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TECHNICAL REPORT

Emergency Communications (EMTEL);
Guidelines for alert message content accessibility

ETSI

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Foreword

This Technical Report (TR) has been produced by ETSI Special Committee Emergency Communications (EMTEL).

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

The success of alert messages with the purpose of warning the public and individuals about potential hazards and disasters is dependent on the ability of the message recipients to:

  (i)   understand that an alert message has been received; and

  (ii)   to understand the contents of the alert message in order to draw the correct conclusions.

Both these abilities may be restricted by specific sensory or cognitive requirements of individual users. Individuals with sensory impairments may not become aware of a published warning message unless the message is delivered in a modality which they can receive and interpret. For a warning message to be understood by its recipients it is essential that it is presented in a way that users can interpret correctly, taking into account their specific sensory and cognitive requirements. Other factors that need to be considered are e.g. the ability of a foreign user to understand the local language.

While the design guidelines collected in the present document are expected to benefit primarily users with special sensory or cognitive requirements they are equally relevant for user in situations in which environmental factors exclude the use of specific modalities (e.g. spoken language in a very noisy environment) or in which the users are not able to interpret specific presentation of information (e.g. written alert messages while driving a vehicle).

1 Scope

The present document provides user interface design guidelines applicable to alert messages which allow users with disabilities to become aware of alert messages and to access the contents of such messages. These guidelines cover the presentation of alert messages.

The contents of alert messages is not in the scope of the present document.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ISO 9241-12 (1998): "Ergonomic requirements for office work with visual display terminals (VDTs) -Part 12: Presentation of information".

[i.2] ISO 9241-171 (2008): "Ergonomics of human-system interaction - Part 171: Guidance on software accessibility".

[i.3] ISO/IEC 40500 (2012): "Information technology - W3C Web Content Accessibility Guidelines (WCAG) 2.0".

[i.4] ETSI EG 202 116 (03-2009): "Human Factors (HF); Guidelines for ICT products and services; "Design for All"".

[i.5] ETSI EG 203 350 (V1.1.1) (11-2016): "Human Factors (HF); Guidelines for the design of mobile ICT devices and their related applications for people with cognitive disabilities".

[i.6] ETSI EN 301 549 (V1.1.2) (04-2015): "Accessibility requirements suitable for public procurement of ICT products and services in Europe".

[i.7] Wireless Emergency Alerts (WEA).

NOTE: Available at https://www.fcc.gov/consumers/guides/wireless-emergency-alerts-wea.

[i.8] ETSI TS 102 900 (V1.2.1) (01-2012): "Emergency Communications (EMTEL);European Public Warning System (EU-ALERT) using the Cell Broadcast Service".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Assistive Technology (AT): umbrella term that includes assistive, adaptive, and rehabilitative devices for people with disabilities and also includes the process used in selecting, locating, and using them

Web Content Accessibility Guidelines (WCAG): part of a series of web accessibility guidelines published by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C)

NOTE: This may contain additional information.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AT   Assistive Technology
CMAS   Commercial Mobile Alert System
ICT   Information and Communication Technology
TV   Television
WCAG   Web Content Accessibility Guidelines

4 Accessibility Scenarios

4.1 General

This clause describes the reception of alert messages by different fictive recipients (personae) in a fictive emergency situation. The emergency situation is common to all personae, whereas the accessibility conditions to the alert information of each persona depends on different influencing factors that may be autogenic, societal or environmental. This situational description will serve the identification of accessibility scenarios.

4.2 Emergency situation description

- Hazard: toxic cloud

- Location: a large highly populated city in Spain, in the community of Catalonia

- Official spoken languages in the area: Spanish and Catalan

- Time: 6:23 pm

- Severity: medium

- Likelihood: confirmed

4.3 Personae description

In the alerting scenarios described below reference is made to a number of people with either a sensory or cognitive impairment, special age characteristics which may have to be considered, and/or in an environment which makes use of specific modes for the presentation of information not useful or receivable by users being the target of the hazard alert. Their specific characteristics are described in table 1.

Table 1

Name	Influencing autogenic factors	Influencing societal factors	Influencing situational/ environmental context
Daniela			Very tired Driving
Anna	Elderly		In the kitchen
Max	Child		Playing with smartphone
Balazs		Does not know the local languages	In public area Highly noisy environment
Irene			Tired Mobile phone in vibration mode
John			Highly noisy environment
Eric	Severe hearing disability	Able to speak in local languages and understand sign language	Sick, at home
Sara	Visual impairment		At home, working
Pilar	Deaf from birth	Able to speak in local language and understand sign language	In public area

Daniela is a 31-year-old woman. She is driving in her car towards her hometown - a village just 20 km away from her working place. She is a trauma surgeon in the emergency room of the University hospital in the city and finished her 12 hours shift about 20 minutes ago, two hours later than she would normally do due to an operation that got complicated. She is very tired. It was a very long day with several victims of car and hiking accidents. She is looking forward to pick up her son Max, who is at the apartment of Daniela's mother Anna. Anna takes care of Max after school while Daniela is at work.

Anna is a 76 years old woman who lives by herself in a village just 20 km away from the city. She is Daniela's mother and the Max's grandmother. She uses to take care of Max when he gets out of school the days that Daniela has late shift. Today is normally not such a day, but Daniela called her 3 hours ago, warning Anna that she would most probably be very late today. Anna picked up Max from school at 5 pm and they both went walking to Anna's place. Anna is watching TV while waiting for Daniela, as Max is doing his homework in the other room. She gets hungry and goes to the kitchen to prepare a small sandwich.

Max is an 8-year-old boy. He is doing his homework at her grandmother's place while waiting for her mother Daniela to pick him up and to go home together. Max is looking forward to finish the homework and start playing with his smartphone that her mother gave him to localize him in case she has difficulties to arrive home on time.

Balazs is a 19 years old Hungarian student travelling by train with 2 friends through Europe with an Inter-rail ticket. The train arrived to the city 6 minutes ago. Balazs got off the train with his friends and they are all in the platform 7 of the main train station in the city. While Balazs is searching the address of the youth hostel in his mobile phone to find the shortest walking way, his friends are taking care of the luggage and selecting some drinks from the vending machine in the platform. Balazs has some problems to find the address, because the address was not spelled correctly in his travelling guide. He stops a young girl that is waiting on the same platform to ask her in English about the way. Balazs speaks Hungarian and some English, but no Spanish or Catalan, the same as his friends. The young girl tries to explain in English and shows Balazs the way on the screen of his mobile phone that currently shows a map of the city. It is quite difficult to understand each other on the platform, since a train is just arriving and the noise level is increasing.

Irene is a 33-year-old project manager in a big company. She is still sitting in a meeting that should have finished more than one hour ago. She has 3 missed calls from her husband John that she did not notice as she had configured her smartphone to only give vibration signals to avoid being disturbed during the meeting. She is nervous because she knows that John is waiting for her since more than 20 minutes, but she cannot interrupt the discussion now.

John is a 34-year-old lawyer. He took the afternoon off to coordinate the technical inspection of his vehicle and is currently waiting since more than 20 minutes for his wife Irene, in the bar just around the corner of her office. She is normally well on time, so he is worried and called her already 3 times to figure out why she is not showing up, but she did not take the calls. After having tried to call Irene he realizes that he has a lost call from his friend Pere that he did not hear. No surprise, this bar is very noisy.

Eric is a 44 year old graphic designer that works in the same company as Irene. He is at home today, as he has flu. He was born with a severe hearing disability that cannot be compensated with hearing aid. He learned to speak, read and write in Spanish and Catalan and to communicate by sign language as a child in a special education centre.

Sara is a 50 years old musician and composer. She is working in her apartment in the city composing a new song for a yogurt advertisement with the e-piano connected to her computer. She has an important visual impairment.

Pilar is 21 years old, was born deaf, and is walking down the street on her way home. She has learned sign language at a young age. When she speaks, others have difficulty understanding her. Reading and writing in Spanish is possible but not fluently since Spanish is her secondary language. Pinar has a smart phone.

4.4   Alerting scenarios

Daniela is alerted by a special tone played by the portable navigation device in her car. She looks for a second into the navigation screen and sees a warning sign, and looks back to pay attention to the street. The portable navigation device plays a speech message through the speakers that explains the warning message indicated in the screen in Daniela's previously selected language in the device settings. The warning message delivers the following information:

- Type of disaster alert message: "Warning!"

- Time of occurrence: "Time: 06:23";

- Characterization of the disaster: "Toxic cloud";

- Location of the disaster: "Location 2,1 km south east from your current location; moving westwards"

- Advice: "Move inside a building or closed area, close windows and doors; wait for further instructions"

Daniela closes the car windows and switches off the air conditioning. She uses the speech recognition function in the car to activate the telephone and call her mother Anna to make sure that she is informed and follows the right recommendations.

A pop-up window appears in **Anna**'s TV over the TV programme showing the warning message about the toxic cloud and blinding the TV programme. Luckily, the pop-up window is complemented by a loud alarm sound and turning down the sound of the TV program. Anna gets alerted and goes as quickly as she can to the living room. She reads the message in the TV that is also reproduced in speech in the language she had previously selected in the TV settings when it was installed and complemented by symbols and a map that describe the specific characteristics of the warning (toxic cloud that is spreading over the city). She closes the window of the living room and checks that all remaining windows in the building are closed. While doing so, Max meets her and asks her if all windows are secure. She confirms that they are all closed and he only needs to check the window of the bathroom. In this moment, her telephone rings: it is Daniela calling from her car.

Max's smartphone starts ringing with a special alarm tone and vibrating on the table. His public warning application is about to deliver a warning message. Max picks the smartphone and tips on the screen. The screen shows a message in text complemented by symbols which is also reproduced in speech. Max understands that the windows in the apartment should be closed and goes to meet his grandmother to make sure that she closed all windows.

Balazs hears an alarm sound on the platform of the station and interrupts his conversation with the young girl looking around to find out what is going on. His friends also stop manipulating the vending machine to figure out the reason for this sound. The young girl picks her mobile phone that also starts vibrating in her pocket. The loudspeakers of the train stations start reproducing the warning message first in Catalan, then in English and then in Spanish. At the same time, the digital screens in the train station show the message in text complemented with symbols that make clear that the alarm is about a toxic cloud in the city and surroundings. Balazs realizes that his smartphone is also vibrating and shows the same message in the language he had previously configured in the phone (Hungarian in this case).

Irene is wondering why her mobile phone starts vibrating and ringing with an alarm tone since she had configured it to use only vibration mode before going into the meeting. The rest of her colleagues have the same issue with their mobile phones. They all pick their smartphones and check them. They can then read the warning message. At the same time, the loudspeakers of the meeting room reproduce the same message in Catalan, English and Spanish, as this is an international company. The air conditioning of the building switches off automatically and the colleagues check that the windows of their offices are closed. Irene tries to reach her husband by phone.

John is watching the sports channel in the bar and realizes that the program is overlaid by a pop-up window showing a warning message. At the same time his mobile phone starts ringing and vibrating. He cannot hear the tone, but feels the vibration and checks his smartphone, where he can read the same message in his preferred language (Spanish). He is thinking that he should call Irene, and when he is about to do it, he sees an incoming call from Irene on his mobile phone.

Eric notices a red blinking light alarm in his adapted system at home. This alerts him about a warning that he should check. He picks up his tablet to check it and switches on the TV. Immediately, he sees a pop-up message on the TV with the text message about the toxic cloud complemented by symbols and map. He checks the public warning application on his tablet and realizes that it is also lighting and vibrating. He taps on the screen and reproduces the message in sign language with an avatar application. With all these sources of information, he can understand the situation and checks that all windows are closed in the apartment.

Sara receives a sound warning in the computer, but also through the smoke detectors of the apartment and the smartphone. She switches on her TV and immediately there is a voice message explaining the situation being reproduced by the TV.

Pilar feels the mobile phone in her pocket vibrate. She takes her phone out of her pocket and sees an alert message on the display. She thinks she understands, but to make sure she clicks a key and the phone starts to display the video with the message in sign language. She quickly goes into the nearest shopping mall.

4.5 Remarks on alerting scenarios

One common feature of all scenarios described in clause 4.4 is the fact that the actual alerting action needs to use as many modes of presenting the alert as possible. This is because it is unclear if the user is either unable to receive information through individual modes (due to e.g. an impairment) or in a location or environment which prevents the recognition of the alerting message. While this does not guarantee that the user will interpret an alert message correctly it certainly raises the probability that the alert is properly received. Depending on the urgency of an alert message, the alerting system should be enabled to override specific properties of a user's device settings.

NOTE: A number of other standards do not foresee this type of overriding user settings (e.g. CMAS (Commercial Mobile Alert System) [i.7] and EU-alert [i.8]).

Multimodality for sending out the actual alerting message may even go beyond the interface of the device that the user has chosen to use in a specific situation. Other means for alerting may be used (e.g. turning on a TV set in a home to deliver the alert via video and sound) while at the same time using the home owner's smartphone to deliver the same message) or public messages may support the delivery of the alert (e.g. through public announcement system in train station).

While the alerting message needs to be delivered in as many modes as possible, the actual information about the alert characteristics can be delivered to the user based on the device and interaction modes preferred by the user.

Alert messages presentation for people with disabilities may also be important for people without disabilities in specific situations (noisy surroundings, car driving). Display options for people with cognitive impairments or language problems may also be useful for children or very old people. One has to distinguish between the actual alert (which may be/should be intrusive) and the information presentation which can be better adapted to the current situation and the special needs of the person to be alerted.

5 Guidelines for Presentation of Alert Messages

All well-established design rules for the development of accessible ICT devices and systems should be followed when designing a system to present disaster alert messages. In particular the design guidelines in ETSI EN 301 549 [i.6], ETSI EG 203 350 [i.5], ISO 9241-171 [i.2], ETSI EG 202 116 [i.4] and ISO 9241-12 [i.1] should be investigated and followed.

If the alerting process makes use of web-based services and/or the Internet, the design guidelines of WCAG 2.0 [i.3] should be followed.

In addition to these well-established design rules the most important additional rule deals with the presentation of the actual disaster alert:

Guideline 5.1: For the presentation of a disaster alert the alerting system should be enabled to override device settings of an end user device.

Guideline 5.2: For the presentation of a disaster alert message the user device should make use of all modalities which can be experienced by the user, irrespective of specific device settings