[2] https://www.oasis-open.org/ - ICT industry standardization organization

[3] https://www.etsi.org - European standardization body

3.3.2 General Data Model

This section provides an overview of the main data items that will be handled by the ABS+ system. This information is considered to be illustrative in order to explain the operating principles of ABS + and to define the procurement requirements of the ABS + system. The data model for the specific ABS + solution (which will be selected as a result of the procurement procedure) may be different from the one described below.

CBE component

An overall data model for the CBE component is shown in Figure 5.

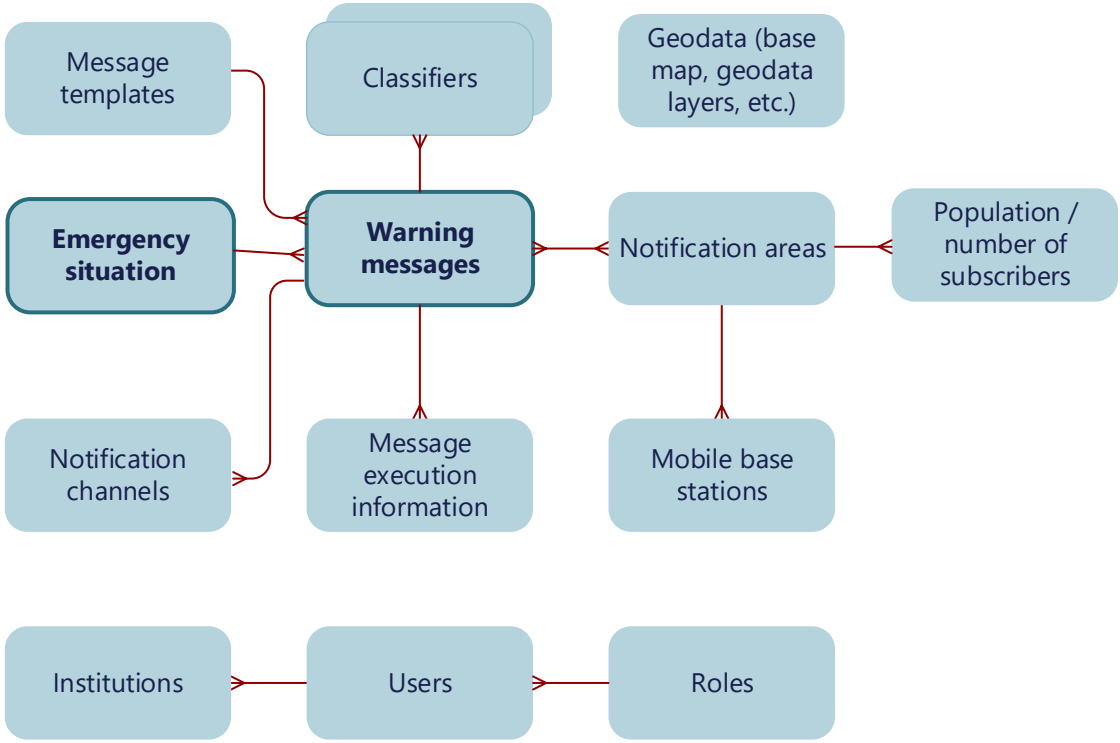

Figure 5. Main data items of the CBE component

The main data items of the CBE component are:

- **Warning messages** - information about the warning message to be sent, including
  - identifier of the message;
  - the text of the message;
  - type of warning, etc. classification according to CAP/EU-Alert;
  - channel (default - cell broadcasting)
  - notification area (reference to a predefined or specifically identified notification area);

- time of sending message (immediate or scheduled);
- frequency for sending messages (if necessary);
- the status of the message (e.g., prepared, confirmed, pending, sending, sent successfully, sending failed, etc.);
- information from related data items (e.g., reported population/number of subscribers, etc.);
- Information about user who created the message;
- Information about user who approved message;
- the time of message creation and last correction;

- **Emergency situation**
  - identifier;
  - name;
  - description;
  - type;
  - priority (assessment of risks to public);
  - coordinates (point, area);
  - etc.
- **Message templates** – Pre-defined messages that speed up/eases the creation of messages
  - identifier;
  - the name of the template;
  - description of the template;
  - the author of the template;
  - the time of creation and last correction;
  - message attributes:
    - the text of the message;
    - type of warning, etc. classification according to CAP/EU-Alert;
    - channel (default - cell broadcasting)
    - notification area
- **Classifiers**: the various classifiers used by the ABS + system;
- **Notification areas** - predefined or once already used notification areas
  - identifier
  - area name (for predefined areas)
  - description of the area (for predefined areas)

- the coordinates of the area;
- additional information (area size, population/number of subscribers, etc.)

- **Notification channels** - information about available notification channels (default - CB)
  - in the case of cell broadcasting, information about MNO, CBC, connections, etc.
- **Mobile base stations** – information about MNO mobile base stations. Information received from MNO (possibly by using information from CBC)
  - identifier;
  - MNO;
  - coordinates;
  - technical specifications;
  - status (working, not working, etc.);
- **Geodata** — various geographical data is required to work with ABS +, including
  - basic raster and vector maps;
  - details of addresses, names and administrative areas;
  - data from different sites (national critical infrastructure sites, sensitive objects, public authorities, etc.);
- **Population/number of subscribers**: information about the population/number of subscribers of the selected areas, calculated on the basis of population density (data from Central Statistical Bureau of Latvia) or on the data of active registered subscribers (in case the CBC option is used);
- **Users** - ABS + users:
  - identification;
  - name of the user;
  - user account/password
  - other authentication methods (if any)
  - role;
  - the institution;
  - etc.
- **Roles**: user roles that define the right to access certain ABS + data and system functions;
- **Institutions**: institutions that will use ABS + as users (in future).

CBC component

An overall data model for the CBE component is shown in Figure 6.

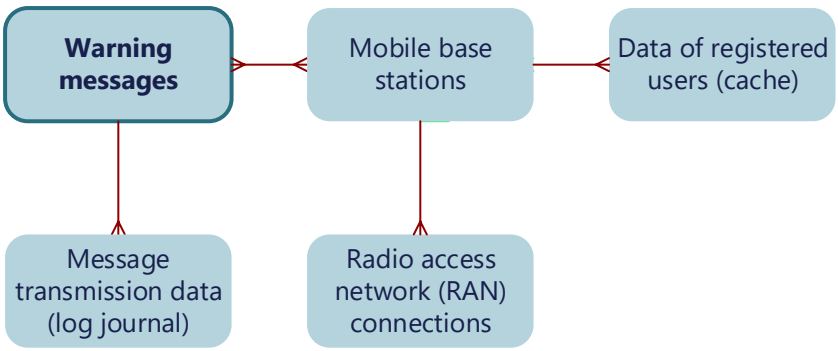

Figure 6. Main data items of the CBC component.

The main data items of THE CBE component are:

- **Warning messages** - details of warning messages to be sent from the CBE (a subset of the message data available to the CBC))
- **Mobile base stations** – information about MNO mobile base stations received from MNO:
  - identification;
  - MNO;
  - coordinates;
  - technical specifications;
  - status (working, not working etc.);
- **Radio access network (RAN) connections** — information about MNO mobile communications hardware and connections;
- **Message transmission data (log journal)**;
- **Data of registered users (cache)**.

3.3.3 Data exchange interfaces

In the context of data exchange between ABS + components, the main data interfaces are summarized in Table 11.

Table 11. ABS + data exchange interfaces

#	From	To	Data	Interface description
1	CBE	CBC	**Messages to be sent**	The interface is not standardized and will be specific to the chosen ABS + solution. The interface includes a full cycle of message management – creating, browsing, sending, deleting, etc.
2	CBC	CBE	**Status of the messages to be sent**	The interface is not standardized and will be specific to the chosen ABS + solution.
3	CBE	CBC	**CBC configuration/parameters**	Depending on the specific solution, the CBE could send different configuration / parameterization commands to the CBC (definition of notification areas, etc.).
4	CBC	RAN	**Messages to be sent**	The CBC sends messages to mobile devices using the appropriate 3GPP standards
5	RAN	CBC	**Status of messages to be sent**	Messaging event log information as specified in 3GPP standards)
6	RAN	CBC (or CBC share)	**Registered subscriber data (Optional)**	If the solution also maintains a list of registered subscriptions (cache), then this information is collected from mobile devices.
7	Other institutions	CBC	**Messages to be sent (future)**	A future interface for creating warning messages from other State institutions information systems (e.g., the LEGMC) and sending them through the API to ABS +
8	CBE	Other channels	**Messages to be sent (future)**	In the future it will be possible to warning send messages via CBE to other channels

3.3.4 Data processing technologies

The following data processing technologies must be used for data processing in ABS +:

- **Database.** As a base site for the storage and processing of ABS + data, one of the *enterprise*-level databases (Orace, MS SQL, IBM, DB2 also Postgres) must be used to provide the required level of performance and security. For this purpose, the *High Availability* (HA) database connection must be used by locating the relevant nodes in two physically remote data centers.
- **Log and monitoring data storage.** One of *the time-series* databases, such as *Elasticseach* or analogue, should be used to monitor events and ABS +. For security and accessibility, it should also be HA mode.
- **Data analysis solution.** An appropriate data analysis (*Business Intelligence*) solution must be available for data analysis, which can also include a separate database (data warehouse), such as *Business Objects, Microstorage, MS Power BI*, etc.
- **File store.** It is likely that the storage of ABS + unstructured data will also require the storage of files that can be carried out in a normal file system or the use of so-called virtualized storage services (*object store*).

3.4 Infrastructure

3.4.1 General requirements

In order to operate ABS +, two geographically separated data centers with a reserved optical data transmission connection between them must be provided, as well as separate data transmission connections with all Latvian MNO's must be provided to each data center.

For the operation of the ABS + software components virtual computing and data storage resources must be provided, according to the specific requirements of the chosen ABS +solution.

Ensuring high availability

Depending on received offers from the potential ABS + Suppliers, it must be decided whether the redundancy of ABS + components will be made at the software or infrastructure level. If the decision is to make a reservation at the infrastructure level, the infrastructure service provider must ensure the reservation of virtual resources in two data centers (for example, using VMware High Availability or a similar solution).

The following illustration (Figure 7) shows the architecture of the infrastructure solution.

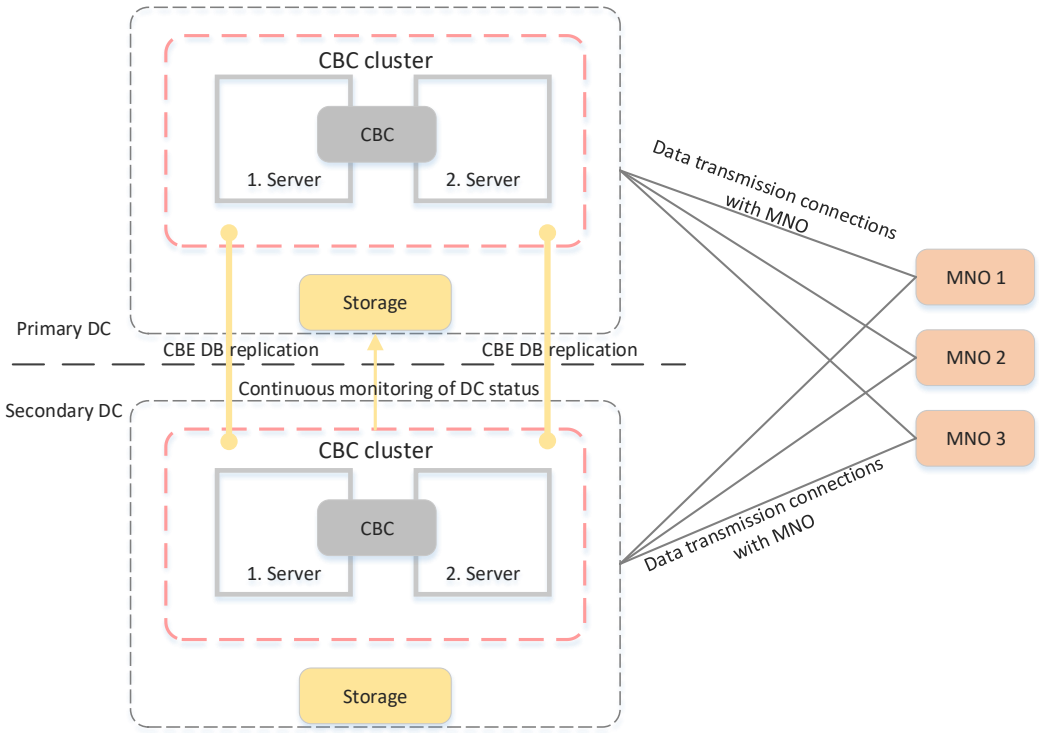

Figure 7. Infrastructure architecture in two geographically segregated data centres.

ABS + computing and data storage resources and configuration in the primary and secondary data centers ensure ABS + operation even in the event of a single data center failure. Data centers are interconnected by reserved optical data connections and reserved network infrastructure. High availability can be achieved by software means (if provided by the manufacturer) or by infrastructure means.

Ensuring high availability of the solution is an essential precondition for ensuring the continuous operation of CBC and CBE. For this reason, the solution must provide a reservation for all technical elements of the architecture, thus avoiding the formation of a single point of failure (SPoF). The solution in case of failure of one data center must be automatic operation of ABS + from the other data center.

Servers, data storage and archiving resources

The infrastructure provider must provide the virtual computing and data storage resources as well as the archiving resources necessary for the operation of the ABS + solution. The Supplier of the ABS + solution must specify in their tender application the requirements for the required infrastructure (equipment specification, licenses, etc.).

Data transmission network

To ensure full and reliable management and monitoring of ABS +, a dedicated, fault-tolerant data transmission network must be provided using a dedicated data transmission infrastructure between data centers. The infrastructure service provider must ensure the establishment of connections with all Latvian mobile network operators from each (primary

and secondary) data center. The infrastructure service provider must ensure the monitoring of the territorial data transmission network and the possibility for the Customer to provide access to the monitoring data.

3.5 Changes in regulatory framework

In order to ensure a successful implementation of ABS +, it is necessary to make changes to the regulatory framework. Table 12 gives an overview of the necessary changes to the regulatory framework for the implementation and operation of the ABS + system. The report looks at what changes to the regulatory framework should be made in substance. The purpose of the review is not to define amendments to regulations at a level of detail and level so that they can be considered as draft amendments to regulations.

Table 12. Necessary changes to regulatory enactments

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
1.	**Electronic Communications Law (ECL)**	13. Article [2]	National policy in the field of the single emergency call number "112" and eCall shall be implemented by the SFRS.	It should be added that the national public warning policy is implemented by the SFRS.
		Transitional provisions	Lists the rules that the Cabinet of Ministers must adopt in order to implement the objectives, requirements and tasks of the ECL.	The delegation to the Cabinet of Ministers should be accompanied by the adoption of rules to look at public warning procedures in the event of disasters or disaster threats using PMECN. This arrangement could be included in the Cabinet of Ministers Regulation No 440 of 8 August 2017, Procedures for the Establishment, Operation and Financing of the National Early Warning System.

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
2.	**General authorization conditions in the electronic communications sector (General authorization)**	Title II	The common conditions for the general authorization are defined.	The conditions should be supplemented by the obligation of the ECM providing PMECN to transmit to end-users of their network the notification of emergency event, disaster or disaster hazards received from the SFRS.
3.	**Civil Protection and Disaster Management Law (CPDML)**	Article 1.	Article 110 of the Directive states that "By 21 June 2022, Member States shall ensure that, when public warning systems regarding imminent or developing major **emergencies** and disasters are in place, public warnings are transmitted by providers of mobile number-based interpersonal communications services to the end-users concerned." Civil Protection and Disaster Management Law (CPDML) has defined the terms "disaster", "threats of a disaster", but the law does not address "emergency situations." On the other hand, the term "emergency situation" appears in the law "On Emergency Situation and State of Exception", during which the Cabinet of	It is necessary to introduce the term "emergency" or an equivalent concept, such as "emergency event", into the law. In the context of the Directive, this term could be defined as: "Emergency situation: a situation threatening human life, health, property or the environment, or a situation which has already caused a loss of life, caused damage to human health, damaged property or damaged the environment".

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
			Ministers has the right to limit the rights and freedoms of State administrative and local government institutions, natural persons and legal persons to the extent specified by the Law, and to impose additional duties on them. In the context of the Directive, it can be understood that the emergency situation is not the same as emergency, but all situations where the public needs emergency assistance from the state (rescue services).	
		Article 8 (2)	Specific tasks of the Cabinet of Ministers, including the tasks of adopting certain procedures, rules to implement the objectives, requirements and tasks of the CPDML.	If new regulations of the Cabinet of Ministers on public warning on mobile phones within the framework of early warning system have to be adopted, then Section 8, Paragraph 2 of the CPDML should supplemented with the task of adopting rules in the Cabinet of Ministers to look at public warning procedures in case of emergency events, disasters or disaster threats, including PMECN, including the duties and rights of PMECN merchants.
		Transitional provisions	Specify the Cabinet of Ministers rules to be adopted to implement the objectives, requirements and tasks of the CPDML.	The delegation should be accompanied by a delegation to adopt, within a specified time limit, rules on public warning procedures in the event of exceptional events, disasters or disaster hazards, using PMECN, including the duties and rights of PMECN merchants.

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
4.	**08.08.2017. The Cabinet of ministers Regulation No. 440 "Procedures for Establishing, Operating and Financing the National Early Warning System" (Regulation No. 440)** Or New The Cabinet of Ministers regulations regarding public warning to mobile phones within the national public warning system framework.	I, II, III, IV	Arrangements for the establishment, operation and financing of an early warning system shall be established by addressing the parties involved in early warning and their responsibilities, responsibilities and tasks.	Required: ▪ Option A. To supplement the establishment of the establishment of an early warning system, the operational arrangements and the financing arrangements with the rules under which public warning messages are sent to PMECN users; or ▪ Option B. Approve new Cabinet of Ministers rules to see detailed arrangements for sending warning messages to PMECN users. In addition to Regulation No. 440 (option A), it is necessary to include: 1. SFRS sends public warning messages to PMECN end-users using the ABS + system. 2. ABS + operation organization: a. The manager of the ABS + system shall be the SFRS in performing the following tasks: i. define the requirements of ABS +, participate in the implementation of the system, accept the deliverables and system implementation as a whole; ii. directing the necessary legislative amendments, justifying the need for ABS +;

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
				iii. directing national cooperation with MNO in the implementation of ABS +, determining the SLA indicators expected from the MNO; iv. planning ABS + functional development, connecting new notification channels to ABS +; v. the preparation, approval and sending of public warning messages by the ABS + user; vi. authorizes the granting of rights to ABS + users; vii. ensure funding links for the deployment, operation and development of ABS +. b. The holder of the ABS + system shall be the Information Centre of the Ministry of the Interior in carrying out the following tasks: i. Drawing up ABS + funding and project implementation documentation, ensuring the role of the beneficiary; ii. carry out ABS + procurement, enter into a contract on the implementation and maintenance of ABS +; iii. manage the ABS + deployment project, coordinate the involvement of the parties involved (MNO, ABS + supplier, SFRS, etc.); iv. Provide the necessary infrastructure for running ABS +; v. Provide CBE/CBC connection to MNO networks;

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
				vi. Monitoring the execution of the MNO SLA; vii. Ensure that ABS + is operated (administration, monitoring, etc.); viii. Planning technical development of ABS +, architecture of integration, notification systems. 3. PMECN merchants shall send a warning notice within 3 minutes of receiving it from ABS +. 4. Financing arrangements: a. The Information Centre of the Ministry of the Interior shall implement the maintenance and operation of the ABS + system in accordance with the financial resources allocated. b. The maintenance and performance of equipment and software equipment involved in sending ECM warning messages shall be financed by ECM if no other arrangements are specified in the contracts concluded. In addition to Regulation No. 440, the technical and functional requirements for PMECN operators must be specified in each delegation/procurement contract. If new Cabinet of Ministers rules are created (Option B), the requirements can be determined in such a way as to ensure equal claims against all existing and potential PMECN merchants. The scope of new rules would be:

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
				1. These Regulations prescribe the rights and obligations of the ECM in the transmission of public warning messages to end-users. 2. The rules apply to ECM providing PMECN. Potential requirements for PMECN merchants are listed in Table 13
5.	**Cabinet of Ministers Regulation No 360 "Regulations Regarding Conformity Assessment, Making Available on the Market, Installation and Use of Radio Equipment"**	Annex 1, point 6	Special requirements for radio equipment to ensure that the caller's location is determined for emergency communication from mobile devices.	It is necessary to supplement these special requirements that, from a specified date, mobile terminal equipment offered on the Latvian market must be equipped with and enabled cell broadcasting functionality according to the EU-ALERT standard (ETSI TS 102 900) (*Cell Broadcast*); The addition could be included in Annex 1 to this Regulation as another requirement for radio equipment.
6.	**07.03.2013. Law "On Emergency Situation and State of Exception"**	Article 9	(4) Part of the obligation - Public electronic mass media shall notify a decision on emergency situation free of charge, as well as provide other information regarding	It should be added that PMECN merchants, at the request of SFRS, send a warning message to the end-users of the network free of charge regarding the emergency situation and provide other information on the emergency situation and recommendations

No.	Legislative instrument	Article NA, paragraph No.	Existing version, nature	Description of the nature of the necessary amendments
			emergency situation and recommendations for actions of inhabitants in conformity with the conditions of the Cabinet and the responsible authority regarding the procedures and urgency of providing the information.	for citizens' behavior, subject to the conditions of the Cabinet of Ministers and the responsible authority regarding information procedure and urgency.
		Article 15	(2) Part of the obligation is specified - Public electronic mass media shall notify a decision on state of exception free of charge, as well as provide other information regarding state of exception and recommendations for actions of inhabitants in conformity with the conditions of the Cabinet and the responsible authority regarding the procedures and urgency of providing the information.	It should be added that PMECN merchants shall, at the request of the SFRS, send a warning message to the end-users of the network free of charge regarding the state of emergency and provide other information on the state of emergency and recommendations for the behavior of the population, subject to the conditions of the Cabinet of Ministers and the responsible authority regarding information procedure and urgency.

Table 13 below gives an overview of the necessary regulatory changes to identify tasks, the obligation for PMECN merchants to ensure that warning messages are sent to PMECN end-users. Two options are considered:

- Option #1. Establishing the tasks of the State administration and delegating to PMECN merchants;
- Option #2. Procurement of PMECN merchant service.

The report looks at what changes to the regulatory framework should be made in substance. The purpose of the review is not to define amendments to regulations at a level of detail and level so that they can be considered as draft amendments to regulations.

Table 13. Necessary changes to the regulations in order to determine the obligations for PMECN merchants.

No.	Legislative instrument	Article NA, paragraph No.	Justification for the change	Procedures for delegation and necessary amendments to regulatory documents
Option A. Establishing the tasks of the State administration and delegating to PMECN merchants.				
1.	**22.09.2020. Cabinet Regulation No. 589 "Regulations of the Ministry of the Interior"**	II. Functions, tasks and competence of the Ministry	1. In accordance with Section 40(1) of the "State Administration Structure Law": "A public person may delegate a private individual and another public person (hereinafter - authorized person) administration tasks if the authorized person can perform the relevant task more effectively"; 2. Section 45 (1) of the "State Administration Structure Law". The delegation of administration tasks that are in the competence of an institution of direct administration for a time period up to three years, shall be decided on by the member of the Cabinet to whom the institution that enters into a contract is subordinate. The Cabinet shall decide on the delegation for a longer period of time" 3. In the light of the above, as well as the lack of appropriate technological infrastructure at the disposal of the national regulatory authorities (MoI, MoI IC, SFRS, etc.) to ensure full dissemination of ABS + system communications to PMECN end-users, it is possible to partially delegate this function to public mobile electronic communications networks, the technological infrastructure of which will allow SFRS reports.	1. The Ministry of Interior shall submit an information report on the upgrading of the State Early Warning System for consideration. 2. The Cabinet of Ministers takes note of the submitted report, as well as: a. supports the transmission of ABS + system notifications to end-users OF PMECN networks through the CB broadcasting technology solution and supports the necessary funding and funding sources; b. determines, clarifies the tasks of the State administration to the Ministry of Interior and supports the inclusion of this task in the by-law of the Ministry of Interior; c. it is stipulated that the Ministry of Interior is entitled to subdelegate this task of State administration to the merchants of PMECN – SIA "Latvijas Mobilais Telefons", SIA "Tele2" and SIA "Bite Latvija".

No.	Legislative instrument	Article NA, paragraph No.	Justification for the change	Procedures for delegation and necessary amendments to regulatory documents
			deliver messages to users of the public mobile electronic communications network. 4. In addition to paragraph 3, the following considerations should be noted in favor of the ABS + Communication as a public administration task: a. The performance of this task is in the interest of the general public and the benefits of carrying out the task are to be assessed at national level. b. It is in the public interest that these notices be made available to virtually every citizen of Latvia for free. c. The State should find funding (to cover investment and operational costs) to ensure that these communications are made available to the public. 5. "Partial delegation" means that PMECN merchants would be delegated the function of ensuring the transmission of notices prepared by the SFRS to end-users of the PMECN networks using the technological solution of CB, including the following tasks for PMECN merchants: a. PMECN merchants shall provide CB transmission capability on their infrastructure (including necessary licenses, adjustments to the PMECN network, etc.); b. PMECN merchants must have full access to their communications infrastructure (IP addresses, passwords, configurations) in order to be able to connect to the CBC; c. PMECN merchants shall provide CBE with information on transmitters in towers, their status;	3. The Cabinet of Ministers approves amendments to the regulation 589 "Regulations of the Ministry of the Interior", specifying, supplementing them with: a. Tasks of the State Administration of the Ministry of Interior - Providing ABS + system warning using PMECN capabilities; b. The right of the Ministry of Interior to delegate this task in part, in accordance with the procedures specified in regulatory enactments, to the SIA "Latvijas Mobilais Telefons", SIA "Tele2" and SIA "Bite Latvija" by entering into delegation contracts. c. The Cabinet of Ministers approves amendments to Regulation No. 440 or approves new rules that view the provision of warning messages to PMECN end-users (see Table 12 section 4). d. The Ministry of Interior shall enter into a delegation agreement with PMECN merchants in accordance with Section 40(1) of the "State Administration Structure Law"... a public person may delegate the administrative task to a private individual and another public person if the authorized person can perform the relevant task more effectively".

No.	Legislative instrument	Article NA, paragraph No.	Justification for the change	Procedures for delegation and necessary amendments to regulatory documents
			d. PMECN merchants shall ensure that notifications received from SFRS are sent to end-users of the PMECN networks.	
Option B. Procurement OF PMECN merchant service.				
2.	**08.08.2017. Cabinet of Ministers Regulation No 440 Procedures for the Establishment, Operation and Financing of the National Early Warning System**	I, II, III, IV	1. Unlike variant A., this option does not delegate the national management task to PMECN merchants, but a procurement procedure is being organized to purchase PMECN merchant services that would ensure the transmission of ABS + system notices to end-users of the PMECN network using the technological solution of CB. 2. The outcome of such a procurement procedure would be contracts with PMECN merchants with defined responsibilities, party responsibilities, service SLA indicators, service delivery arrangements, settlement arrangements, cost compensation arrangements, reporting arrangements, etc. parts of the contract. 3. In order to be able to organize and conclude contracts with PMECN merchants, it is necessary to: □ Option A. Supplementing the arrangements for setting up a public warning system, operational arrangements and financing arrangements laid down in Regulation No. 440 with rules under which public warning system warning messages are sent to end-users of PMECN; or □ Option B. Approve new Cabinet of Ministers regulations, which would only look at the procedures for sending public warning system messages to end-users of PMECN.	1. The Ministry of Interior shall submit to the Cabinet of Ministers an information report regarding the modernization of the State early warning system. 2. The Cabinet of Ministers shall take note of the report submitted, as well as: a. supports the transmission of ABS + system notifications to end-users of PMECN networks using CB broadcasting technology; b. support the necessary funding and funding sources; 3. The Cabinet of Ministers approves changes to Regulation No. 440 or approves new rules concerning the provision of ABS + waring messages to PMEST end-users (see Table 12 section 4). 4. A procurement procedure is being organized to purchase PMECN merchant services that would ensure the transmission of ABS + system warning messages to end-users of the PMECN network using the technological solution of CB. 5. Contracts with PMECN merchants with defined responsibilities, party responsibilities, service SLA indicators, service delivery arrangements, billing

No.	Legislative instrument	Article NA, paragraph No.	Justification for the change	Procedures for delegation and necessary amendments to regulatory documents
				arrangements, cost compensation arrangements, reporting arrangements, etc. are concluded.

Contract with PMECN merchant regarding sending public warning messages to mobile phones

The technical and functional requirements for PMECN merchants should be defined in a delegation/procurement contract (depending on the form of cooperation chosen), including but not limited to:

- The PMECN merchant is obliged to cooperate in sending warning messages to PMECN end-users in accordance with the rules.
- The PMECN merchant shall, upon receipt of a notification from the SFRS warning, send it to the PMECN end-users in the relevant PMECN cells within the period of notification specified by the SFRS without delay but no later than 3 minutes.
- A PMECN merchant distributes a warning message in parallel, using all THE technologies applied BY PMECN that support cell broadcasting technology, using all the broadcasting equipment needed for the geographical area of broadcasting.
- A PMECN merchant shall ensure that warning messages received from SFRS are sent to all end-users of PMECN located in the relevant PMECN broadcasting cells, including end-users who are in Latvia as roaming.
- THE PMECN merchant shall ensure that warning messages are sent to the channels defined in ETSI TS 123 041 standard.
- A PMECN merchant is not entitled to make changes to the notice received from the SFRS.
- The PMECN merchant shall ensure that no charges are applied to end-users of the PMECN network for receiving a warning message.
- The PMECN merchant shall provide the technological solution with the capability to disseminate XX (number) warning messages received by the SFRS to end-users of the PMECN.
- The PMECN merchant shall, in accordance with ETSI TS 123 041, ensure that a warning message is sent with a unique number in order to limit the re-transmission of the same warning message to the same end-user.
- The PMECN merchant shall provide a description of the interface of the SFRS network, as well as provide a description of the interface changes.
- The PMECN merchant shall provide the infrastructure in such a way that the Service Accessibility Index is at least 99.90% per calendar month.
- The PMECN merchant has a duty to continuously monitor the infrastructure needed to send warning messages. The PMECN merchant shall report the damage detected to the SFRS and shall be prevented in accordance with the contracts concluded.
- A PMECN merchant transfers data about shippers for warning messages to ABS + via API.

- Following the release of the warning message, the PMECN merchant shall transmit the following data (in the breakdown of the technologies used in the PMECN network):
  - how many active broadcasting cells were in the geographical area of broadcasting,
  - the number of active broadcast cells a warning message was sent within 3 minutes.
- By [date], the PMECN merchant shall send the SFRS report on the warning messages distributed by the PMECN in the previous calendar year:
  - PMECN availability indicators in the previous calendar year;
  - An annual assessment of the provision of the Service and, if necessary, an improvement plan;
  - other recommendations.

4 ABS + implementation

4.1 ABS + Implementation Plan

The implementation of ABS + requires coordinated activities by a number of parties. Figure 8 shows the ABS + implementation road map with activities.

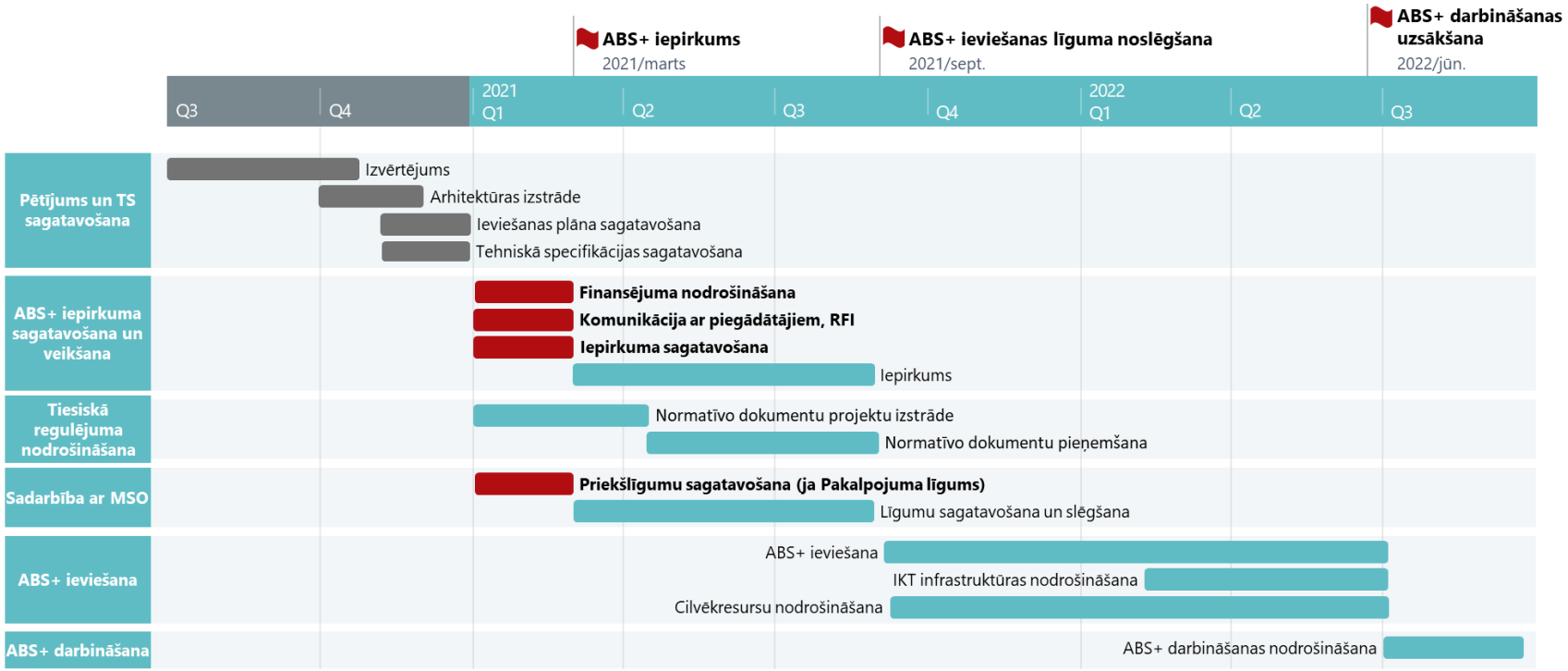

Figure 8. ABS + implementation road map

The more detailed ABS + implementation plan according to the road map is presented in the Table 14.

Table 14. ABS + implementation plan.

No.	Activity	Deadline	Explanation of the deadline	Responsible	Involved
1.	**Study and development of technical specifications**			**SFRS**	
1.1.	Assessment	31.10.2020.		SFRS	MoI, MoI IC, MNO, Ministry of Defence, State security Services
1.2.	Architectural development	15.12.2020.		SFRS	MoI, MoI IC, State security services
1.3.	Preparation of the implementation plan	15.12.2020.		SFRS	MoI, MoI IC, State security services
1.4.	Preparation of the technical specification	15.12.2020.		SFRS	MoI, MoI IC, State security services
2.	**Provision of funding**				
2.1.	Determination of the source of funding (project included in project selection)	01.01.2021.	**ASAP to start preparing for procurement**	MoI	SFRS, Ministry of Finance
2.2.	Development of a project application	01.06.2021.	3 months for matching an application	MoI IC	SFRS
2.3.	Conclusion of a contract on the implementation of the project	01.09.2021.	Until the conclusion of a procurement contract	MoI IC	SFRS
3.	**Preparation and performance of ABS + procurement**			**MoI IC**	
3.1.	Communication with suppliers, RFI	01.03.2021.		MoI IC	
3.2.	Preparation of procurement	01.03.2021.		MoI IC	SFRS

No.	Activity	Deadline	Explanation of the deadline	Responsible	Involved
3.3.	Procurement procedure	01.09.2021.		MoI IC	SFRS
	1. Stage - Qualification of tenderers				
	2. Phase - Initial offer, negotiations				
	3. Phase - Final Quote				
3.4.	Entering into a procurement contract	15.09.2021.	**9 months before the deadline for the implementation of the Directive**	MoI IC	
4.	**Provision of a legal framework**			**MoI IC**	
4.1.	Drafting of regulatory documents			MoI IC	SFRS, Ministry of Transport, MoI IC
	Amendments to laws (3)	01.02.2021.			
	Amendments to Regulations of Cabinet of Ministers (3)	01.02.2021.			
4.2.	Adoption of regulatory documents			MoI IC	SFRS, Ministry of Transport, MoI IC
	Amendments to laws (3)	15.04.2021.			
	Amendments to Regulations of Cabinet of Ministers (3)	01.09.2021.	until signature of the procurement contract		
5.	**Cooperation with MNO**				
5.1.	Cooperation arrangements (Working Group)	01.03.2021.	pending the announcement of procurement	MoI IC	SFRS, MoI
5.2.	Pre-contractual preparation and conclusion (if Service Contract)	01.04.2021.	by the end of the procurement qualification phase	MoI IC	SFRS, MoI
5.3.	Preparation and conclusion *of delegation/service* contracts	01.09.2021.	pending approval of the Regulations of Cabinet of Ministers	MoI IC	SFRS, MoI
6.	**ABS + deployment**			**MoI IC**	

No.	Activity	Deadline	Explanation of the deadline	Responsible	Involved
6.1.	ABS + deployment	09/04/2021	07/04/2022	MoI IC	SFRS
6.2.	Provision of ICT infrastructure	02/08/2022	07/03/2022	MoI IC	
6.3.	Provision of human resources	09/08/2021	07/04/2022	MoI IC	
7.	**ABS + operation**			**MoI IC**	**SFRS**

4.2 ABS + implementation project organization

In order to ensure the implementation of ABS + within the deadlines set by the Directive and in accordance with the implementation plan, it is recommended to define and formalize the ABS + implementation organization as a project management structure. Figure 9 provides a framework for the management organization of the ABS + implementation project proposed by the consultants.

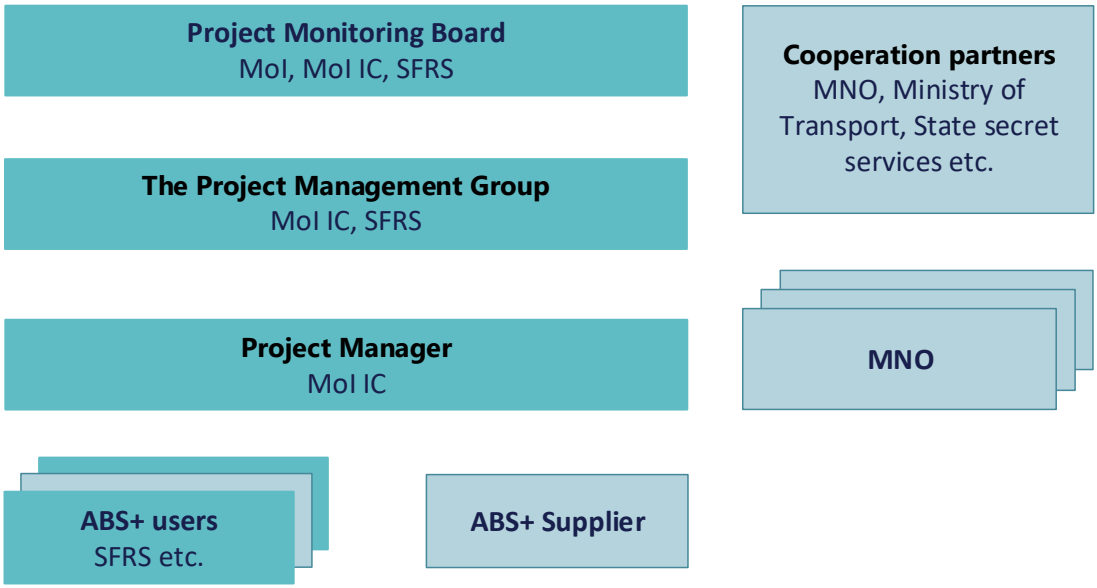

Figure 9. ABS + implementing project management organisation

The Project Monitoring Board (PMB) shall monitor whether the implementation of ABS + deployment activities is in line with the objectives and expected results of the initiative and confirm the need for changes to the project. The project supervision board shall be composed of the Ministry of Interior, the Information Centre of the Ministry of Interior and SFRS. Other parties involved in the deployment of ABS + (MNO, Ministry of Transport, State security services) may also participate in the PMB, which shall be invited as necessary. The PUP shall be organized by the Project Manager (MoI IC). The PUP shall meet once a quarter or as necessary.

The Project Management Group (PMG) controls the progress of ABS + deployment and requires changes in the implementation of activities. The PMG is subject to PMB. The role of the PMG is to ensure that decisions related to the implementation of the project are taken and implemented. The PMG proposes and harmonizes the approach to implementing ABS + deployment activities, accepts the deliverables and takes other decisions to achieve the results of the Project. The composition of the PMG includes MoI IC, SFRS. When concluding the ABS + deployment agreement, the PMG will also participate in the ABS + supplier. The work of the PVG shall be organized by the Project Manager (MoI IC). As

necessary, the Project Manager shall invite the PMG to participate in other parties involved in the implementation of ABS + (ABS + users, MNO, Ministry of Transport, State security services).

The Project Manager shall manage all activities related to the deployment of ABS +, shall be responsible for implementing ABS + in accordance with the time plan and budget, ensuring that the objectives of the activities are achieved. The project manager shall be responsible for the cooperation between the parties involved in the project. The project manager shall coordinate and supervise the work of outsourcing providers.

The ABS + supplier is responsible for implementing ABS + within the framework of the contract.

ABS + users define ABS + functional requirements and their priorities, harmonize the requirements, test the system. The primary ABS + user is SFRS OMD.

Cooperation partners are organizations involved in ABS + deployment activities, including but not limited to the development of regulatory frameworks, the organization of cooperation with MNO, procurement organization, infrastructure provision. The cooperation partners shall participate in the meetings of the PUP and the PVG as necessary.

MNO is participating in the introduction of ABS + as co-operation partners with which contracts (delegation or service contracts) for participation in the operation of ABS + (sending of warning messages at the request of ABS +) are concluded. Work with the MNO is coordinated and directed by the Project Manager (MoI IC).

4.3 ABS + implementation and maintenance costs

The introduction of the ABS + system in line with the ABS + implementation plan will require funding from shown in Table 15. The introduction of ABS + may be financed from a number of funding sources. If funds from external financial instruments are raised for the implementation of ABS + and additional resources will be mobilized to raise funds (for preparing the application documentation), this heading will complement the costs of the ABS + deployment initiative listed in the Table 15.

Table 15. Costs of the ABS + deployment initiative.

Project Activities	Description	EUR, including VAT	Type of activity execution	Responsible
ABS + research and planning activities	Consulting services related to ABS+ research, architecture design and implementation planning	58,000	Procurement (existing CC contract)	SFRS
Introduction and maintenance of ABS + for 5 years		5,000,000	Procurement	MoI IC

Project Activities	Description	EUR, including VAT	Type of activity execution	Responsible
CBE + CBC Software + Implementation	CBE and CBC licenses Customization, integration and deployment services	3,000,000		
Maintenance of the CBE + CBC software 5 g.	CBE and CBC support services, software upgrades and change requests	2,000,000		
Purchase of infrastructure for CBE + CBC operation	ICT infrastructure (servers, server software) for ABS+	200,000	Procurement	MoI IC
Maintenance of infrastructure 5 years	ICT infrastructure hosting in two data centers, administration, upgrades and related services	210,000	MoI IC budget increase	MoI IC
ABS + project and contract management	Project and contract management personnel expenses	60,000	MoI IC budget increase	MoI IC
ABS + procurement support and supervision	Consulting services related to ABS+ procurement and implementation supervision	80,000	Procurement	MoI IC
Information campaigns on ABS +	Preparation and conducting of information campaigns	50,000	Procurement	SFRS
MNO cost compensation		-		MoI
TOTAL cost of ABS + deployment initiative:		**5,658,000**		

The provisional cash flow for the introduction of ABS + is given in Table 16. The information provided may serve as a basis for preparing requests for budgetary and financial instruments.

Table 16. Preliminary cash flow for the implementation of the ABS + initiative EUR, including VAT.

Cost lines	2020	2021	2022	2023	2024	2025	2026	Total
ABS + research and planning activities	**58,000**							**58,000**
ABS + deployment	**-**	**60,000**	**3,380,000**	**-**	**-**	**-**	**-**	**3,340,000**
Software	**-**	**-**	2,100,000	**-**	**-**	**-**	**-**	**2,100,000**
Infrastructure	**-**		200,000	**-**	**-**	**-**	**-**	**200,000**
Introduction	**-**	60,000	980,000	-	-	-	-	**1,040,000**
ABS + deployment			900,000					**900,000**
ABS + procurement support and monitoring		30,000	50,000					**80,000**
ABS + project and contract management		30,000	30,000					**60,000**
Information campaigns on ABS +	**-**	**20,000**	**15,000**	**15,000**	**-**	**-**	**-**	**50,000**
MNO cost compensation	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Maintenance	**-**	**-**	**442,000**	**442,000**	**442,000**	**442,000**	**442,000**	**2,210,000**
Software	0	0	400,000	400,000	400,000	400,000	400,000	**2,000,000**
Infrastructure	0	0	42,000	42,000	42,000	42,000	42,000	**210,000**
TOTAL:	**58,000**	**70,000**	**3,737,000**	**457,000**	**442,000**	**442,000**	**442,000**	**5,658,000**

4.4 ABS + deployment and maintenance procurement planning

Procurement Scope

The purchase of ABS + system deployment and maintenance shall be planned for the software part within the following scope:

- Minimum components:
  - **CBE** — ABS + Part enabling SFRS dispatchers or other authorized users to prepare, confirm warning messages, send messages, monitor the status/results of sending messages, etc.;
  - **CBC** — ABS + part integrated with MNO mobile communications equipment and supporting warning message transmission.
- Preferred (option) component:
  - Component of determining the final localization of MNO subscribers.

The financial supply of mandatory and preferred components should be provided under separate headings in order to make it possible to choose the most rational, economically advantageous tender in the course of the procurement.

Procurement approach

In order to establish the completeness and validity of the technical specification, it is recommended that additional communications and ABS + technical specification be validated with potential suppliers in the framework of the market survey or RFI (*Request for information*) process prior to the announcement of the procurement. When receiving comments from potential suppliers, the technical specification should be specified and/or supplemented.

It is recommended that the procurement be organized through **a flexible procurement procedure**: for example, a competitive dialogue or a competitive procedure with negotiation. This will provide an opportunity

- specify the requirements for the initial tenders of tenderers in the course of the procurement and make rational use of the funding intended for the deployment of ABS +;
- pay particular attention to the outline and evaluation of the financial supply and procurement contract, as the initial communication with potential suppliers showed significantly different, complex and difficult comparable approaches to cost estimates: mandatory/optional functional modules, interfaces with mobile equipment manufacturers, number of cells/subscribers, number of software instances, etc.

Both the market survey and procurement should be organized **in English**, given that all potential ABS + suppliers are not companies represented in Latvia. This would reduce the risk of translation and consequently, the consumption of inappropriate communication time for both applicants and the customer (MoI IC).

4.5 Risk Management Plan

The planning, deployment and operation of ABS + shall relate to the following risks:

ABS + implementation risks

1. Management risks:
    a. The responsibility for the deployment and operation of ABS + is not clearly defined;
    b. The implementation of ABS + is delayed;
    c. No funding has been applied for the deployment and operation of ABS +;
2. Cooperation with MNO:
    a. Cooperation agreements with the MNO have not been concluded in time;
    b. The MNO impedes the introduction of ABS + because the costs of the MNO are not compensated;
3. Regulatory risks:
    a. The regulatory framework has not been modified in time for the conclusion of contracts with MNO and the introduction of ABS +;
    b. The MoU does not harmonize amendments to the regulatory framework because the interests of the MNO involved are not respected (e.g., the costs of the MNO are not compensated);
4. Procurement risks:
    a. Delays in the conduct of the procurement procedure;
    b. Tenderers' tenders are not qualitative (the commissioning party does not have the possibility to ascertain regarding the conformity of the tender with the requirements);
    c. No tenderer has applied for participation in the procurement;
5. Project management risks:
    a. ABS + users are not involved in selecting and deploying the system;
6. Financial risks:
    a. Actual ABS + deployment costs exceed the available/approved budget;

b. Cost increases and inflation.

ABS + operating risks

7. ICT infrastructure risks
    a. Failure / unavailability of server components
    b. Failure / unavailability of network connections to MNOs
8. ABS + software risks
    a. Software errors
9. Risks associated with the use of ABS +
    a. User errors
    a. Unauthorized use of ABS +

Table 17 shows an assessment of identified risks and a management plan for them.

Table 17. Risk assessment and risk management plan.

No.	Risk group	Risk	Risk impacts	Probability of accession	Risk prevention/mitigation measures
1a.	Management	Responsibility for the deployment and operation of ABS + is not clearly defined	high	average	1) Align with the participating parties the ABS + implementation plan and the allocation of responsibility prior to the decision in the IM and Cabinet of Ministers; 2) Include in the information report an ABS + implementation plan and a breakdown of responsibility in line with the proposals presented in 4.2.
1b.	Management	The adoption of the necessary decisions for the implementation of ABS + is delayed	average	high	1) Strengthening ABS + project management capacity to streamline the necessary decision-making; 2) Regular communication between stakeholders (Working Group).
1c.	Management	No funding available for ABS + deployment and operation	high	high	1) Submission of an information report to the Cabinet of Ministers as a matter of urgency; 2) Urgent application of ABS + as A COVID-19 mitigation measure.
2a.	Cooperation with MNO	Cooperation agreements with MNO have not been concluded in time	high	high	1) Develop a proposal (possibly with alternatives) for cooperation with MNO (delegation, responsibility, cost compensation); 2) When deciding on ABS + architecture and the implementation model, launch a consultation on the conditions of cooperation with the MNO without delay.
2b.	Cooperation with MNO	MNO impedes ABS + deployment because MNO costs are not compensated	high	high	1) As a guideline for cooperation, to establish equal treatment for all MNO's and to communicate it to MNO;

No.	Risk group	Risk	Risk impacts	Probability of accession	Risk prevention/mitigation measures
					2) When deciding on ABS + architecture and the implementation model, launch a consultation on the conditions of cooperation with the MNO without delay.
3a.	Regulatory framework	The regulatory framework has not been modified in time to allow for the conclusion of contracts with MNO and the introduction of ABS +	medium	high	1) When adopting a decision on ABS + architecture and the implementation model, draft legislative amendments recommended by the consultants shall be prepared without delay.
3b.	Regulatory framework	The Ministry of Transport Republic of Latvia does not harmonize amendments to the regulatory framework because the interests of the MNO involved are not respected (e.g., the costs of the MNO are not compensated)	medium	medium	1) In adopting a decision on ABS + architecture and the implementation model, proactively align cooperation proposals approach between the Ministry of Transport Republic of Latvia and MNO for legislative amendments (before tabling legislative amendments to the Ministry of Transport Republic of Latvia); 2) When taking a decision on ABS + architecture and the implementation model, launch a consultation on the conditions for cooperation with MNO and The Ministry of Transport Republic of Latvia without delay.
4a.	Procurement	Delays in the procurement procedure	high	average	1) Validation of the technical specification with potential suppliers prior to the announcement of procurement to reduce the likelihood of complaints; 2) Launch procurement preparation when deciding on ABS + architecture and the implementation model;

No.	Risk group	Risk	Risk impacts	Probability of accession	Risk prevention/mitigation measures
					3) Recruitment of experts for the evaluation of tenderers' tenders, negotiations and clarification of the technical specifications during the procurement process.
4b.	Procurement	Tenderers' tenders are not qualitative (the commissioning party does not have the possibility to ascertain regarding the conformity of the tender with the requirements)	high	high	1) Validation of the technical specification with potential suppliers prior to the announcement of procurement; 2) The procurement documentation and communication with tenderers shall be provided in English.
4c.	Procurement	No tenderers have applied for participation in the procurement	low	high	1) Validation of the technical specification with potential suppliers prior to the announcement of procurement
5a.	Project management	ABS + users are not involved in selecting and deploying the system	high	medium	2) Recruitment of competent project management personnel 3) Planning and matching the extent of user engagement by signing an agreement with an ABS + supplier (configuration and testing of the system according to required user usage scenarios, including re-testing)
6a.	Financial	Actual ABS + deployment costs exceed available/approved budget, inflation	high	medium	1) Market survey (RFI) prior to the announcement of procurement; 2) The inclusion of mandatory and desired (optional) requirements in procurement in order to reduce the amount of functionality during procurement or performance of the contract; 3) Carrying out an early survey of the costs of the project;

No.	Risk group	Risk	Risk impacts	Probability of accession	Risk prevention/mitigation measures
					4) The inclusion of funds in the project budget for unforeseeable expenditure; 5) Recruitment of competent project management personnel.
7a	ICT infrastructure risks	Failure / unavailability of server components (e.g. servers, storage devices, etc.)	high	high	1) Colocation of servers in two geographically remote data centers 2) Redundancy of all key infrastructure elements
7b	ICT infrastructure risks	Failure / unavailability of network connections to MNOs	high	high	1) Establishing redundant data connections with the MSO
8a	ABS + software risks	Software errors	medium	medium	1) Software testing before commissioning 2) A maintenance contract with a Supplier that provides for prompt Supplier response and error correction
9a	Risks associated with the use of ABS +	User errors, such as a poorly trained user, can make mistakes when preparing or sending a message	medium	medium	1) User training
9b	Risks associated with the use of ABS +	Unauthorized use of ABS +	high	low	1) Granting of appropriate Access Rights, implementation of organizational and technical controls

No.	Risk group	Risk	Risk impacts	Probability of accession	Risk prevention/mitigation measures