Reducing Movement Permission by signaller action for an area

DISCLAIMER in context of
ERTMS 2026 - Conference (21-23 April 2026):

This document shows the status of the discussion!
It is an interim status of processing in the OD domain system pillar without a final decision.

1 Purpose and Scope

This document delivers the operational process describing how - in case of imminent danger- an emergency area is used to influence trains inside or approaching this area. A precondition is that the CCS system cannot automatically mitigate and that the Signaller takes the initiative to create the emergency area. The area helps to find out which trains must be stopped by emergency brake or will have an adapted (shortened) MA avoiding TR Mode.

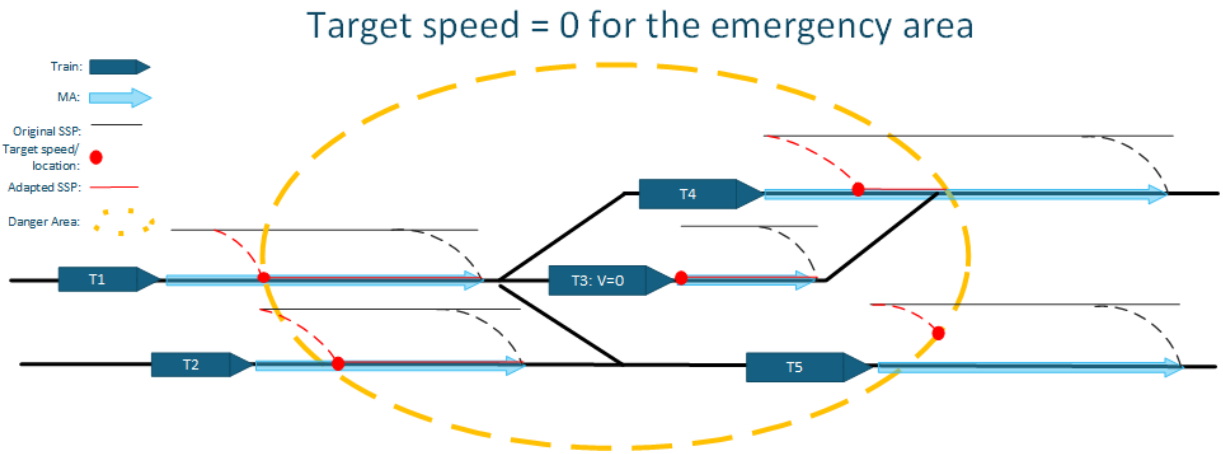
In the Scope:

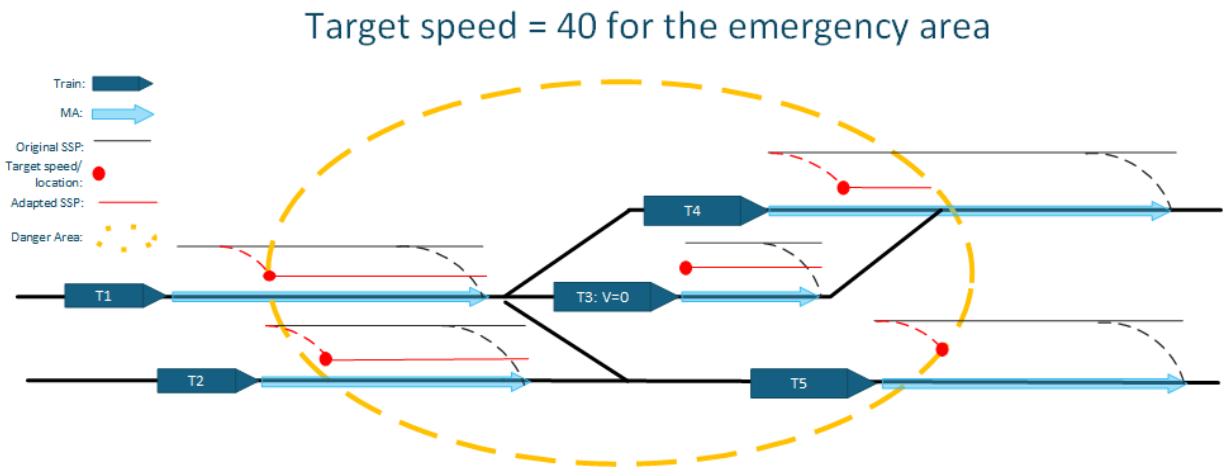
Creation of the emergency area and emergency stop for selected trains.

Out of Scope:

- Causes and details of the Emergency Alert process
- Use of OS Mode in case of non confirmed imminent danger --> for this scenario please refer to: -- ON HOLD---Creating On Sight Emergency Area
- Automated selection of impacted train(s) using incoming data about danger and danger position combined with train positions reports --> for this scenario please refer to: S2 T63 307 Optimised Emergency Stop

The diagrams below illustrate the target speed and location for the emergency area for trains outside or inside the area.





Where:

T1: Train on approach, the target speed can be reached at border of the area

T2: Train on approach, close to the border, the target speed cannot be reached at border

T3: Train inside area, as train speed is zero, the train front is target location

T4: Train inside area, target speed reached inside area (outside the area, the original SSP applies)

T5: Train inside area, target speed not reached inside area (outside the area, the original SSP applies)

1.1 Analysis

The following document delivers an analysis of operational solutions in different EU-member states:

S2 t64 108C Use of Emergency Area functionality by Signaller action (Annex)

1.2 Actor list

- SPP-10100 - Train Driver
- SPP-10102 - Trackside CCS
- SPP-10103 - On-board CCS
- SPP-10101 - Signaller
- SPP-10696 - Train

2 Station Outputs

2.1 Operational Design Decisions

2.1.1 Generic Operational Design Decisions

2.1.2 Specific Operational Design Decisions

Disclaimer: content of the design decisions aligned to the Operational Process as it was approved, but they were not yet consolidated, because design decisions are a new section in the template.

The signaller shall be able to alert all trains in an area with a single action

The signaller shall be provided with trackside functionality that allows reducing the speed profile of the existing MA for all trains in an area that can be freely defined by the signaller in real-time within the Signaller Area of Control.

> **Functionality that allows reducing MA for all trains in an area allows quick alerting while limiting logistical impact**
>
> If a situation occurs that impacts the safety of train movements, the MA of any connected train should be reduced dependent on the actual risk involved (OD principle 3.4). If the danger cannot be detected by any system, the signaller should take action to alert affected trains. If it is not known that a specific location is affected, this can be properly supported by a system function that allows defining an emergency area (OD principle 8.1). If desirable for quick reaction, predefined areas could be used as well.

Trains in or moving into an emergency area get a reduced MA but will not be tripped

When an emergency area is activated, the signaller can choose a new maximum speed (including 0 km/h) and the allowed train speed will be reduced in such a way that a driver can still control the train if braking is initiated right away. If the driver does not react quickly, a braking intervention due to overspeed will be triggered, but the train will not be tripped.

> **Tripping trains does not bring significant safety gains, while producing substantially more operational impact**
>
> If trains inside the Emergency Area would be tripped, all control of the train movement is taken away from the train driver. This will induce substantial wear in braking system and may cause damage in heavy freight trains. It also requires more effort and time to allow these trains to start moving again and to provide them with an MA. Reducing the target speed will enforce a similar reaction, but will also allow control over the train movement to remain with the driver, especially if the reduced speed is not 0 km/h. This way, stopping at locations that are not suitable for stopping can be prevented. This is especially useful if many trains in an area are affected by the emergency response, while only a limited number of these may actually encounter the dangerous event that triggered this reaction. Also, this way the emergency area could lead to the same operational result as receiving a Radio Alarm Call, as specified in TSI OPE Appendix B.13 (complying with OD principle 7.1), without the typical disadvantage of 'blanketing' an area that is typically larger than the actual area in which danger may exist. This is

considered to be a proper implementation to be considered ALARP (OD principle 8.5)

2.2 Operational Requirements

2.2.1 Generic Operational Requirements

SPP-6680 - An harmonized process shall be defined to automatize and optimize the activation and deactivation of unplanned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.

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SPP-6859 - CCS shall rely on a standardized set of manual controls for degraded operations.

The standardized manual controls for degraded operations, are based on harmonised operational rules. This approach minimizes national variations in Generic Applications.

SPP-6932 - Signaller shall have a visual representation of the complete status of the operational situation

In order to react to incidents that have the potential to limit the railway safety and track capacity, the signaller shall have a visual overview of the operational status

SPP-8650 - An harmonized process shall be defined to mitigation measures to react in case of an incident

An harmonized process shall be defined to mitigation measures to react in case of an incident (e.g. track section sweeping, deploying/requesting unplanned maintenance routines, etc.)

SPP-7055 - An harmonized process shall defined to execution safety-related mitigation measures for Track Workers protection

An harmonized process shall defined to execution safety-related mitigation measures for Track Workers protection - e.g. warnings initialisation, emergency train-braking application commands, etc.

2.2.2 Specific Operational Requirements

SPP-41196 - A specific procedure shall manage the reaction of the system in case an area is affected by an imminent danger

A specific procedure shall manage the reaction of the system in case any area of the railway infrastructure is affected by an imminent danger. Different reactions could be possible depending on the criticality of the danger and its location.

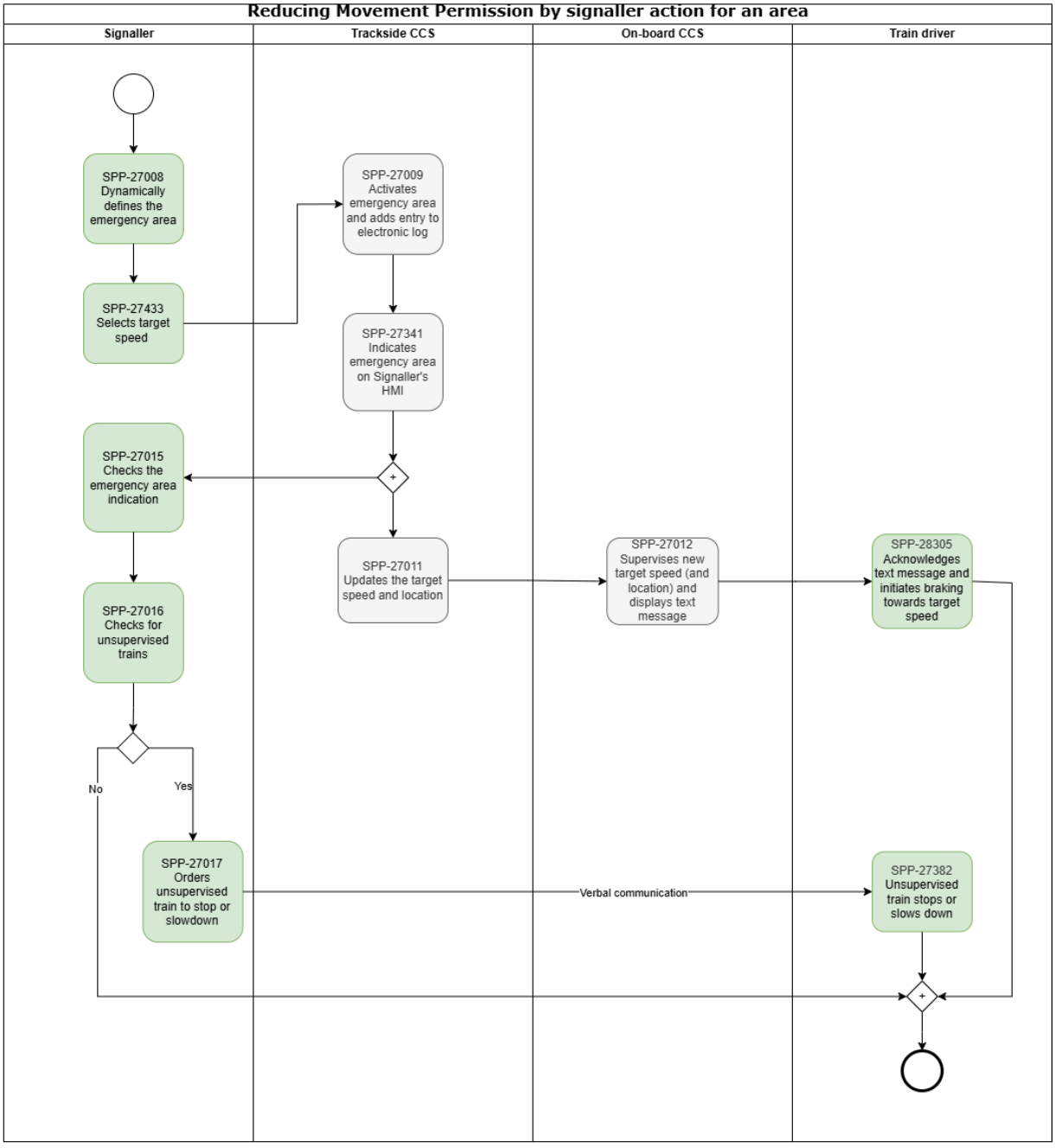
2.3 Candidate Operational Process

Reducing Movement Permission by Signaller action for an area in case of imminent danger

Status	In Progress
Op.Precondition	A situation has occurred that presents imminent danger in a certain area on the infrastructure, which the CCS system cannot automatically mitigate.
Op.Rationale	Handling a situation that presents imminent danger in a certain area on the infrastructure, for which the signaller needs to take action.
Op.Postcondition	Any train moving towards or on the affected infrastructure has been stopped or slowed down. No trains have been tripped as a result of the reduced movement permission.

Reducing Movement Permission by Signaller action for an area in case of imminent danger

Stop or slow down all trains inside or approaching the area with the option to avoid EM braking.



SPP-27008 - Signaller dynamically defines the emergency area

Signaller dynamically defines the needed emergency area on the HMI based on the incoming information about danger.

Status	Open
User Needs	The Signaller's HMI supports dynamic definition of an emergency area, e.g. by drawing a border on the screen to define the area or selecting a list of contiguous track sections.

SPP-27433 - Signaller selects target speed

The Signaller selects the target speed for the defined emergency area and requests the activation of the area.

Note: The default target speed is 0 km/h but other values can be chosen if the Signaller only wishes to slow down the trains in the area.

Status	Open
User Needs	The Signaller's HMI provides: • capability to activate the defined emergency area • Optionally a low target speed can be selected different from the default value 0 km/h. Note: The value of the optional low target speed is also a predefined value, but the low target speed value could be configurable on a user level to support different Infrastructure Manager needs

SPP-27009 - Trackside CCS activates emergency area and adds entry to electronic log

The Trackside CCS activates the requested emergency area and selected target speed for the area. Trackside CCS makes an entry in the electronic log detailing the activated emergency area and target speed.

Status	Open
User Needs	The Signaller's HMI is able to display any activated emergency area and its related target speed, if any.

SPP-27341 - Trackside CCS indicates emergency area on Signaller's HMI

The Trackside CCS indicates the active emergency area on the Signaller's HMI.

Status	Open
User Needs	The Signaller's HMI is able to display any activated emergency area and its related target speed.

SPP-27011 - Trackside CCS updates the target speed and location

The Trackside CCS calculates the target location for the target speed in the area and sends updated MAs (including a standard text message to instruct the driver to stop or slow down) to any trains in, or approaching, the activated emergency area. The target location is based on the reported speed and location and considers the configured assumed SB brake performance and time.

Note: The assumed SB brake performance can be train category specific. If the assumed SB brake

performance is high, trains will immediate apply EM brakes for the supervised target speed and location.

Status	Open
User Needs	No derived User Need

SPP-27012 - On-board CCS supervises new target speed (and location) and displays text message

The On-board CCS of any train with an MA inside, or approaching, the emergency area supervises the new target speed and location and, if required, applies the brake. The On-board CCS indicates the text message on the DMI and requests the Train Driver to acknowledge.

Note: if the train exits the emergency area, either braked or running with the allowed target speed, the original allowed speed and EoA/SvL of the original MA are applicable. The text message will disappear and the train can continue normally.

Status	Open
User Needs	DMI displays the text message received from Trackside CCS and allows its acknowledgement. *Reason for the text message is to instruct the Train Driver to perform the brake actions even before ERTMS brake reactions (Full SB or EB) will apply.*

SPP-28305 - Train Driver acknowledges the text message and initiates braking towards target speed

The Train Driver acknowledges the text message and initiates braking towards target speed indicated on the DMI.

Status	Open
User Needs	DMI requests to the driver the text message acknowledgement and is able to get this input from the driver.

SPP-27015 - Signaller checks the emergency area indication

The Signaller checks the indication of the activated emergency area on the HMI.

Status	Open
User Needs	See OR SPP-27341 - Trackside CCS indicates emergency area on Signaller's HMI above

SPP-27016 - Signaller checks for unsupervised trains

Signaller checks if there are any unsupervised trains which are affected by the emergency area.

Status	Open
User Needs	Signaller's HMI indicates unsupervised trains (e.g. train operational ID, estimated position etc).

SPP-27017 - Signaller orders unsupervised trains to stop or slowdown

The Signaller contacts the Train Driver of any affected unsupervised train and orders them to stop or slow down.

Status	Open
User Needs	No derived User Need

SPP-27382 - Train driver of unsupervised train stops or slows down

The Train driver of the unsupervised train stops, or slows down, the train as ordered by the Signaller.

Status	Open
User Needs	No derived User Need

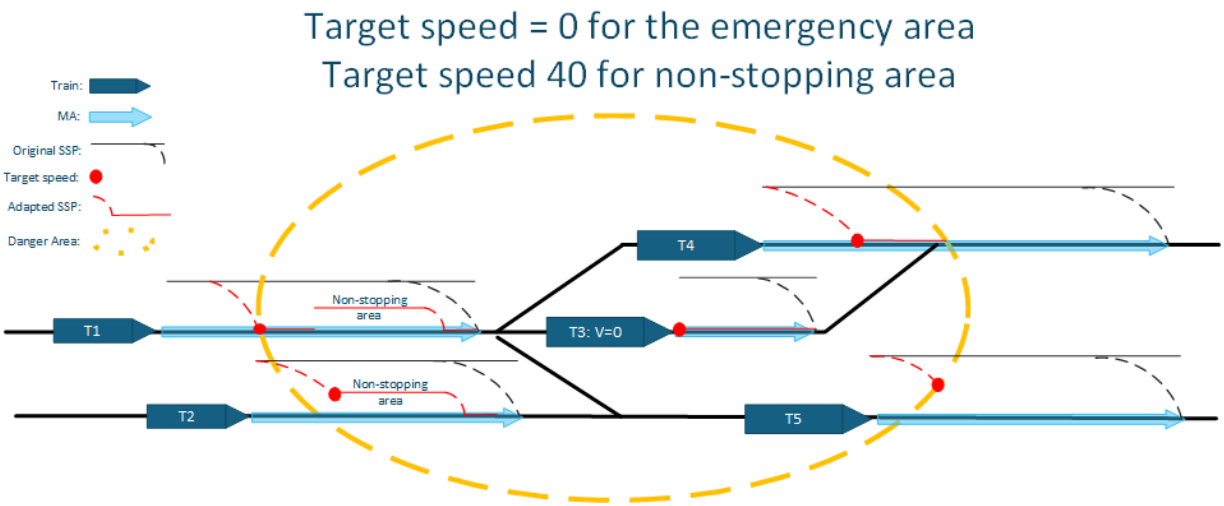
3 Impact on TSI OPE

4 Points of Discussion

The following issues arose during the drafting of the process and were subject to clarification. To see more, please open the work item.

It must be clarified how the functionality for emergency areas should be in case...

It must be clarified how the functionality for emergency areas should be in case they are activated in a non-stopping area. One option could be to require an allowed speed set to >0 km/h for the non-stopping area's (including train length) in the defined emergency area. **[** Open **]**



It must be clarified if the target speed enforced by the activation of the emerg...

It must be clarified if the target speed enforced by the activation of the emergency area should extend to trains running in SR-mode without an MA? In principle it should be technically possible to enforce a speed or distance to run in SR. However, there could potentially be trains running in ISOLATED or non-reporting SR trains and in such cases, they would not receive any update from the Trackside CCS and the only option is for the Signaller to contact those trains individually and request them to stop or slow down. It must be considered if the Signaller will easily be able to identify such trains and determine which to manually inform and which will be technically informed. **[** Open **]**

To be considered during the Rule Book station if a definition of "electronic log...

To be considered during the Rule Book station if a definition of "electronic log" is needed. **[** Open **]**

The use of text messages for safety related tasks must be further analyzed to de...

The use of text messages for safety related tasks must be further analyzed to decide if this is an acceptable approach. **[** Open **]**

During the Rule Book station for t62 and t64, it should be clarified if the term...

During the Rule Book station for t62 and t64, it should be clarified if the term "unsupervised train" is sufficiently clear, or if it is needed to focus on "trains moving on European Instruction" instead.

Comment from review of S2:
"Unsupervised could be misinterpreted. In the glossary, unsupervised trains are trains that are 'not under supervision of the CCS system'. It is debatable if a connected train running in SR would be considered 'unsupervised' as distance, speed, specific path and also the entry to SR can be regarded as at least partly supervised by the CCS system. Suggestion to indicate that we mean any train driving without MA here." **[**✏ Decided **]**

Comments from safety review

1. this detailed list defines technical solutions rather then operational needs.
To evaluate and identify hazards, it would be helpful to know examples for imminent danger requesting this handling of trains. This currently missing.
2. It sounds strange from safety point of view, that safety relevant data shall be engineered twice in different subsystems. From safety perspective it is prefered to have only one source for the data to avoid inconsistencies and errrors in the engineering process.
Note: My expectation is to focus on operational needs and not on technical solutions in station 2.
3. Usually operational requirements related to the analysed process are included in this chapter. The copy of the global operational requirements is not helpful and the relation to the operational process is not clear.
Please made some more precise requirements related to the process "reducing MP by signaller action for an area".
E.G. The signaller shall be able to command to stop all trains in a pre-defíned area immediatly or at the next possible location without brake intervention.
Note: The speed reduction for a certain area is from my perspective addressed in the 403 Manage usage restriction and does not need to be handled twice.
4. In situations of imminent danger, a rapid response is essential. However, dynamically defining an emergency area may contradict the goal of enabling quick action.
Please assess whether the use of pre-configured emergency areas is feasible, as this approach is more robust under time pressure and reduces the risk of errors when defining area boundaries.
5. It is unclear why the aspect of "slow down" is addressed in this process. Isn’t this already covered under 403 Manage Usage Restrictions?
Please clarify the distinction between the two and explain the rationale for including it in 108C.
From my perspective, this introduces redundancy. I therefore propose removing the "slow down" aspect from 108C.
6. Please clarify the difference to manage usage restricitions in case the target speed is not 0 km/h.
Expectation: The same functionality shall not be triggered via different commands
7. Please decribe the operational needs and not the functions.
Proposal for rewording: The Trackside CCS shall stop all trains within the emergency area at the nearest possible location that can be reached without triggering an emergency brake.
Trains approaching the emergency area shall be stopped either at its boundary or at the nearest possible location that can be reached without triggering an emergency brake within the area.

This requirement applies to all supervised trains (i.e., operating in modes FS, AD, OS, SM, and SR).
8. Why the signaller shall check the emergency area indication? It is not clear what he has to check and how this impact the process.
Check if this can be removed or clarify the consequences of this action.
9. How can the signaller checks unsupervised trains? They are displayed on the HMI? Please clarifiy in which modes are the trains and how they can be identified.
I wondering if it is under the responsibility of the signaller to check that all trains impacted by the new activated emergency area are correctly stopped. E.g. if due to radio disturbance trackside CCS does not gets a confirmation that the updated movement permission was received.
10. See comment above. It is not clear which trains are unsupervised and how the signaller can identify them.
11. see above. This is covered by CENELEC and does not need additional specification. **[** Open **]**

5 Glossary

5.1 Terms and definitions

Term	Definition
Driver Machine Interface (DMI)	Train device to enable communication between the ETCS on-board and the driver.
EMERGENCY BRAKING	Application of a predefined brake force in the shortest time in order to stop the train with a defined level of brake performance.
Emergency area	An emergency area in the target system is an area which can be created dynamically at the Signaller's HMI. The HMI shall support dynamic definition of an emergency area, e.g. by drawing a border on the screen to define the area
Emergency stop order	ETCS order braking a train with the maximum brake force until the train is at a standstill.
End Of Authority	Location up to which a train or a shunting composition is authorised to proceed.
Human Machine Interface	Human Machine Interface is mainly the space and environment in which interactions between humans and machines occur, through complex relations between input and output exchanged among several sub-systems and/or peripheral devices and presented by means of the display of graphical elements and data, from where Operators can issue commands and supervise the sub-systems behaviour.

Term	Definition
MOVEMENT AUTHORITY	Permission for a train to run to a specific location within the constraints of the infrastructure.
STANDSTILL, ETCS	A state which is entered when the ERTMS/ETCS on-board equipment determines that the train is not moving, and which is left when the ERTMS/ETCS on-board equipment determines that the train is moving. Important note: The criteria for determining standstill are not harmonised. An ERTMS/ETCS on-board reporting “standstill” does not guarantee that there is no train movement at all.
TRIP MODE	ERTMS/ETCSERTMS/ETCS on-board equipment mode (e.g. entered when passing an EOA), resulting in an application of the emergency brake that can only be revoked at standstill and with additional precautions.
Text message	Information in writing displayed on the Driver Machine Interface.
Train	A train is defined as (a) traction unit(s) with or without coupled railway vehicles with train data available operating between two or more defined points.
Unsupervised movement	An unsupervised movement is not under the supervision of the CCS system. There is no authorisation given by the Trackside CCS. If it is combine like this it sounds a little bit like the Signaller could be responsible for the Driving or it could be the Driver's fault if the Signaller makes a mistake while protecting the movement." contenteditable="false" src="/polarion/ria/images/control/comment_resolved.png" class="polarion-dle-comment-resolved-icon">

5.2 Abbreviations

Abbreviation	Definition
EB	EMERGENCY BRAKING
EOA	End Of Authority
HMI	Human Machine Interface
MA	MOVEMENT AUTHORITY
SB	Service Brake or in the context of modes, Stand By mode
TR	TRIP MODE