Feature Document (FD)

Hazard Light

<<Feature>>

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1 INTRODUCTION

1.1 Document Purpose

A Feature Document (FD) document specifies **what** the feature shall do and how it shall behave from customer perspective. It should also provide reasoning and background **why** we have the feature in the vehicle.

The FD also serves as an Item Definition as defined by ISO26262 for those features, which follow the Ford Functional Safety process.

To get more information about the concept of feature, function and component level abstraction refer to the Ford RE Wiki. For details on the Ford Functional Safety (ISO26262) process refer to the Ford Functional Safety Sharepoint.

1.2 Document Scope

This Feature Document (FD) specifies the following features:

Feature ID	Feature Name	Owner	Reference
	Hazard Light (Program(s): Core)	Feature: Lars Junker (Ljunker5) FUSA: Elcin Pehlivan (epehliv2)	

Table 1: Features described in this FD

1.3 Document Audience

The FD is written by the feature owner of Feature: Lars Junker (Ljunker5)
FUSA: Elcin Pehlivan (epehliv2)
. All Stakeholders, i.e., all people who have a valid interest in the feature should read and, if possible, review the FD. It needs to be guaranteed, that all stakeholders have access to the currently valid version of the FD.

*#**Hint:** The FD template has the IP Classification "Proprietary" by default. IP Classification "Confidential" might be required in some cases, e.g. by Ford Functional Safety.*

1.3.1 Stakeholder List

For the latest list of stakeholder of the feature and their influence refer to <Put VSEM Link here>.

*#**Hint:** Refer to Ford RE Wiki – Stakeholder List on how to create a stakeholder list. The stakeholder list should be stored in VSEM in the pseudo folder "General Data Artifacts" of the corresponding feature.*

1.4 Document Organization

1.4.1 Document Context

Refer to the Specification Structure page in the Ford RE Wiki to understand how the FD relates to other Ford Requirements Documents and Specifications.

1.4.2 Document Structure

The structure of this document is explained below:

Section 1 – Introduction how to use this document including responsibilities and requisite documents. Explains the terminology. Gives a clarification of the definitions, concepts and abbreviations used in the document.

Section 2 – Feature Description. States briefly the background and the purpose of the feature, feature variants and corresponding regions and markets. Also includes input requirements, assumptions and constraints.

Section 3 – Feature Context describes all external entities, which have an influence on the feature.

Section 4 – Feature Modeling. Contains Use Case, Driving Scenarios, State Charts to describe the functional behavior of the feature.

Section 5 – Safety. Lists System Behaviors and Safety Goals of the feature.

Section 6 – Feature Requirements. Lists functional and non-functional requirements of the feature.

Section 7 – Architecture. Shows the coarse architecture, which the feature requirements are deployed to. Describes the elements and the boundary of the feature as well as the decomposition and distribution of associated functions.

Section 8 – List of Open Concerns

Section 9 – Document Change History including a list of new or modified requirements. The requirements in this document are tagged, and this section contains different types of tables listing all, new, or changed requirements by their title and page no.

Section 10 – Appendix

*#**Hint:** All sections are mandatory, unless explicitly marked by the tag "#Classification" as "optional" or as applicable e.g. to certain domains like "Functional Safety".*

1.5 Document Conventions

1.5.1 Requirements Templates

Each requirement, use case or scenario in this specification shall follow the corresponding template given in the document template *Specification_Macros.dotm* at RE Wiki - Specification Templates.

1.5.1.1 Identification of requirements

1.5.1.2 Requirements Attributes

The templates provided by *Specification_Macros.dotm* define a list of attributes for each requirement. This helps to classify the requirement. The attributes are explained at RE Wiki - Requirements Attributes.

2 FEATURE OVERVIEW

2.1 Purpose and Description of Feature

*#**Hint:** Some descriptive text to explain the purpose and functionality of the feature.*

The primary goal of the Hazard Light feature is to warn other traffic participants that the vehicle is temporarily a potential hazard.
Therefore, it uses the turn signal lights, which all flash synchronously. An optical and acoustical feedback on feature activation is given to the driver using the turn signal tell tale.

2.2 Feature Variants

*#**Hint:** Definitions for different variants of the feature (if applicable). Give each variant a descriptive name by which it can be referenced further on in the document. If no variant exists, state "No Feature Variants".*
The Variant Description should give a short informative text which describes the variants of the feature.

Variant Name	Variant Description	Remarks
Hazard Light	No Variants	

Table 2: Feature Variants

2.2.1 Regions & Markets

*#**Hint:** Description of purpose and functionality of the feature. If there is no variant, give feature name in first column.*

Market / Region / Variant Name	North America	South America	Europe	Middle East/Africa	Asia / Pacific	China
Hazard Light	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory

Table 3: Regions & Markets

2.3 Input Requirements

*#**Hint:** List all input requirements, which are relevant for the feature. Typically, attribute requirements, legal requirements as well as national and international standards have to be considered.*

2.3.1 Legal Requirements

- : Automatic activation 6.6.7.2.
  - The hazard warning signal may be activated automatically in the event of a vehicle being involved in a collision or after an emergency stopl. In such cases, it may be turned "off" manually.
- : Color 5.15.
  - The hazard warning signal may be activated automatically in the event of a
- : Compliance with CMVSS101
  - The feature Hazard Light shall comply with FMVSS101.
- : Compliance with ECE R48
  - The feature Hazard Light shall comply with ECE R48.
- : Compliance with FMVSS101
  - The feature Hazard Light shall comply with FMVSS101.
- : Flashing 5.9.1.
  - vehicle being involved in a collision or after the de-activation of the
- : Presence 6.6.1.
  - The presence of a hazard warning signal is mandatory.

- : Simultaneous operation 2.7.18
  - "Hazard warning signal" means the simultaneous operation of all of a vehicle's direction-indicator lamps to show that the vehicle temporarily constitutes a special danger to other road-users.
- : Trailer 6.6.9.
  - If the vehicle is equipped to draw a trailer it shall be also be capable of enabling the trailer's turn signal lamps.

2.3.2 Industry Standards

- : ISO 26262
  - The system should be developed according to Ford's implementation of Functional Safety.

2.3.3 Attribute Requirements

- : Warn traffic participants
  - The feature Hazard Light wants to warn traffic participants, in case the vehicle constitutes a special danger. Situations which legally require/strongly recommend the use of hazard lights could be
  - (a) if the vehicle is in a hazard, thus holding up traffic,
  - (b) towing or being towed,
  - (c) approaching a traffic jam or
  - (d) driving at very slow speed on the highway.

2.4 Lessons Learned

*#**Hint:** Additional information and lessons learned from previous development or related features. A typical source for Lessons Learned is the FMA Quality History.*
*#**Functional Safety:** In context of Functional Safety Lessons Learned and similar information will be used to check the completeness of the Functional Safety Goals and assumptions in the Hazard Analysis and Risk Assessment (HARA).*
*#**Link:** Ford Functional Safety Sharepoint*

2.5 Assumptions

*#**Classification**: Optional*
*#**Hint:** A list of known assumptions concerning the effects of the feature's behavior on other features or elements (i.e., dependencies) as well as assumptions on the behavior expected by the feature (e.g. known limitations). During the course of the feature development most of those assumptions are typically either converted into actual requirements or discarded at some point – such that this chapter remains mostly empty. For assumptions, which are relevant for the Functional Safety process refer to chapter 6.2 "Safety Assumptions"*

Assumption3

In cases hazard lights are malfunctioning brake lights will still be detected by the following traffic

Purpose
This assumption is used in the controllability rating

Assumption1

The driver is not aware of the activation of the feature due to missing supporting functions.

Purpose
In order to evaluate the worst case supporting functions are not working to inform the driver about the activation. Once the supporting functions are working, the driver will be able to realize the unintended activation and deactivate the feature.

Assumption2

The driver is not aware of the deactivation of the feature due to missing supporting functions

Purpose

In order to evaluate the worst case supporting functions are not working to inform the driver about the deactivation. Once the supporting functions are working, the driver will be able to realize the unintended deactivation and re-activate the feature.

2.6 References

2.6.1 Ford Documents

List here all Ford internal documents, which are directly related to the feature.

Reference	Title	Doc. ID	Document Location	Revision

Table 4: Ford internal Documents *(not specified in SysML model)*

2.6.2 External Documents and Publications

The list of external documents could include books, reports and online sources.

*#**Hint:** You may refer to IEEE Citation Reference on how to format a reference.*

Reference	Document / Publication	Document Location

Table 5: External documents and publications *(not specified in SysML model)*

2.7 Glossary

*#**Hint**: Terms, concepts and abbreviations used in the document shall be defined and illustrated here. Note that changes to terms and/or concepts described in this section tend to cause major updates to this document.*
The tables below have feature specific definitions and abbreviations. For additional, non-feature specific terms please refer to the RE Glossary

See Appendix for Definitions and Abbreviations.

3 FEATURE CONTEXT

3.1 Feature Context Diagram

*#**Hint:** High level diagram of feature interactions with the environment, people or other feature or other external entities.*
*#**Link:** RE Wiki - Context Diagram*

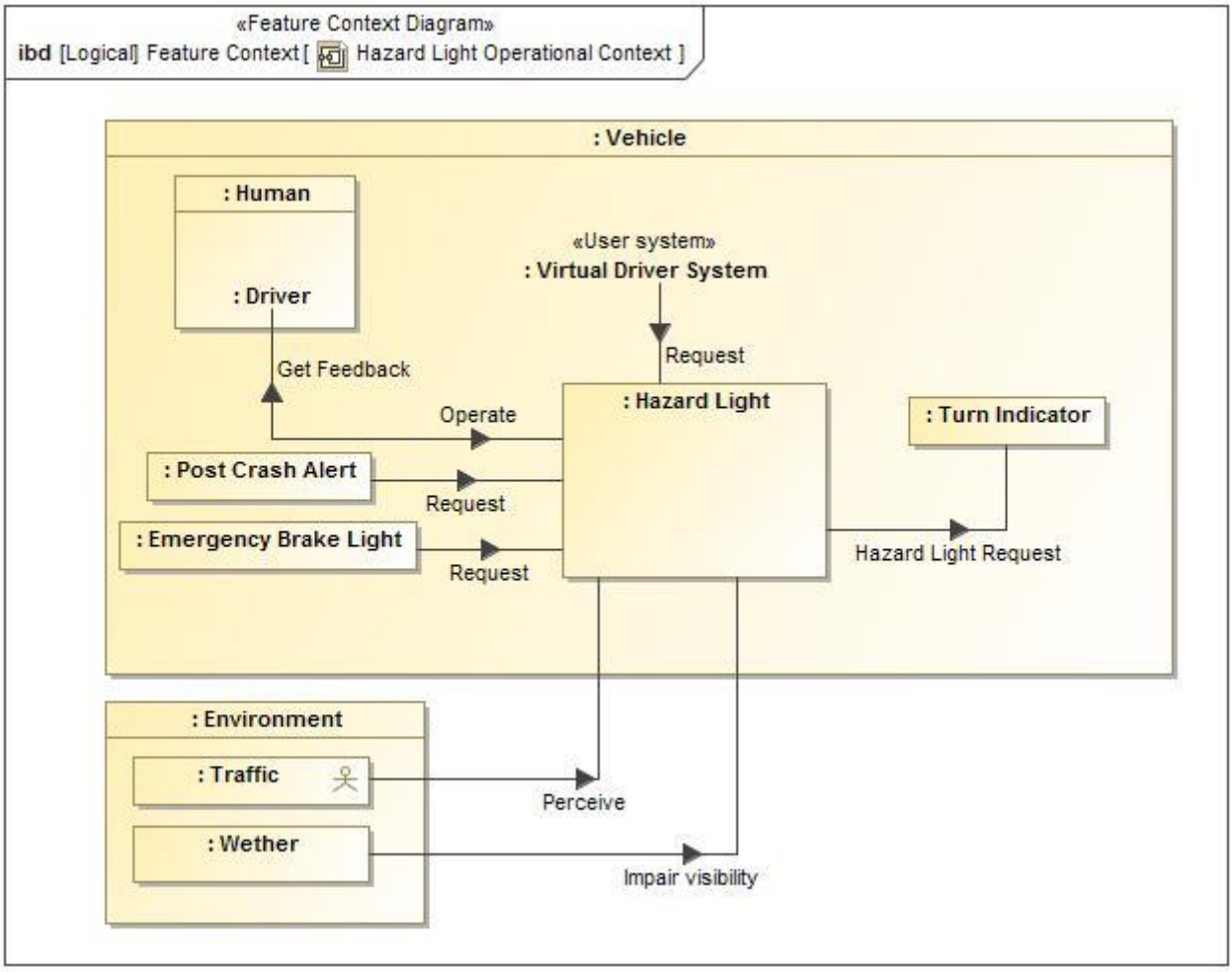


Figure 1: Hazard Light Operational Context

3.2 List of Influences

ID	External Entity	Influence Description
Get Feedback	Hazard Light To Human	The driver gets an audio and visual feedback of the feature activation status.
Hazard Light Request	Hazard Light To Turn Indicator	The Hazard Light Feature requests the Turn Indicator to activate all Indicators.
	Turn Indicator To Hazard Light	The Hazard Light Feature requests the Turn Indicator to activate all Indicators.
Impair visibility	Wether To Hazard Light	Mud, snow and other obstructions of the lamps may impair the visibility of the feature.
Operate	Human To Hazard Light	The human driver is always in control of the feature.
Perceive	Environment To Hazard Light	

Request	Emergency Brake Light To Hazard Light	The Entity requests the Hazard Light Feature to be active.
	Hazard Light To Turn Indicator	The Entity requests the Hazard Light Feature to be active.
	Post Crash Alert To Hazard Light	The Entity requests the Hazard Light Feature to be active.
	Turn Indicator To Hazard Light	The Entity requests the Hazard Light Feature to be active.
	Vehicle To Hazard Light	The Entity requests the Hazard Light Feature to be active.

Table 6: List of Influences

4 FEATURE MODELING

4.1 Operation Modes and States

*#**Classification:** Optional (Mandatory for Functional Safety)*
*#**Link:** RE Wiki – State Charts*
*#**Hint:** State Charts are a popular means to express feature behavior in terms of states and modes. An advantage of this state machine like approach is that consistency can be easily verified.*

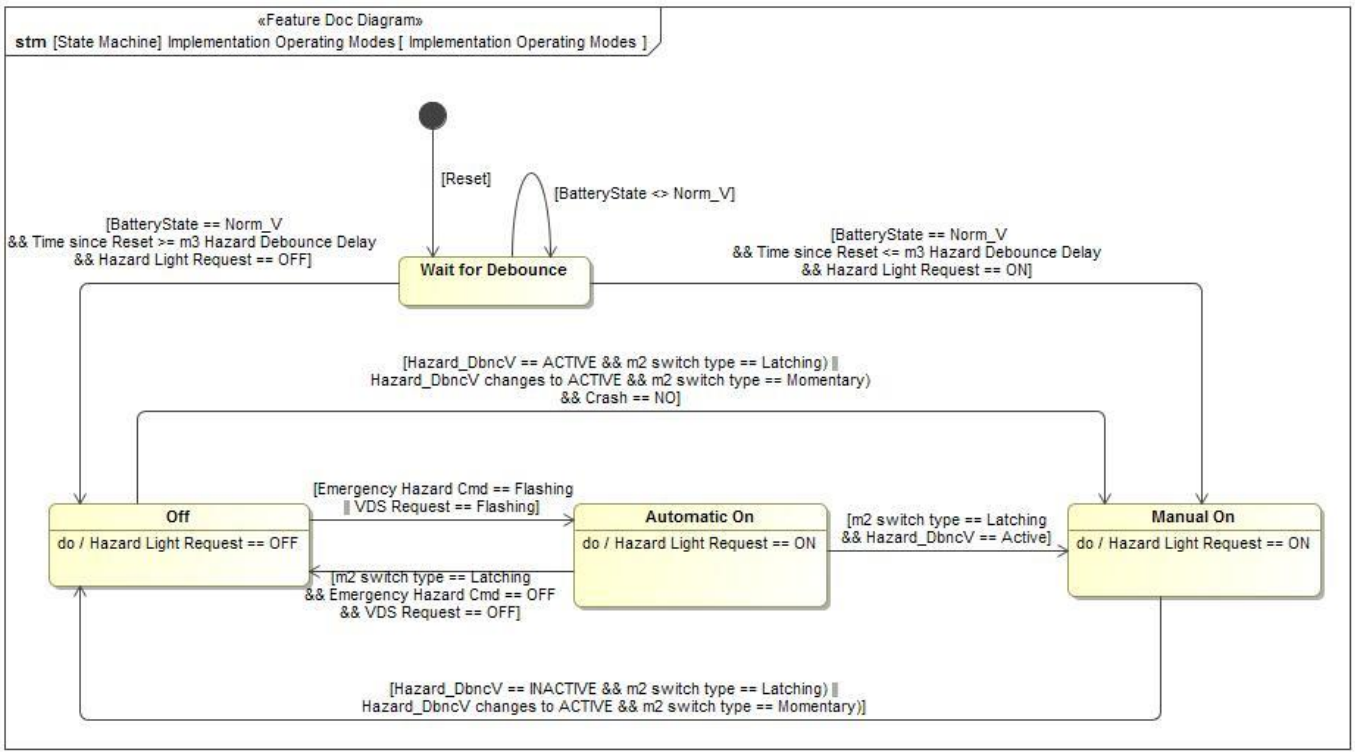


Figure 2: Implementation Operating Modes

State	Description	Requirements Reference (optional)
Automatic On	Do behavior: Hazard Light Request == ON	
Manual On	Do behavior: Hazard Light Request == ON	
Off	Do behavior: Hazard Light Request == OFF	
Wait for Debounce		

Table 7: Operation Modes and States on Implementation Operating Modes

Transition ID	Description	Requirements Reference (optional)
T1	Guard: =Emergency Hazard Cmd == Flashing || VDS R...	
T2	Guard: =BatteryState == Norm_V && Time since Rese...	
T3	Guard: =Reset	
T4	Guard: =BatteryState <> Norm_V	
T5	Guard: =BatteryState == Norm_V && Time since Rese...	
T6	Guard: =Hazard_DbncV == INACTIVE && m2 switch typ...	
T7	Guard: =m2 switch type == Latching && Hazard_Dbn...	
T8	Guard: =Hazard_DbncV == ACTIVE && m2 switch type ...	

T9	Guard: =m2 switch type == Latching && Emergency ...	

Table 8: Transitions between Operation Modes and States on Implementation Operating Modes

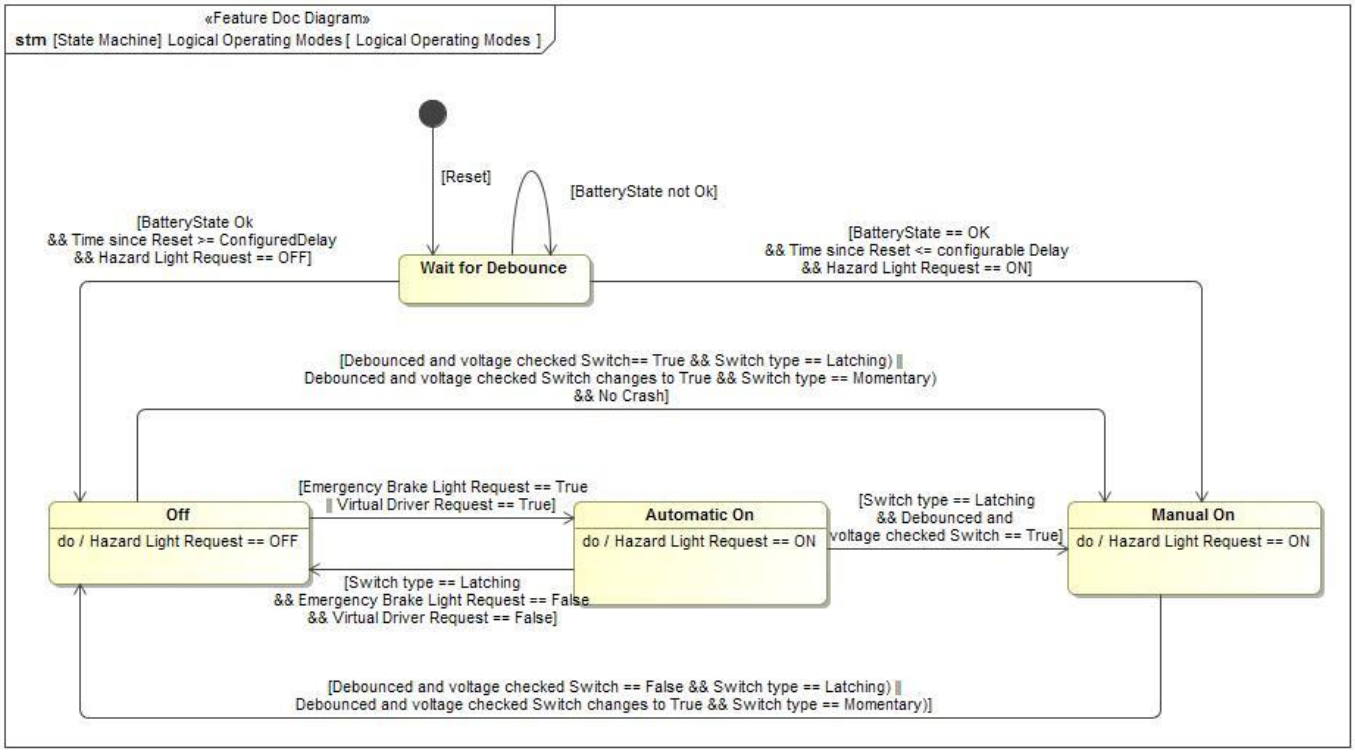


Figure 3: Logical Operating Modes

State	**Description**	**Requirements Reference** (optional)
Automatic On	Do behavior: Hazard Light Request == ON	
Manual On	Do behavior: Hazard Light Request == ON	
Off	Do behavior: Hazard Light Request == OFF	
Wait for Debounce		

Table 9: Operation Modes and States on Logical Operating Modes

Transition ID	**Description**	**Requirements Reference** (optional)
T1	Guard: =BatteryState Ok && Time since Reset >= Co...	
T2	Guard: =Debounced and voltage checked Switch== Tr...	
T3	Guard: =BatteryState == OK && Time since Reset <=...	
T4	Guard: =Switch type == Latching && Debounced and...	
T5	Guard: =Debounced and voltage checked Switch == F...	
T6	Guard: =Reset	
T7	Guard: =Emergency Brake Light Request == True || ...	
T8	Guard: =Switch type == Latching && Emergency Bra...	
T9	Guard: =BatteryState not Ok	

Table 10: Transitions between Operation Modes and States on Logical Operating Modes

4.2 Use Cases

*#**Classification:** Optional*
*#**Link:** RE Wiki – Use Cases*

4.2.1 Use Case Diagram

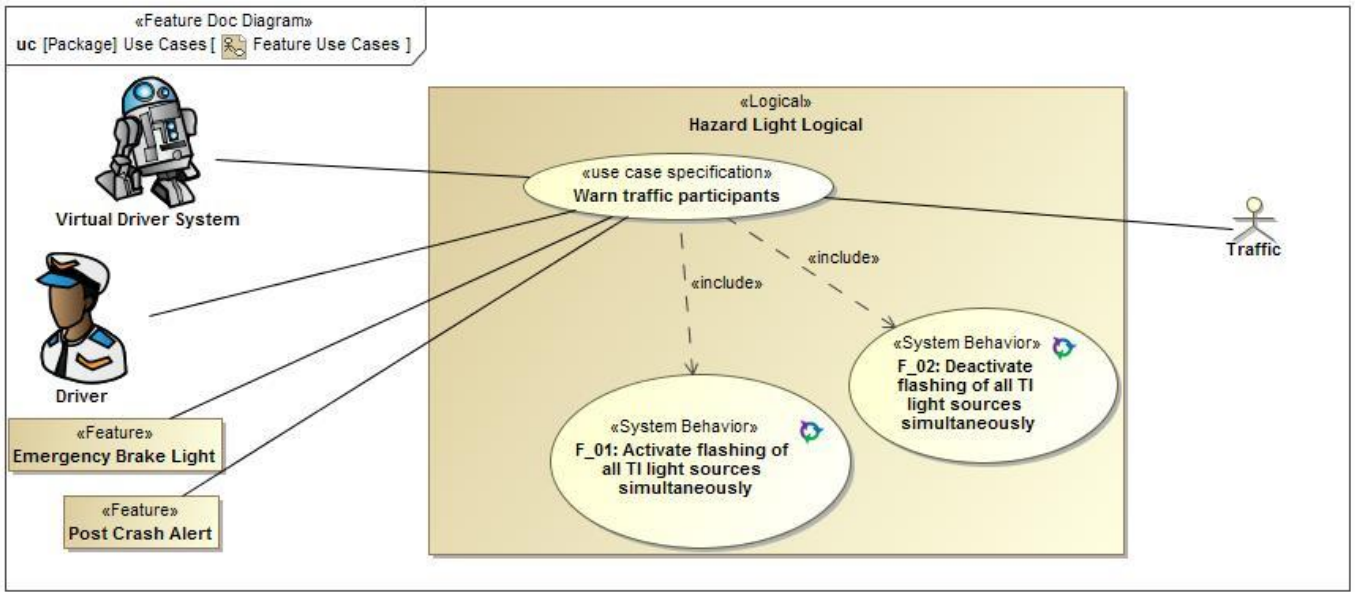


Figure 4: Feature Use Cases

4.2.2 Actors

Actor	Description
Driver	Primary Actor. The Human Driver of the vehicle.
Emergency Brake Light	Primary Actor. Vehicle Feature.
Post Crash Alert	Primary Actor. Vehicle Feature.
Traffic	Secondary Actor.
Virtual Driver System	Primary Actor. Autonomous vehicle control system.

Table 11: List of Actors

4.2.3 Use Case Descriptions

*#**Classification:** Optional*

Warn traffic participants

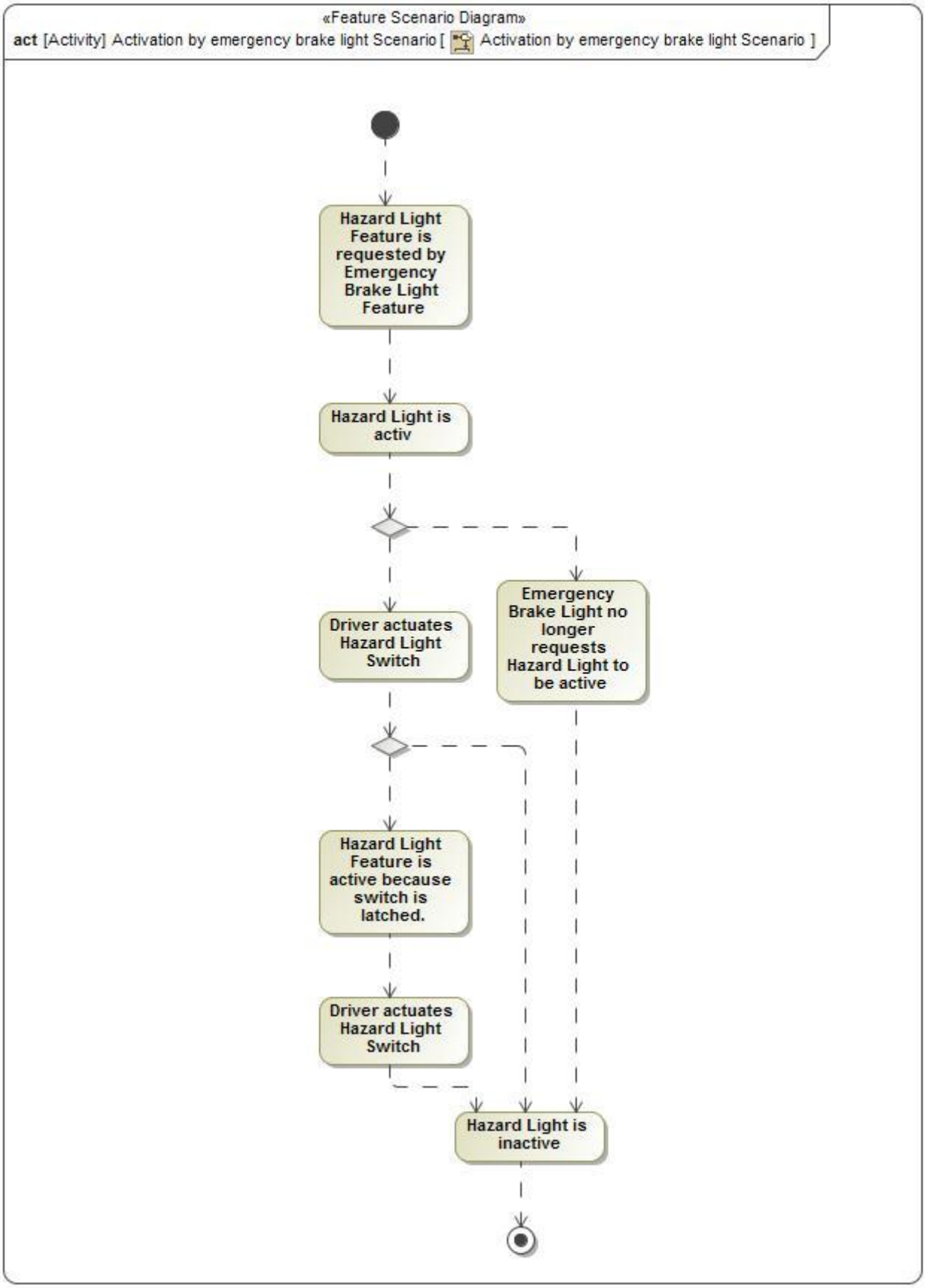
Actors		Driver
		Emergency Brake Light
		Post Crash Alert
		Traffic
		Virtual Driver System
Subject		Hazard Light Logical
Description		After detecting a hazardous event, hazard lights will be activated to warn the surrounding traffic.

Preconditions	PreC1	The risk of being a danger to traffic exceeds a certain threshold. This is considered a hazard and classified as such.
	PreC2	The risk of the vehicle being a potential danger to the traffic has been evaluated.
Triggers	T1	Hazardous event affecting the host vehicle.
	T2	Vehicle being towed.
	T3	Vehicle towing.
	T4	Approaching a traffic jam.
	T5	Having performed an emergency brake.
	T6	Having had an accident.
Main Flow Description		The Hazard Light feature is active and all turn signals flash synchronously.
Main Flow	M1	Activate Hazard Light feature.
	M2	Request all turn signals to flash synchronously.
	M3	Generate optical and acoustical feedback for the driver.
Alternative Flow Description		The Hazard Light Feature is active and all functional turn signal lights are flashing synchronously. (This could happen, if parts of the turn signal light sources get destroyed during an accident)
Alternative Flow Steps	A1	n/a

4.3 Driving and Operation Scenarios

*#**Classification:** Optional (Mandatory for Functional Safety)*
*#**Functional Safety:** Driving and operating scenarios which impact the functionality of the feature can be used to check, if the situation analysis in the HARA is complete*
*#**Link:** RE Wiki – Driving Scenarios*

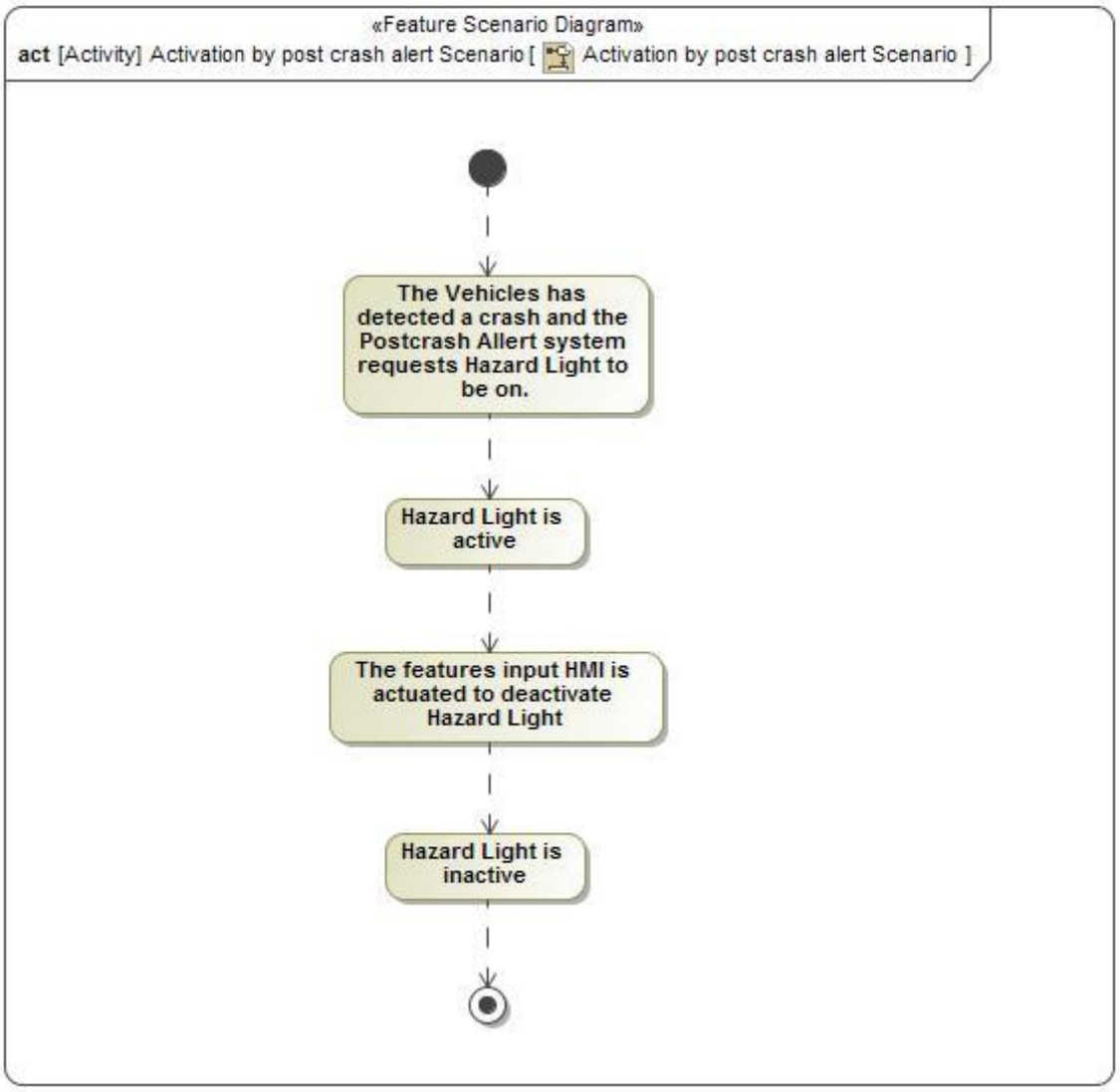
Activation by emergency brake light Scenario



Flow of Actions	
1	Hazard Light Feature is requested by Emergency Brake Light Feature

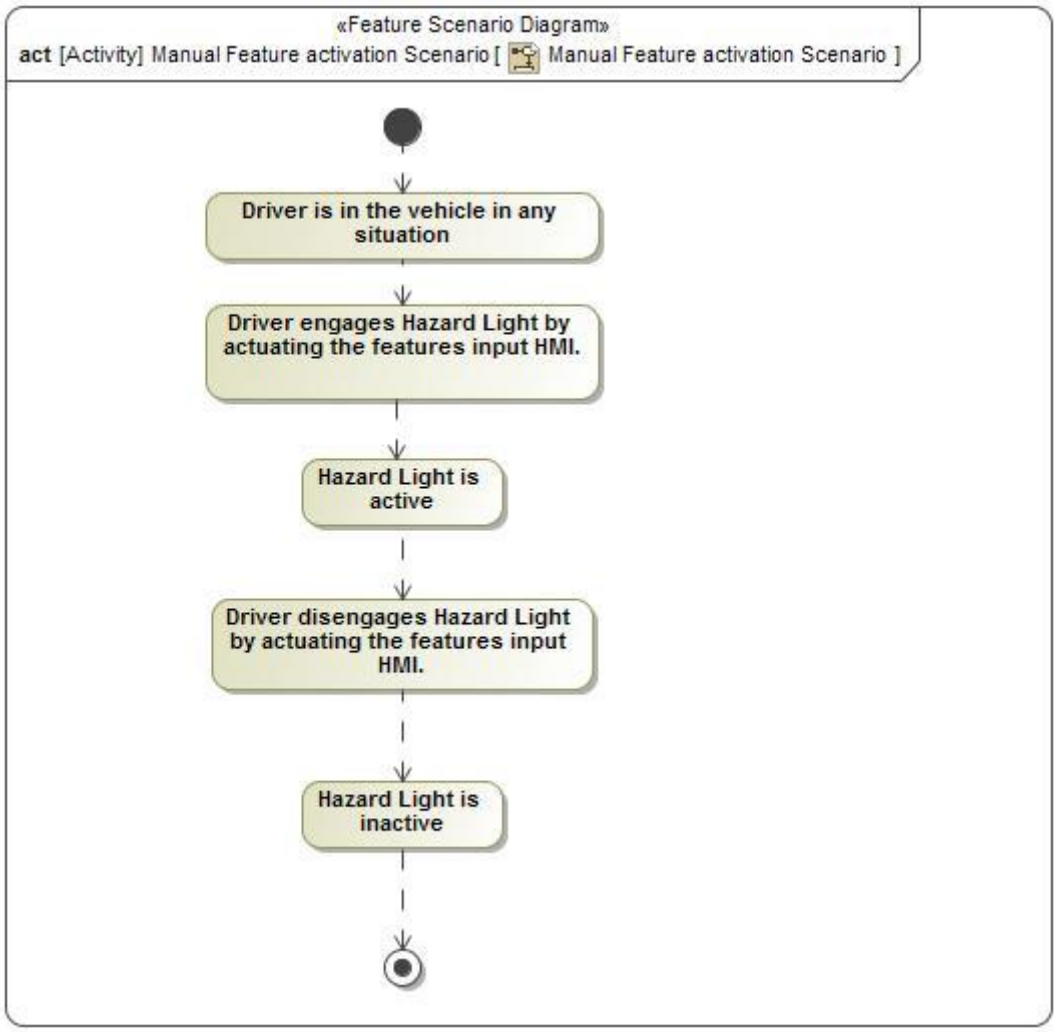
2	Hazard Light is activ

Activation by post crash alert Scenario



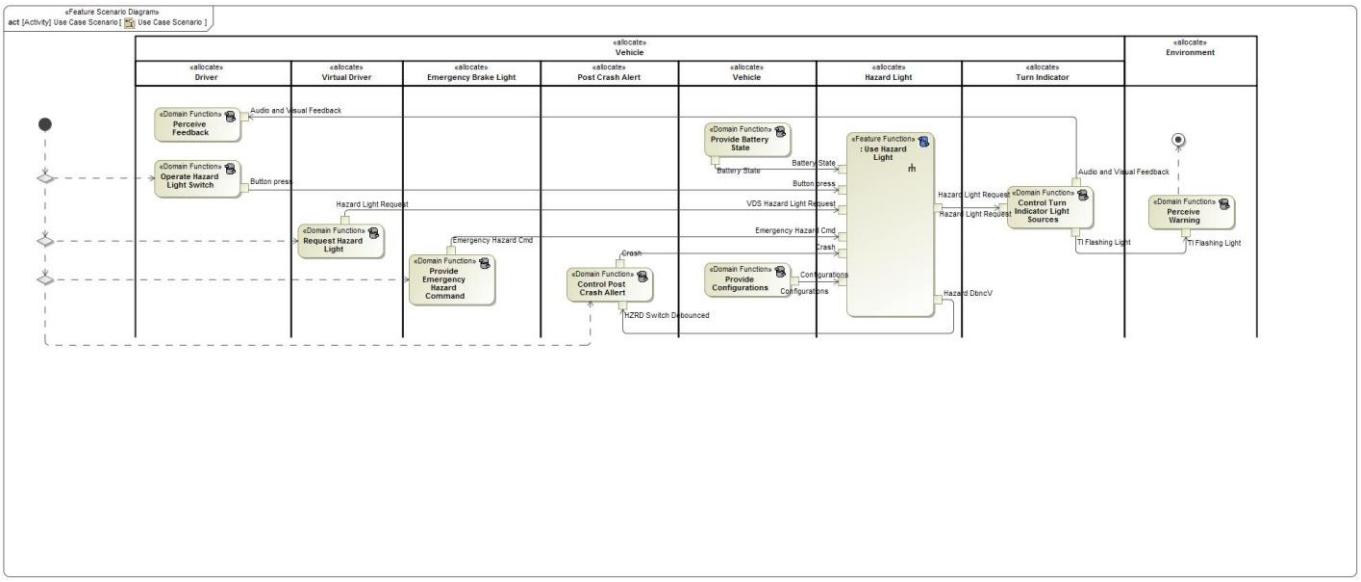
Flow of Actions	
1	The Vehicles has detected a crash and the Postcrash Allert system requests Hazard Light to be on.
2	Hazard Light is active
3	The features input HMI is actuated to deactivate Hazard Light
4	Hazard Light is inactive

Manual Feature activation Scenario



Flow of Actions	
1	Driver is in the vehicle in any situation
2	Driver engages Hazard Light by actuating the features input HMI.
3	Hazard Light is active
4	Driver disengages Hazard Light by actuating the features input HMI.
5	Hazard Light is inactive

Use Case Scenario



5 FEATURE REQUIREMENTS

*#**Functional Safety:** In general, safety requirements are not listed here. However, it is possible that later in the development process, a non-safety requirement becomes a safety requirement. In such a case it may remain on this list.*
*#**Link:** RE Wiki – How to write good requirements.*

5.1 Functional Requirements

Manual override

The hazard light switch shall always provide a manual override control for the Hazard Light feature.

Requirement ID:					
Rationale	The driver shall stay in charge as the main operator.				
Acceptance Criteria	If hazard light has been activated, pressing the hazard light switch shall always control the hazard lights.				
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type	Functional	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Light Sources activation

The hazard light shall activate all turn indicator light sources simultaneously, regardless of the Ignition state.

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type	Functional	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Switch Type Parameter

There shall be a m2 parameter, which determines whether the Hazard switch is LATCHING-type Switch or non-latching momentary-type switch to ground (MOMENTARY).

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.	• Latching			**V&V Method**	
Type	Functional	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Switch transition for activation

When the Hazard Light feature is inactive, pressing the hazard light button down from its default position shall trigger feature activation.

Requirement ID:			
Rationale	When the driver requests hazard light, it should respond immediately.		
Acceptance Criteria	The currenct hazard light switch status shall change, when the switch is moving from its default position to the pressed position.		
Notes			
Source		**Owner**	

Source Req.				**V&V Method**	
Type	Functional	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Inoperable Flashrate and Cycle

When a lamp is determined to be inoperable and the Hazard Lighting feature has activated both the right and left turn lamps, the lamps and the interior telltale shall flash in sync and in phase at 80 + 5 times per minute with a 50 + 5 percent duty cycle.

Requirement ID:

Rationale	The flash rate and percent duty cycle may be changed via configuration parameters Turn_Long_On_Cfg and Turn_Long_Off_Cfg				
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type	Functional	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Normal Flashrate and Cycle

Hazard Lighting feature has activated the left turn lamps and the right turn lamps, and no lamp is inoperable, the lamps and the interior telltale shall flash in sync and in phase at 80 + 5 times per minute with a 50+5 percent duty cycle.

Requirement ID:

Rationale	The flash rate and percent duty cycle may be changed via configuration parameters Turn_Long_On_Cfg and Turn_Long_Off_Cfg				
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type	Functional	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Switch transition for deactivation

When the Hazard Light Feature is active, releasing the pressed hazard light button shall trigger feature deactivation.

Requirement ID:

Rationale					
Acceptance Criteria	The current hazard light switch status shall be changed to inactive, when the button comes back from the pressed position.				
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type	Functional	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

5.2 HMI Requirements

*#**Hint:** Requirements in this section could specify details of e.g. the icons, the GUI or the sounds.*

Latching

The hazard light switch shall be latching.

Requirement ID:

Rationale	Feature Activation shall be remembered, even if the supply voltage is disconnected. If the hazard light is active and the supply voltage drops (e.g. due to a short) for a short amount of time, the traffic shall be informed about the hazard as soon as the supply voltage is available again.				
Acceptance Criteria	Pressing the Hazard Light switch once activates the Hazard Light Feature, pressing it again deactivates the Hazard Light Feature.				
Notes	If the switch is latching mechanically, it is recovered automatically after reconnection of supply voltage. However, this generates an issue, when the Hazard Light feature is activated automatically in case of an emergency brake event. On the other hand the current hazard light status must be stored in NVM when using a momentary type switch (electronically latching).				
Source				**Owner**	
Source Req.	• Provide hardware switch			**V&V Method**	
Type	HMI	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Provide hardware switch

There shall be a hardware switch accessible from the driver's position to activate and deactivate the Hazard Light Feature.

Requirement ID:

Rationale	There must be a switch to activate and deactivatae the feature.				
Acceptance Criteria	The switch shall be accessible with the right arm streched, without the necessity to lean over.				
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type	HMI	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

Switch symbol

The symbol to be printed on the hazard light switch shall be the 'feature image'.

Requirement ID:

Rationale	The hazard light switch shall have a symbol printed on it to have it recognizable at first glance from the driver's perspective. This is important, since the driver should not have to search for the switch in case it is needed.				
Acceptance Criteria	The symbol shall be printed on the surface of the actual hazard light switch button.				
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type	HMI	**Priority**	1 - High	**Status**	

Req. Template Version 6.0 End of Requirement

6 FUNCTIONAL SAFETY

*#**Classification**: Functional Safety only*
*#**Hint:** This section is dedicated to the Ford Functional Safety (ISO26262) process. For details of this process refer*
*#**Link:** Ford Functional Safety Sharepoint*
#Contact: *RE Wiki Roles & Responsibilites page – Role: Application Functional Safety Engineer*

6.1 System Behaviors for HARA

*#**Classification**: Functional Safety only*
*#**Hint:** List of selected system behaviors is an input to the Hazard Analysis and Risk Assessment (HARA). There needs to be a rationale why other system behaviors / functions are not considered.*

ID	Name
	F_01: Activate flashing of all TI light sources simultaneously
	F_02: Deactivate flashing of all TI light sources simultaneously

Table 12: System Behaviors for HARA

6.2 Safety Assumptions

*#**Hint:** Copy the assumptions from the document "FFSD 02 Hazard Analysis and Risk Assessment", Tab. "2 - Assumptions" with "Ref/ID", "Name", "Category", "Description", "Purpose". In this document, additionally a reference to the requirement ID is inserted.*
*#**Link:** Functional Safety Sharepoint – HARA*

ID	Assumption	
	Name	Assumption1
	Description	The driver is not aware of the activation of the feature due to missing supporting functions.
	Purpose	In order to evaluate the worst case supporting functions are not working to inform the driver about the activation. Once the supporting functions are working, the driver will be able to realize the unintended activation and deactivate the feature.
	Category	Vehicle
	Related Requirements IDs	
	Name	Assumption3
	Description	In cases hazard lights are malfunctioning brake lights will still be detected by the following traffic
	Purpose	This assumption is used in the controllability rating
	Category	Other Systems
	Related Requirements IDs	
	Name	Assumption2
	Description	The driver is not aware of the deactivation of the feature due to missing supporting functions
	Purpose	In order to evaluate the worst case supporting functions are not working to inform the driver about the deactivation. Once the supporting functions are working, the driver will be able to realize the unintended deactivation and re-activate the feature.
	Category	Vehicle
	Related Requirements IDs	

Table 13: Functional Safety Assumptions

6.3 Safety Goals

*#**Classification**: Functional Safety only*
*#**Hint:** The list of Functional Safety Goals is an output of the Hazard Analysis and Risk Assessment (HARA) and therefore not required during the initial creation of the Feature Document.*
*#**Link:** Functional Safety Sharepoint – HARA*

ID	Goal			
SG_01	**Goal Name**	Ensure activation of hazard lights on both sides		
	Description	This needs to consider all the cases when Hazard Lights feature is intended/requested to be active		
	Safety Goal Concept	Safety Goal Concept: Warning & Recovery Concept:		
	ASIL	A	**FTTI**	
	Related FSR IDs			
SG_02	**Goal Name**	Hazard Lights shall be active when requested		
	Description	This needs to consider all the cases when Hazard Lights feature is intended/requested to be active		
	Safety Goal Concept	Safety Goal Concept: Warning & Recovery Concept:		
	ASIL	A	**FTTI**	
	Related FSR IDs			
SG_03	**Goal Name**	Ensure deactivation of hazard lights on both sides		
	Description	this needs to consider all the cases when Hazard Lights feature is intended/requested to be deactivated		
	Safety Goal Concept	Safety Goal Concept: Warning & Recovery Concept:		
	ASIL	QM	**FTTI**	
	Related FSR IDs			
SG_04	**Goal Name**	Ensure activation of hazard lights with correct frequency		
	Description	This needs to consider all the cases when Hazard Lights feature is intended/requested to be active		
	Safety Goal Concept	Safety Goal Concept: Warning & Recovery Concept:		
	ASIL	QM	**FTTI**	
	Related FSR IDs			

Table 14: Functional Safety Goals

6.4 Functional Safety Requirements

*#**Classification**: Functional Safety only*
*#**Hint:** The section lists the Functional Safety Requirements (FSRs) derived from*
*- a Safety Goal (list in subsections **Fehler! Verweisquelle konnte nicht gefunden werden.** and following) in this case each FSR should trace back to a safety goal in ch. 6.3*
*- and Assumptions (list in subsection **Fehler! Verweisquelle konnte nicht gefunden werden.**). in this case each FSR should trace back to an assumption in ch. 6.2.*
*In section **Fehler! Verweisquelle konnte nicht gefunden werden.** "**Fehler! Verweisquelle konnte nicht gefunden werden.**" the initial FSRs from chapters **Fehler! Verweisquelle konnte nicht gefunden werden.** to **Fehler! Verweisquelle konnte nicht gefunden werden.** may be decomposed, if required.*
*#**Link:** Functional Safety Sharepoint – Functional Safety Concept*
RE Wiki - Requirements Attributes

*#**Classification**: Functional Safety only*
*#**Hint:** The section lists the Functional Safety Requirements (FSRs) derived from a Safety Goal and Assumptions. The following should be noted for the use of the attribute fields for FSRs*
- The "Source Req" trace link field in each FSR should have a reference to
- a safety goal in ch. 6.3 "Safety Goals" or
- an assumption in ch. 6.2 "Safety Assumptions"
*#**Link:*** Functional Safety Sharepoint *– Functional Safety Concept*
RE Wiki - Requirements Attributes

6.4.1 Safety Goal: SG_01 Ensure activation of hazard lights on both sides

Name: Ensure activation of hazard lights on both sides
Purpose:
Text: This needs to consider all the cases when Hazard Lights feature is intended/requested to be active
ASIL: A

6.4.1.1 Safety Goal Concept

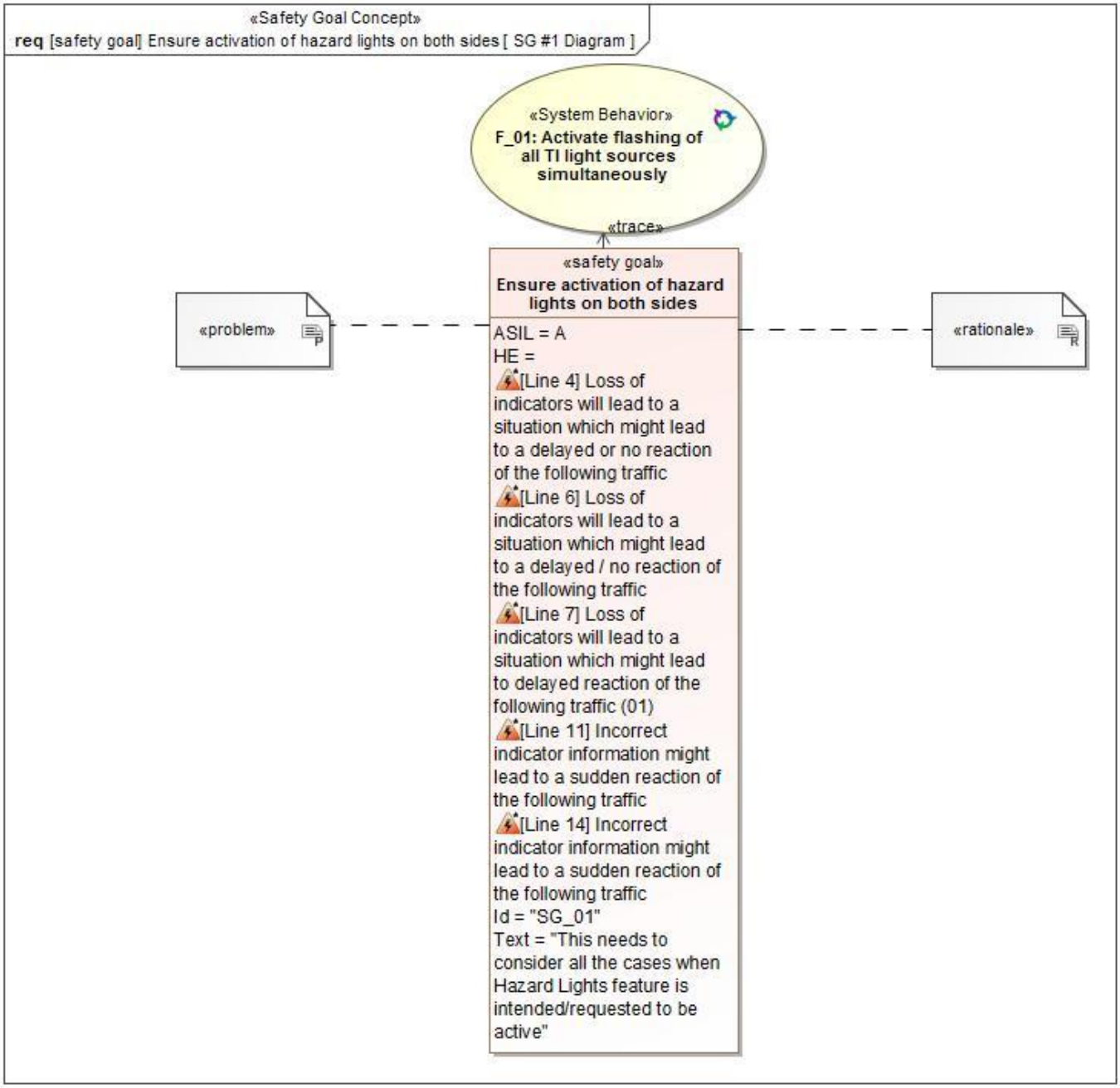


Figure 1: SG #1 Diagram – Ensure activation of hazard lights on both sides

Note: The authoritative source for the Safety Goals is document "FFSD 02 Hazard Analysis and Risk Assessment". The documentation of Safety Goals in this chapter (In the Argumentation for Safety Goal achievement) is for information purposes only.
The authoritative source for the Functional Safety Requirements is section 2.1.x.3: of this document. The documentation of Functional Safety Requirements in the following chapter (complete or summarised) is for information purposes only.

6.4.1.2 Warning and Recovery Concept

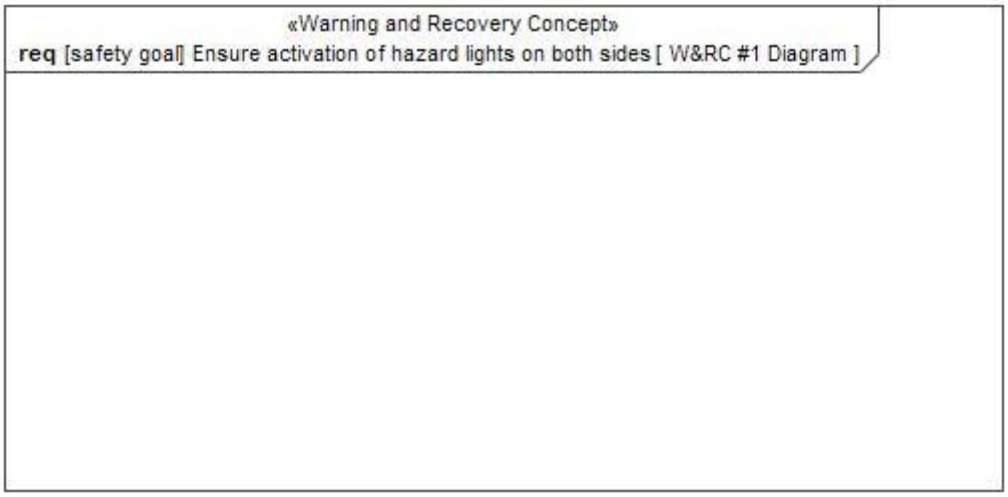


Figure 5: W&RC #1 Diagram – Ensure activation of hazard lights on both sides

6.4.2 Safety Goal: SG_02 Hazard Lights shall be active when requested

Name: Hazard Lights shall be active when requested
Purpose:
Text: This needs to consider all the cases when Hazard Lights feature is intended/requested to be active
ASIL: A

6.4.2.1 Safety Goal Concept

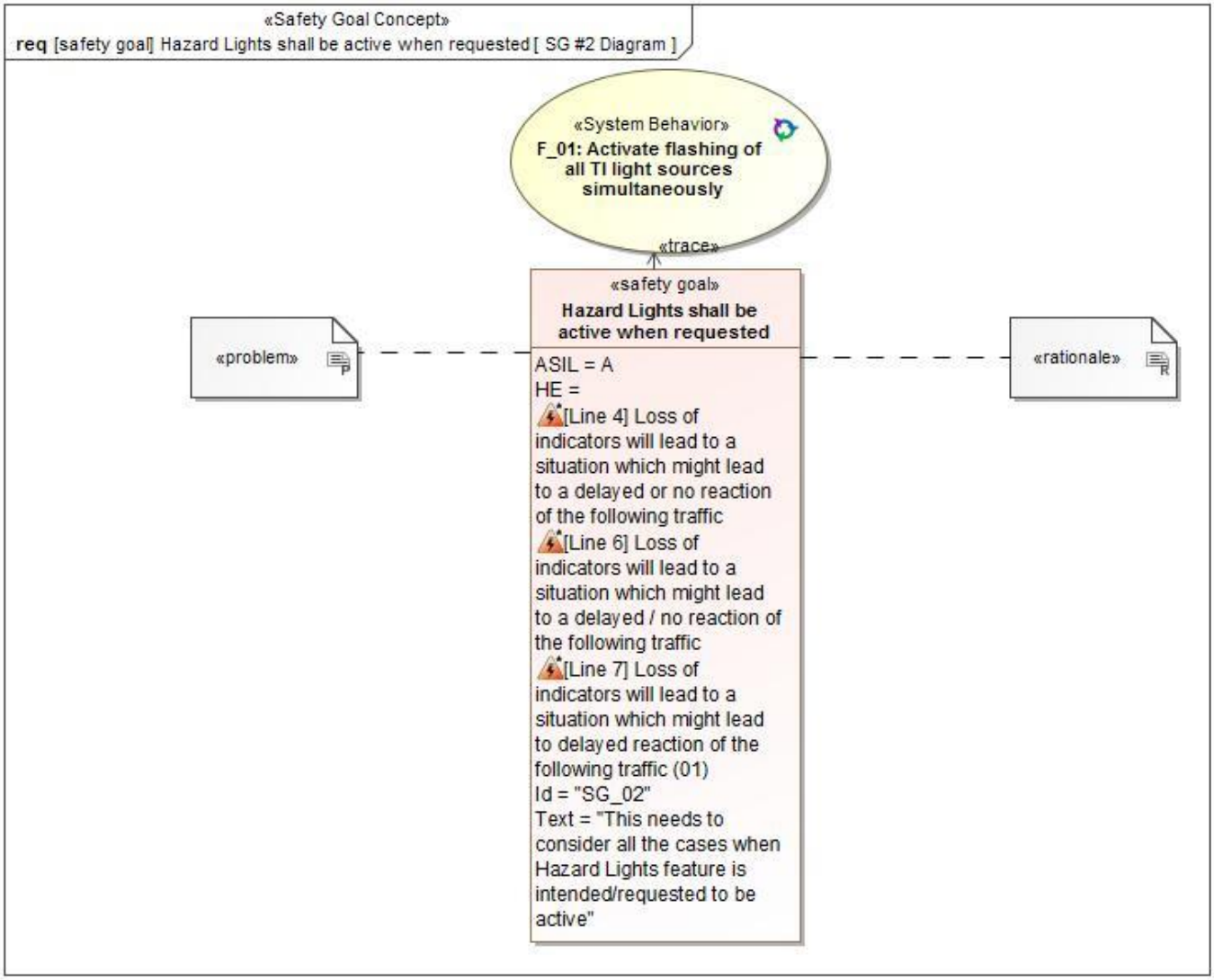


Figure 1: SG #2 Diagram – Hazard Lights shall be active when requested

Note: The authoritative source for the Safety Goals is document "FFSD 02 Hazard Analysis and Risk Assessment". The documentation of Safety Goals in this chapter (In the Argumentation for Safety Goal achievement) is for information purposes only.
The authoritative source for the Functional Safety Requirements is section 2.1.x.3: of this document. The documentation of Functional Safety Requirements in the following chapter (complete or summarised) is for information purposes only.

6.4.2.2 Warning and Recovery Concept

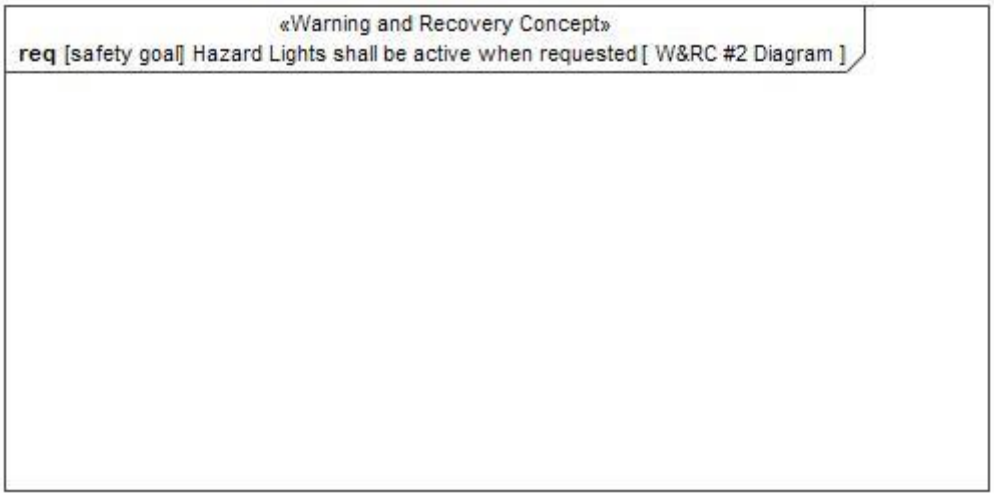


Figure 6: W&RC #2 Diagram – Hazard Lights shall be active when requested

6.4.3 Safety Goal: SG_03 Ensure deactivation of hazard lights on both sides

Name: Ensure deactivation of hazard lights on both sides
Purpose:
Text: this needs to consider all the cases when Hazard Lights feature is intended/requested to be deactivated
ASIL: QM

6.4.3.1 Safety Goal Concept

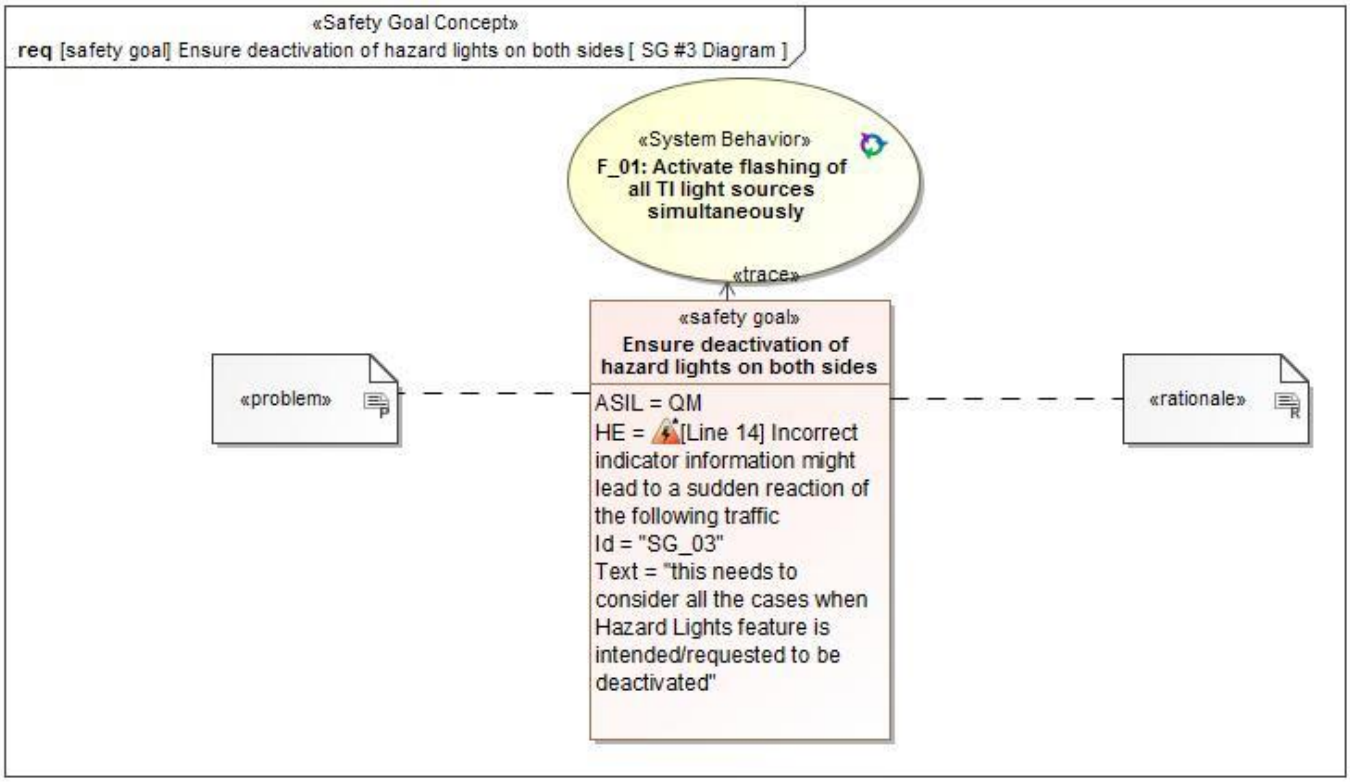


Figure 1: SG #3 Diagram – Ensure deactivation of hazard lights on both sides

Note: The authoritative source for the Safety Goals is document "FFSD 02 Hazard Analysis and Risk Assessment". The documentation of Safety Goals in this chapter (In the Argumentation for Safety Goal achievement) is for information purposes only.

The authoritative source for the Functional Safety Requirements is section 2.1.x.3: of this document. The documentation of Functional Safety Requirements in the following chapter (complete or summarised) is for information purposes only.

6.4.3.2 Warning and Recovery Concept

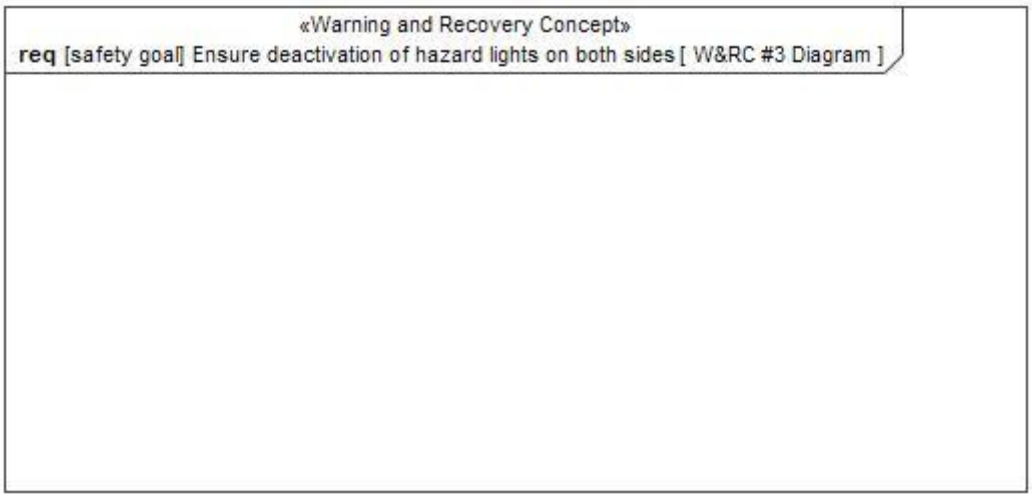


Figure 7: W&RC #3 Diagram – Ensure deactivation of hazard lights on both sides

6.4.4 Safety Goal: SG_04 Ensure activation of hazard lights with correct frequency

Name: Ensure activation of hazard lights with correct frequency
Purpose:
Text: This needs to consider all the cases when Hazard Lights feature is intended/requested to be active
ASIL: QM

6.4.4.1 Safety Goal Concept

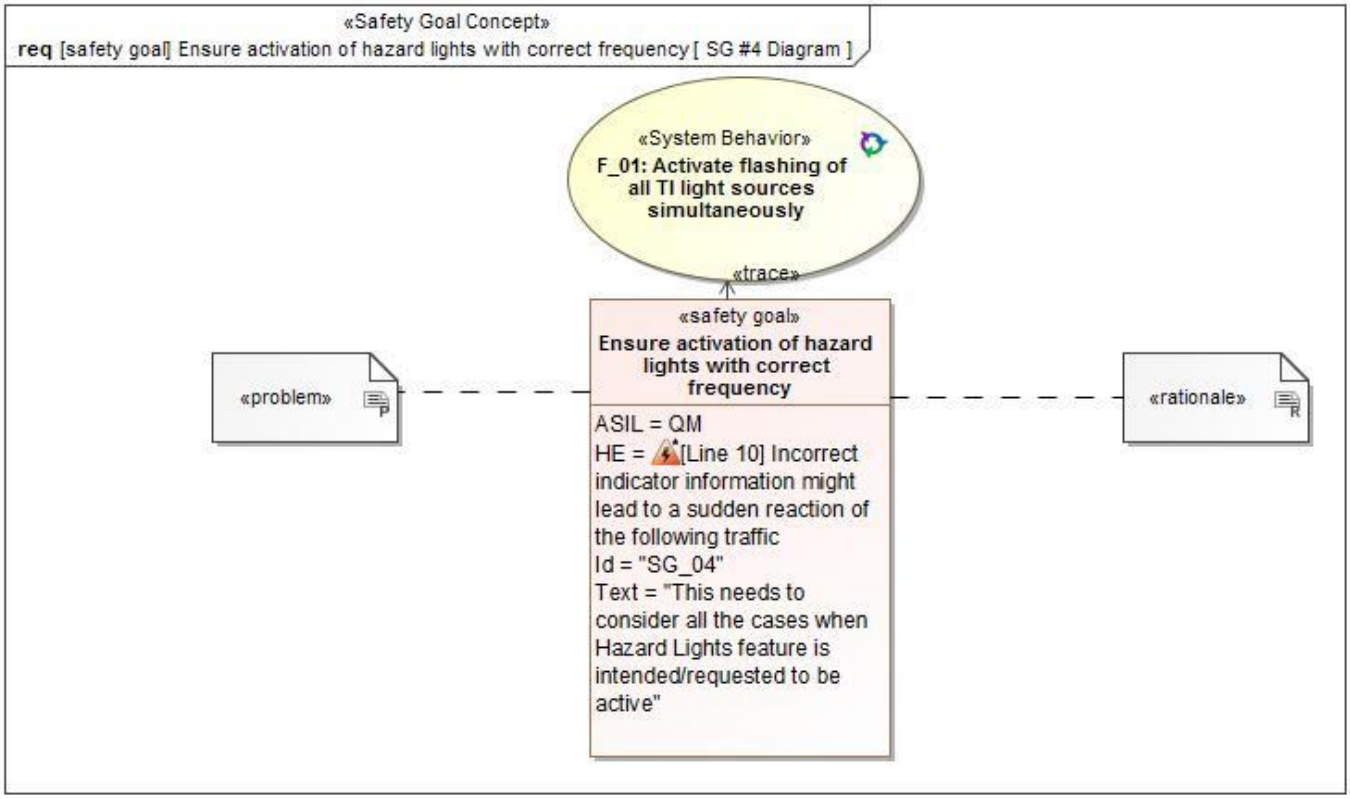


Figure 1: SG #4 Diagram – Ensure activation of hazard lights with correct frequency

Note: The authoritative source for the Safety Goals is document "FFSD 02 Hazard Analysis and Risk Assessment". The documentation of Safety Goals in this chapter (In the Argumentation for Safety Goal achievement) is for information purposes only.
The authoritative source for the Functional Safety Requirements is section 2.1.x.3: of this document. The documentation of Functional Safety Requirements in the following chapter (complete or summarised) is for information purposes only.

6.4.4.2 Warning and Recovery Concept

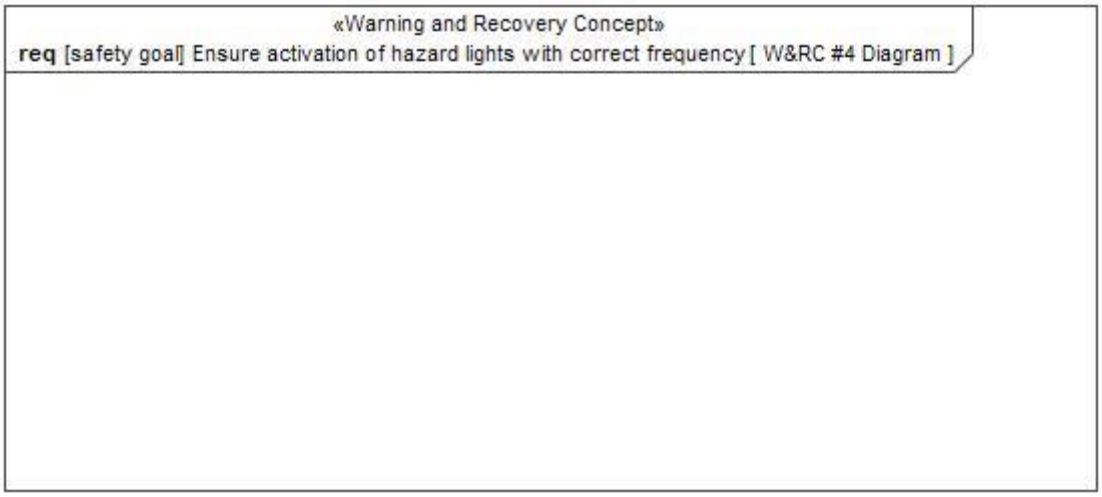


Figure 8: W&RC #4 Diagram – Ensure activation of hazard lights with correct frequency

7 FUNCTIONAL ARCHITECTURE

*#**Classification:** Optional (mandatory for Functional Safety)*
*#**Hint**: This section depicts the coarse Functional Architecture. This architectural step is needed to find the right functional partitioning for the function level. The function shown here are those, which are specified on function level. Either SysML activity diagrams or Data Flow Diagrams could be used to depict such a Functional Architecture. For bigger features, which are decomposed in a hierarchical manner down to atomic functions (and which do not follow the Functional Safety process), a function tree could be given here.*
*#**Links:***
- *Functional Decomposition: RE Wiki – Functional Decomposition*
- *SysML - Activity Diagrams or RE Wiki - Data Flow Diagrams*
- *Data Flow Diagram: RE Wiki – Data Flow Diagram*

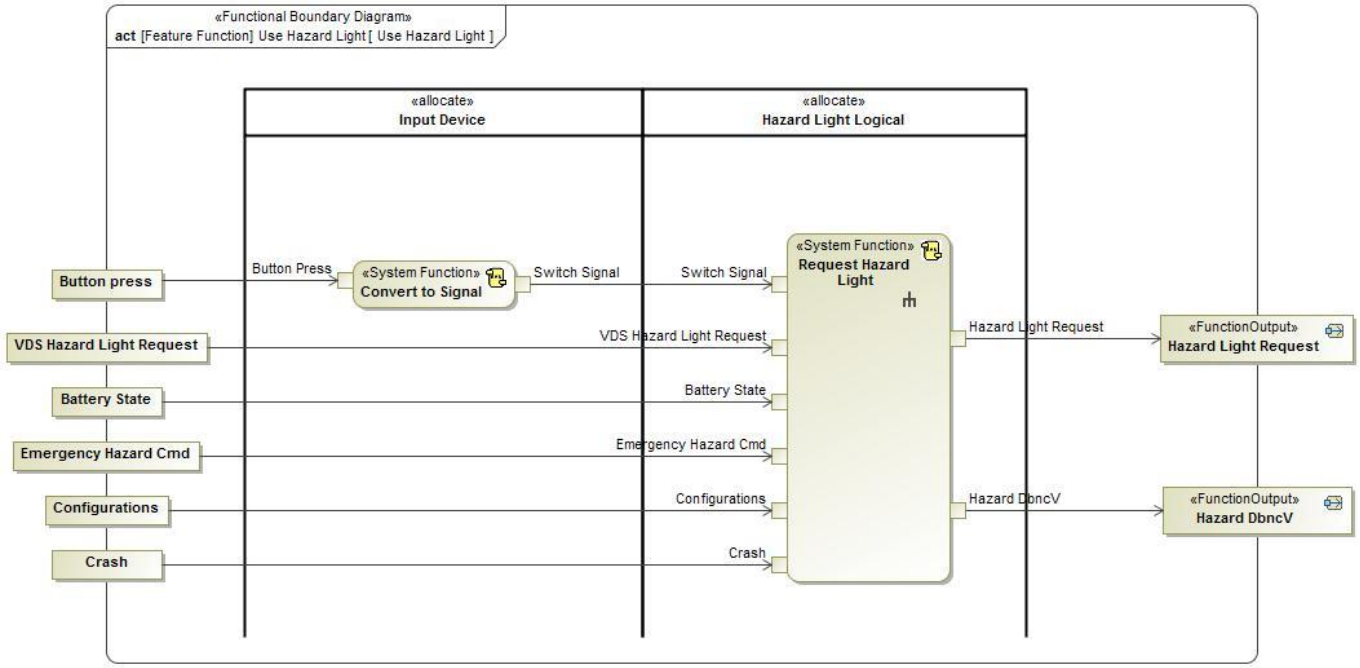


Figure 9: Use Hazard Light

7.1 List of Functions

*#**Hint:** The functions shown in the Functional Architecture should be listed and described in the table below*

Function Name	Description	Comments
(activity) Request Hazard Light	*(activity)*	
(activity) Convert to Signal	*(activity)*	

Table 15: List of Functions

8 OPEN CONCERNS

*#**Hint:** The following list presents open concerns, which have to be discussed or clarified over the course of the on-going requirements engineering.*

ID	Concern Description	e-Tracker / Reference	Responsible	Status	Solution
1					

Table 16: Open Concerns *(Not supported by MagicDraw report generation)*

9 REVISION HISTORY

*#**Hint:** A new version number is assigned to a document with a given revision each time it is checked in to Team Center (TCSE). After release of a revision, the document cannot be edited and no new versions can be created on that revision. When updating the document after that, a new revision has to be created and new versions on that revision will be created upon checking in.*

No Revision History found.

10 APPENDIX

10.1 Definitions

Definition	Description
High speed	Approximately more than 52 mph (83 kph)
Traffic	Moving vehicles and pedestrians interfering with the host vehicle's driving path.
VDS	Virtual Driver System
Virtual Driver System	Synonym for the algorithm the replaces human control of the vehicle.

Table 17: Definitions used in this document

Document ends here.