



Feature Document (FD)

MY 2024
CDX746 Ford Welcome Farewell
(VSEM ID: [F004175](#))

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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 feature:

Feature ID	Feature Name	Feature Application Engineer(s)	Reference
F004175	Ford Welcome Farewell (Program(s): CDX746)	Darnell Fuller (dfulle45)	This Feature Specification is based from the Global Lincoln Embrace/Ford Welcome Farewell Feature Specification 3.0. This VSEM Identification number is based from VSEM F000064. The VSEM structure, under the program Feature Group, has been adjusted to align with this program.

Table 1: Related Features Involved With CDX746 Ford Welcome Farewell

Feature/Function ID	Feature/Function Name
	Daytime Running Lamps
	Liftgate Shutface Backlighting
	Instrument Panel Backlighting
	Rear Side Marker Lamps
	Signature/Decorative Lamps
	Steering Wheel Switches Backlighting
	Vehicle Motion
	Illuminated keypad
	Ambient Lighting
	Media Bin Light
	Courtesy Lamps
	Headlamps Low Beam
	Ford Puddle Light
	Door Panel Backlighting
	Folding Mirrors
	Centerstack display
	Interior Lighting
	Cargo area controls Backlighting
	Rear Park Lamps
	Exterior Lighting
	Front Park Lamps
	Overhead Console Backlighting
	Headlamp Switch Backlighting



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	License Plate Lamps
	Front Side Marker Lamps
	Engine Push-To-Start Backlighting
	Interior Vehicle Displays

1.3 Document Audience

The FD is generated by Magic Draw and updated by the feature owner of [Darnell Fuller \(dfulle45\)](#). 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.

1.3.1 Stakeholder List

Name	CDSID	Contact Info	Role	Stakeholder Group
Klaus Schaufuss	kschaufu		Application Feature Owner	Systems Engineer
Victor Carranza	vcarran5		Application Feature Owner	Systems Engineer
Vinod Venkatesan	vvenka72		Application Feature Owner	Systems Engineer
Rory Bauer	rbauer39		Application Feature Owner	Systems Engineer
Darnell Fuller	dfulle45		Core Feature Owner	Systems Engineer
Fernanda Garza	mgarza22		Team Leader	Systems Engineer
Bella Wu	ywu150		Application Feature Owner	Systems Engineer
Federico Mejía	fmejia5		Modeler	Systems Engineer

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

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](#).

1.6 References

1.6.1 Ford Documents

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

Reference	Title	Doc. ID	Document Location	Revision
Ford GIS Standard	Ford GIS Standard			

Table 2: Ford internal Documents

1.6.2 External Documents and Publications

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

Reference	Document / Publication	Document Location
IEEE Std 1012-2004 IEEE Standard for Software Verification and Validation		
ISO/IEC 19500-2:2003	Information technology -- Open Distributed Processing -- Part 2	



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Reference	Document / Publication	Document Location
UML Testing Profile (UTP), v1.2		
Wikipedia		

Table 3: External documents and publications

1.7 Glossary

See Appendix for Definitions and Abbreviations. Also reference the RLIS “Ford Speak” website for acronym definitions.

1.7.1 Parameters / Values

Name	Description	Range / Resolution
------	-------------	--------------------

Table 4: Parameters / Values used in this document



2 FEATURE OVERVIEW

2.1 Purpose and Description of Feature

Ford Welcome/Farewell brings an inviting experience to the customer. It occurs through a sequence of feature events. Welcome starts as the customer approaches the vehicle and continues until the vehicle is started. Farewell begins when the ignition is turned off and progresses until the customer leaves and locks the vehicle.



Figure 1: Generic Image Of Some Feature Sub-Items On A Vehicle

2.2 Feature Variants

Variant Name	Variant Description	Remarks
Ford Welcome	[No CDX746 Variants]	

Table 5: Feature Variants

2.2.1 Regions & Markets

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



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Ford Welcome	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
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Table 6: Regions & Markets

2.3 Input Requirements

2.3.1 Legal Requirements

- : Compliance with FMVSS101
 - The Feature shall comply with FMVSS101.

2.3.2 Trustmark Requirements

No Trustmark Requirements specified.

2.3.3 Industry Standards

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

2.3.4 Attribute Requirements

2.3.4.1 : Internal 18

- There will be no interference with other mandatory reqs or functions, this has the lowest priority among all features

2.3.4.2 : External 3

- Ford Welcome Farewell (FWF) and Lincoln Embrace (LE) are experience based features which control the vehicle's exterior lighting, interior lighting, and vehicle displays based off of user interaction

2.3.4.3 : External 1

- Welcome Farewell behavior shall only be applicable to Ford vehicles

2.3.4.4 : External 2

- Lincoln Embrace behavior shall only be applicable to Lincoln vehicles

2.4 Lessons Learned

No lessons learned specified.

2.5 Assumptions

No Assumptions specified.



3 FEATURE CONTEXT

3.1 Feature Context Diagram

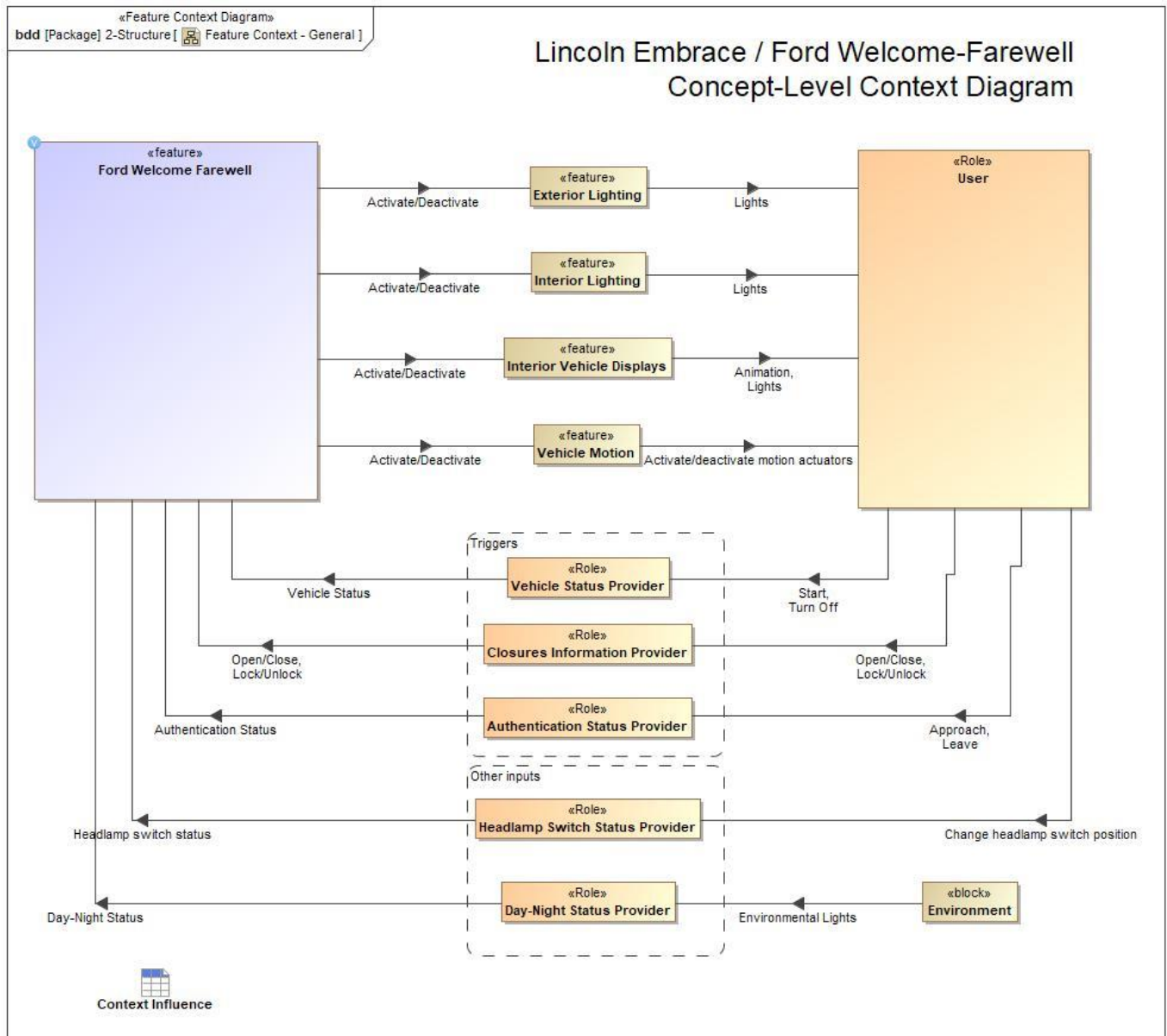


Figure 2: Feature Context - General

3.2 List of Influences

ID	External Entity	Influence Description
Activate / Deactivate	Ford Welcome Farewell To Exterior Lighting	Control over entity.
	Ford Welcome Farewell To Interior Lighting	Control over entity.
	Ford Welcome Farewell To Interior Vehicle Displays	Control over entity.
	Ford Welcome Farewell To Vehicle Motion	Control over entity.



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Activate / deactivate motion actuators	Vehicle Motion To User	Activate or deactivate exterior vehicle actuation, such as mirrors, running boards, vehicle suspension.
Animation	Interior Vehicle Displays To User	Screen animations shown to the user.
Approach	User To Authentication Status Provider	User physically getting close to the vehicle.
Authentication Status	Authentication Status Provider To Ford Welcome Farewell	Status on whether the approaching user is authenticated or not.
Change headlamp switch position	User To Headlamp Switch Status Provider	User can change the switch's position to On, Off or Auto.
Day-Night Status	Day-Night Status Provider To Ford Welcome Farewell	Day-Night sensing value. Indicates lighting conditions outside of vehicle.
Environmental Lights	Environment To Day-Night Status Provider	Lights from environment outside the vehicle.
Headlamp switch status	Headlamp Switch Status Provider To Ford Welcome Farewell	On, Off or Auto.
Leave	User To Authentication Status Provider	User physically getting away from vehicle.
Lights	Exterior Lighting To User	Lighting presented to user.
	Interior Lighting To User	Lighting presented to user.
	Interior Vehicle Displays To User	Lighting presented to user.
Lock/Unlock	Closures Information Provider To Ford Welcome Farewell	User action to lock or unlock the doors.
	User To Closures Information Provider	User action to lock or unlock the doors.
Open/Close	Closures Information Provider To Ford Welcome Farewell	User action to open or close the doors.
	User To Closures Information Provider	User action to open or close the doors.
Start	User To Vehicle Status Provider	User action to start the vehicle.
Turn Off	User To Vehicle Status Provider	User action to turn off the vehicle.
Vehicle Status	Vehicle Status Provider To Ford Welcome Farewell	Run, Start, Off.

Table 7: List of Influences



4.1 Operation Modes and States

Figure 3: Lincoln Embrace / Ford Welcome Farewell Stm v2

State	Description	Requirements Reference (optional)
A - Approach Detection	User has been detected within the approach detection zone. Feature starts welcome experience. Entry behavior: Welcome - Approach Detection	
B - Vehicle Unlock	User has unlocked the vehicle (regardless of approach detection). Entry behavior: Welcome - Illuminated Entry	
C - Vehicle Ingress	Substate where user opens the door to get inside the vehicle. Entry behavior: Welcome - Courtesy Lighting All	
D - Vehicle Ingress Extended	Substate where user opens the door to get inside the vehicle and more than 25 seconds pass without any other action. Entry behavior: Welcome - Courtesy Lighting Extended	
E - Settled in Seat	Substate where user closes the door after getting inside the vehicle. Entry behavior: Welcome - Courtesy Lighting Delay All	
F - Settled in Seat Extended	Substate where user has closed the door after getting inside the vehicle and more than 25 seconds pass without further action. Entry behavior: Welcome - Courtesy Lighting Delay Extended	
Farewell	Superstate for Farewell part of experience.	
G - Ignition Not Off	Ignition has transitioned to Start/Run. Entry behavior: Ignition Run Start - Null	
H - Ignition Not On	Ignition has transitioned from Start/Run to Off/Acc. Entry behavior: Farewell - Illuminated Exit	
I - Media Accessory Delay	Ignition has transitioned from Start/Run to Off and more than 25 seconds have passed without further action from the user. Entry behavior: Farewell - Media Accessory Delay	
J - Vehicle Egress	User has opened the door with the intent of exiting vehicle. Entry behavior: Farewell - Courtesy Lighting All	
K - Vehicle Egress Extended	User turned off vehicle, then opened door but did not close the vehicle's doors within X seconds. Entry behavior: Farewell - Courtesy Lighting Extended	



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L - Courtesy Lighting Delay	User turned off vehicle and opened door and then closed all doors. Entry behavior: Farewell - Courtesy Lighting Delay	
M - Courtesy Lighting Delay Extended	User turned off vehicle and opened door, then closed all doors but did not lock the vehicle within X seconds. Entry behavior: Farewell - Courtesy Lighting Delay Extended	
N - Vehicle Lock	User has locked the vehicle. Entry behavior: Farewell - Null	
Null - Farewell	Null state within the Farewell superstate. Entry behavior: Farewell - Null	
Null - Welcome	Null state within the Welcome superstate. Entry behavior: Welcome - Null	
Welcome	Superstate for Welcome part of experience.	
Z - Null	Stand by/Neutral state. Feature is not actively managing lights or actuators. Entry behavior: Null	

Table 8: Operation Modes and States on Lincoln Embrace / Ford Welcome Farewell Stm v2

Transition ID	Source	Destination	Description	Requirements Reference (optional)
T1	L - Courtesy Lighting Delay	M - Courtesy Lighting Delay Extended	Name: T44 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T2	G - Ignition Not Off	H - Ignition Not On	Name: T35 Trigger signal: Ignition_To_OffAcc SignalEvent Ignition_To_OffAcc	
T3	D - Vehicle Ingress Extended	G - Ignition Not Off	Name: T30 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T4	F - Settled in Seat Extended	N - Vehicle Lock	Name: T53 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T5	I - Media Accessory Delay	J - Vehicle Egress	Name: T38 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T6	Start	Z - Null	Name: T62	
T7	B - Vehicle Unlock	Null - Welcome	Name: T59 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T8	H - Ignition Not On	B - Vehicle Unlock	Name: T4 Trigger signal: Exterior_Unlock_Request SignalEvent Exterior_Unlock_Request	
T9	K - Vehicle Egress Extended	L - Courtesy Lighting Delay	Name: T43 Trigger signal: All_Doors_Closed SignalEvent All_Doors_Closed	
T10	K - Vehicle Egress Extended	G - Ignition Not Off	Name: T25 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T11	J - Vehicle Egress	G - Ignition Not Off	Name: T24 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T12	L - Courtesy Lighting Delay	G - Ignition Not Off	Name: T26 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T13	F - Settled in Seat Extended	Null - Welcome	Name: T61 Trigger signal: Timer_Expired	



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			SignalEvent Timer_Expired	
T14	J - Vehicle Egress	K - Vehicle Egress Extended	Name: T41 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T15	Z - Null	G - Ignition Not Off	Name: T34 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T16	H - Ignition Not On	I - Media Accessory Delay	Name: T36 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T17	N - Vehicle Lock	Null - Farewell	Name: T57 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T18	C - Vehicle Ingress	E - Settled in Seat	Name: T19 Trigger signal: All_Doors_Closed SignalEvent All_Doors_Closed	
T19	E - Settled in Seat	N - Vehicle Lock	Name: T52 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T20	C - Vehicle Ingress	G - Ignition Not Off	Name: T29 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T21	H - Ignition Not On	N - Vehicle Lock	Name: T45 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T22	D - Vehicle Ingress Extended	Null - Welcome	Name: T60 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T23	Z - Null	A - Approach Detection	Name: T3 Trigger signal: Auth_Device_Within_Range SignalEvent Auth_Device_Within_Range	
T24	Null - Welcome	B - Vehicle Unlock	Name: T7 Trigger signal: Exterior_Unlock_Request SignalEvent Exterior_Unlock_Request	
T25	Z - Null	C - Vehicle Ingress	Name: T16 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T26	C - Vehicle Ingress	D - Vehicle Ingress Extended	Name: T18 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T27	M - Courtesy Lighting Delay Extended	J - Vehicle Egress	Name: T40 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T28	L - Courtesy Lighting Delay	N - Vehicle Lock	Name: T47 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T29	Null - Welcome	G - Ignition Not Off	Name: T33 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T30	K - Vehicle Egress Extended	Null - Farewell	Name: T55 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T31	D - Vehicle Ingress Extended	D - Vehicle Ingress Extended	Name: T17 Trigger signal: Door_Ajar SignalEvent Door_Ajar	



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T32	M - Courtesy Lighting Delay Extended	G - Ignition Not Off	Name: T27 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T33	I - Media Accessory Delay	Null - Farewell	Name: T54 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T34	D - Vehicle Ingress Extended	N - Vehicle Lock	Name: T51 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T35	I - Media Accessory Delay	N - Vehicle Lock	Name: T46 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T36	B - Vehicle Unlock	N - Vehicle Lock	Name: T50 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T37	Z - Null	B - Vehicle Unlock	Name: T8 Trigger signal: Exterior_Unlock_Request SignalEvent Exterior_Unlock_Request	
T38	L - Courtesy Lighting Delay	J - Vehicle Egress	Name: T39 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T39	A- Approach Detection	Null - Welcome	Name: T58 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T40	E - Settled in Seat	G - Ignition Not Off	Name: T31 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T41	M - Courtesy Lighting Delay Extended	N - Vehicle Lock	Name: T48 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T42	B - Vehicle Unlock	C - Vehicle Ingress	Name: T12 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T43	N - Vehicle Lock	C - Vehicle Ingress	Name: T10 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T44	A- Approach Detection	C - Vehicle Ingress	Name: T11 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T45	E - Settled in Seat	F - Settled in Seat Extended	Name: T21 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T46	Null - Farewell	G - Ignition Not Off	Name: T28 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T47	H - Ignition Not On	G - Ignition Not Off	Name: T22 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T48	F - Settled in Seat Extended	C - Vehicle Ingress	Name: T14 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T49	I - Media Accessory Delay	G - Ignition Not Off	Name: T23 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T50	C - Vehicle Ingress	C - Vehicle Ingress	Name: T9 Trigger signal: Additional_Door_Ajar	



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			SignalEvent Additional_Door_Ajar	
T51	A - Approach Detection	N - Vehicle Lock	Name: T49 Trigger signal: Exterior_Lock_Request SignalEvent Exterior_Lock_Request	
T52	F - Settled in Seat Extended	G - Ignition Not Off	Name: T32 Trigger signal: Ignition_To_StartRun SignalEvent Ignition_To_StartRun	
T53	M - Courtesy Lighting Delay Extended	Null - Farewell	Name: T56 Trigger signal: Timer_Expired SignalEvent Timer_Expired	
T54	A - Approach Detection	B - Vehicle Unlock	Name: T6 Trigger signal: Exterior_Unlock_Request SignalEvent Exterior_Unlock_Request	
T55	E - Settled in Seat	C - Vehicle Ingress	Name: T13 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T56	Null - Welcome	C - Vehicle Ingress	Name: T15 Trigger signal: Door_Ajar SignalEvent Door_Ajar	
T57	B - Vehicle Unlock	A - Approach Detection	Name: T1 Trigger signal: Auth_Device_Within_Range SignalEvent Auth_Device_Within_Range	
T58	Null - Welcome	A - Approach Detection	Name: T2 Trigger signal: Auth_Device_Within_Range SignalEvent Auth_Device_Within_Range	
T59	J - Vehicle Egress	L - Courtesy Lighting Delay	Name: T42 Trigger signal: All_Doors_Closed SignalEvent All_Doors_Closed	
T60	N - Vehicle Lock	B - Vehicle Unlock	Name: T5 Trigger signal: Exterior_Unlock_Request SignalEvent Exterior_Unlock_Request	
T61	D - Vehicle Ingress Extended	E - Settled in Seat	Name: T20 Trigger signal: All_Doors_Closed SignalEvent All_Doors_Closed	
T62	H - Ignition Not On	J - Vehicle Egress	Name: T37 Trigger signal: Door_Ajar SignalEvent Door_Ajar	

**Table 9: Transitions between Operation Modes and States on
Lincoln Embrace / Ford Welcome Farewell Stm v2**



4.2 Use Cases

4.2.1 Use Case Diagram

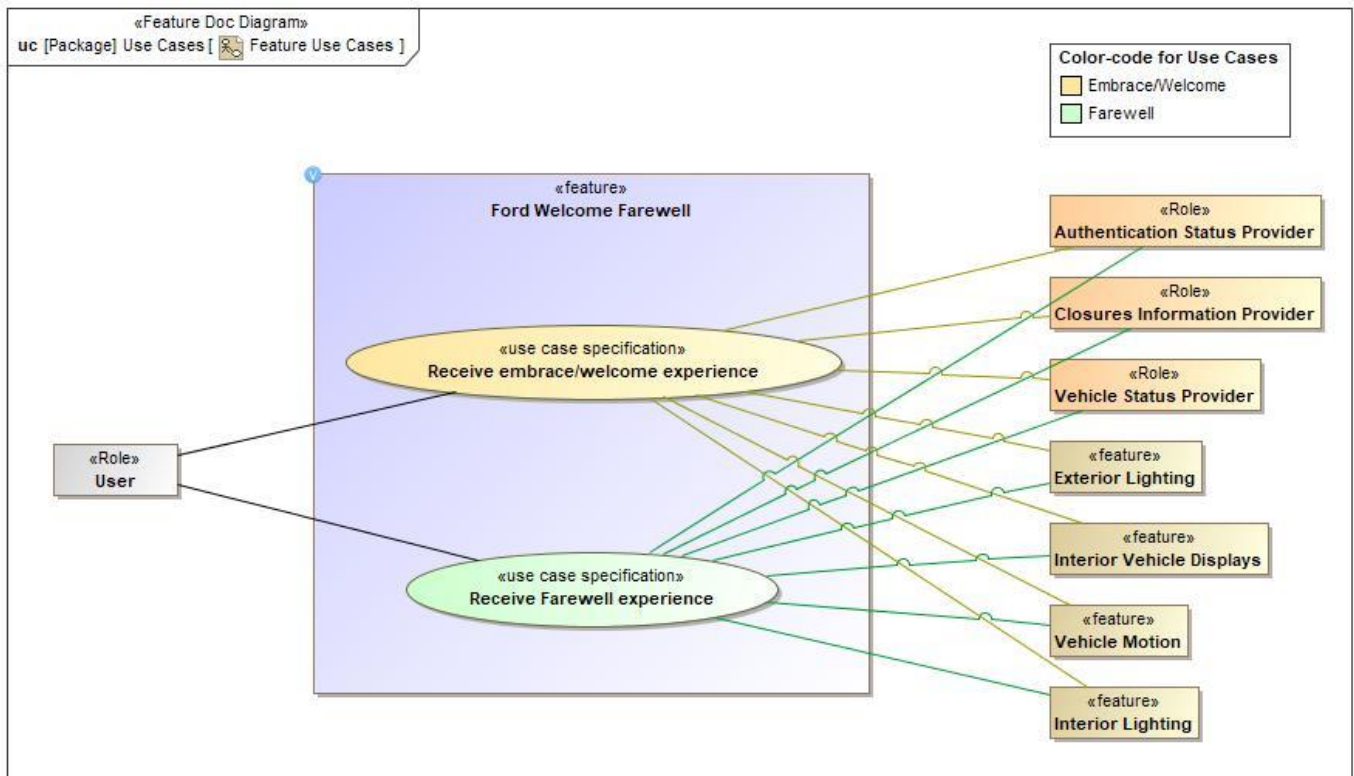


Figure 4: Feature Use Cases

4.2.2 Actors

Actor	Description
Authentication Status Provider	Entity which authenticates a user for vehicle use.
Closures Information Provider	Abstract representation of entity which provides information on door status and lock status. Manages door lock/unlock and ajar.
Exterior Lighting	Exterior lighting features of the vehicle. Examples are Headlamps, Puddle Lamps, Handle Lights, Illuminated Running Boards, Taillamps.
Interior Lighting	Lighting on the interior cabin, such as Ambient Lights, Courtesy Lights, Backlighting.
Interior Vehicle Displays	Screen displays in the interior of the vehicle. Examples: Instrument control panel, Heads-up display, 2nd row screens.
User	Vehicle user (includes Authenticated User).
Vehicle Motion	Exterior vehicle actuators, such as mirrors, running boards, kneeling.
Vehicle Status Provider	Entity which provides vehicle status value (Ignition_Status).

Table 10: List of Actors



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4.2.3 Use Case Descriptions

Receive embrace/welcome experience

Actors	Primary	User
	Secondary	Authentication Status Provider
	Secondary	Closures Information Provider
	Secondary	Vehicle Status Provider
	Secondary	Vehicle Motion
	Secondary	Exterior Lighting
	Secondary	Interior Lighting
	Secondary	Interior Vehicle Displays
Subject		Ford Welcome Farewell
Description		This use case represents the normal flow of actions the user takes to which LE/FWF reacts to by turning on or off lighting features or by actuating other features in order to welcome the user.
Preconditions	PreC1	User walking toward vehicle.
Triggers	T1	User is detected by vehicle.
	T2	User unlocks the vehicle.
Main Flow	M1	User gets close enough to be authenticated by the vehicle.
	M2	LE/FWF reacts to user's Approach.
	M3	User unlocks vehicle.
	M4	LE/FWF reacts to Vehicle Unlock.
	M5	User opens door.
	M6	LE/FWF reacts to Door Ajar.
	M7	User gets inside vehicle and closes door.
	M8	LE/FWF reacts to Door Closed.
	M9	User turns vehicle on.
	M10	LE/FWF reacts to Vehicle Start.
	M11	
Exceptional Flow Description		User does not unlock vehicle after approach.
Exceptional Flow Description		User does not open door after vehicle unlock.
Exceptional Flow Description		User does not start vehicle after ingress.
Exceptional Flow Description		User does not close door or start vehicle after unlock and open door.
Postconditions	PostC1	User receives welcome experience.

Receive Farewell experience

Actors	Primary	User
	Secondary	Closures Information Provider
	Secondary	Vehicle Status Provider
	Secondary	Vehicle Motion
	Secondary	Exterior Lighting
	Secondary	Interior Lighting
	Secondary	Interior Vehicle Displays
	Secondary	Authentication Status Provider
Subject		Ford Welcome Farewell



Feature Document MyFeature

Description		This use case represents the normal flow of actions the user takes to which LE/FWF reacts to by turning on or off lighting features or by actuating other features in order to farewell the user.
Preconditions	PreC1	User has parked the vehicle.
Triggers	T1	User turns the vehicle OFF.
Main Flow	M1	User turns vehicle off.
	M2	LE/FWF reacts to Vehicle Shutdown.
	M3	User opens door.
	M4	LE/FWF reacts to Door Ajar.
	M5	User gets out of vehicle and closes door.
	M6	LE/FWF reacts to Door Closed.
	M7	User locks vehicle.
	M8	LE/FWF reacts to Vehicle Lock.
	M9	
Exceptional Flow Description		User does not exit vehicle after shutdown.
Exceptional Flow Description		User does not lock vehicle after exiting.
Exceptional Flow Description		User does not close door after shutting down and exiting vehicle.
Postconditions	PostC1	User receives farewell experience.



4.3 Driving and Operation Scenarios



4.4 Decision Tables

Not supported by MagicDraw report generation.



5 FEATURE REQUIREMENTS

5.1 Functional Requirements

External 13

FWF and LE shall control the vehicle Exterior Illumination based off of user interaction with vehicle.

Requirement ID:				
Rationale				
Acceptance Criteria				
Notes				
Source		Owner		
Source Req.		V&V Method		
Type		Priority	Status	In-Progress
Reg. Template Version 6.0		End of Requirement		

External 15

FWF and LE shall control the Vehicle Display Illumination, Graphics, and Animations based off of user interaction with vehicle.

Requirement ID:				
Rationale				
Acceptance Criteria				
Notes				
Source		Owner		
Source Req.		V&V Method		
Type		Priority	Status	In-Progress
Reg. Template Version 6.0		End of Requirement		

Internal 19

The feature will be configurable by the application engineer for both Ford and Lincoln programs.

Requirement ID:				
Rationale				
Acceptance Criteria				
Notes				
Source		Owner		
Source Req.		V&V Method		
Type		Priority	Status	In-Progress
Reg. Template Version 6.0		End of Requirement		

External 16

FWF and LE shall control the vehicle Vehicle Motion features based off of user interaction with vehicle.

Requirement ID:				
Rationale				
Acceptance Criteria				
Notes				
Source		Owner		
Source Req.		V&V Method		
Type		Priority	Status	In-Progress
Reg. Template Version 6.0		End of Requirement		



Feature Document MyFeature

External 14

FWF and LE shall control the vehicle Interior Illumination based off of user interaction with vehicle.

Requirement ID:				
Rationale				
Acceptance Criteria				
Notes				
Source		Owner		
Source Req.		V&V Method		
Type		Priority	Status	In-Progress
Req. Template	Version 6.0			End of Requirement

5.1.1 Error Handling

No Error Handling Requirements specified.

5.2 Non-Functional Requirements

5.2.1 Safety

Not supported by MagicDraw report generation.

5.2.2 Security

No Security Requirements specified.

5.2.3 Reliability

No Reliability Requirements specified.

5.3 HMI Requirements

There are no feature HMI Requirements. Individual sub-features may have HMI requirements which would be identified in their feature document. The Approach Detection function (associated with PEPS Keyfob or PaaK) currently has an HMI screen which allows the customer to turn OFF "Welcome Lighting". Selecting this option would disable the polling/searching for the authentication device (keyfob, PaaK, etc.) but would not turn off the Ford Welcome Farwell or Lincoln Embrace feature. As a result, the exterior lights would not turn on automatically when approaching the vehicle but would occur if the customer manually unlocks the vehicle via the authentication device (keyfob, PaaK, etc.).

5.4 Other Requirements

5.4.1 Design Requirements

No feature design requirements. Individual sub-features may have design requirements which would be identified in their feature document.

5.4.2 Manufacturing Requirements

No feature Manufacturing Requirements. Individual sub-features may have manufacturing requirements which would be identified in their feature document.



5.4.3 Service Requirements

No Service Requirements for the feature. Individual sub-features may have service requirements which would be identified in their feature document.

5.4.3.1 Cloud Connectivity Data Analytics Requirements

TBD

5.4.4 After Sales Requirements

No feature After Sales Requirements.

5.4.5 Process Requirements

No feature Process Requirements.



6 FUNCTIONAL SAFETY

6.1 System Behaviors for HARA

ID	Name
1	Exterior lights shall turn on (or fade on)
2	Exterior lights shall turn off (or fade off)
3	Interior lights shall turn on (or fade on)
4	Interior lights shall turn off (or fade off)
5	Vehicle display shall turn on (or fade on)
6	Vehicle display shall turn off (or fade off)
7	Exterior activations shall stow
8	Exterior activations shall deploy

Table 11: System Behaviors for HARA

6.2 Functional Safety Assumptions / Assessments

Ford Welcome Farewell and Lincoln Embrace have been assessed by the Functional Safety group. The assessment of the feature is that it is “not an item” as it relates to Functional Safety. Ford Welcome Farewell and Lincoln Embrace activate sub-features which have their own Functional Safety assessment. The Functional Safety assessments of the sub-features are identified in their respective feature documents.

6.3 Safety Goals

Not Applicable. Please see Functional Safety Assumptions.

6.4 Functional Safety Requirements

Not Applicable. Please see Functional Safety Assumptions.

6.4.1 Safety Goal: Prevent Hazard (Example)

Not Applicable. Please see Functional Safety Assumptions.

6.4.1.1 Safety Goal Concept

6.4.1.2 Warning and Recovery Concept

6.4.1.3 FSRs for - Prevent Hazard (Example)

6.4.2 Derivation of Functional Safety Requirements on Assumptions



No Functional Safety Requirements tracing to Assumptions specified.

6.5 ASIL Decomposition of Functional Safety Requirements

6.5.1 Decomposition of Functional Safety Requirement



7 CYBERSECURITY

7.1 Security Goals

The Cyber-Security team's assessment of this feature on February 24, 2021 was that it is "Non Cyber Relevant".

7.2 Cybersecurity Requirements

The Cyber-Security team also stated that no further Cyber-Security work is needed for this feature.



8 ARCHITECTURE

8.1 Functional Architecture

Description of the diagram and content about Functional Architecture in Documentation field of Functional Boundary Diagram.

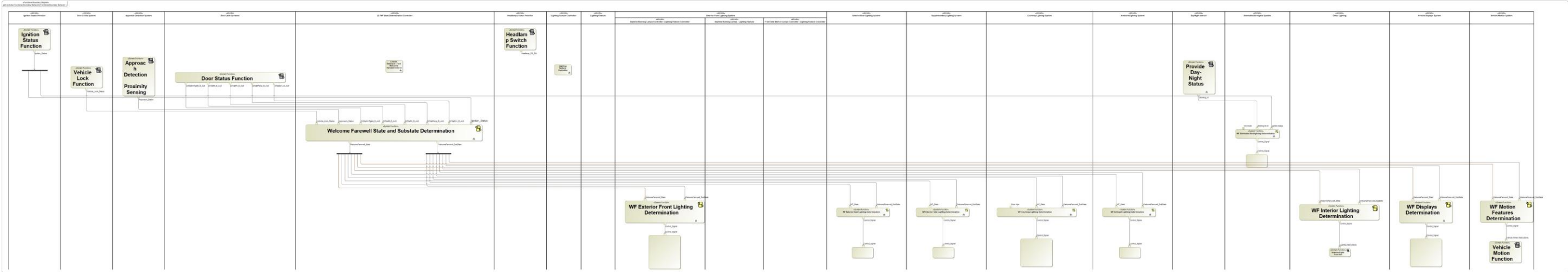


Figure 5: Functional Boundary Behavior



Feature Document MyFeature

8.1.1 List of Functions

Function Name	Description	Comments
(activity) Ignition Status Function	(activity) External function that provides the Ignition Status (Off/Acc/Start/Run).	
(activity) Vehicle Motion Function	(activity) External Function that receives instructions to activate or deactivate the various Motion Features.	
(activity) WF Exterior Front Lighting Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Exterior Front Lighting Features to enable or disable accordingly.	
(activity) Headlamp Switch Function	(activity) External function that provides information on the headlamp's switch status.	
(activity) WF Dimmable Backlighting Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Dimmable Backlighting Features to enable or disable accordingly.	
(activity) Welcome Farewell State and Substate Determination	(activity) This Function determines the current working State for Welcome/Farewell, so as to change/transition the Welcome/Farewell experience as the user approaches, enters, drives, exits, and walks away from the vehicle.	
(activity) Approach Detection Proximity Sensing	(activity) External Function that detects an authorized user moving towards the vehicle.	
(activity) WF Exterior Rear Lighting Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Exterior Rear Lighting Features to enable or disable accordingly.	
(activity) Lincoln Embrace / Ford Welcome Farewell Stm v3		
(activity) WF Displays Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Infotainment Displays to enable or disable accordingly.	
(activity) WF Exterior Side Lighting Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Exterior Side Lighting Features to enable or disable accordingly.	
(activity) Provide Day-Night Status	(activity) External functions that determines whether it is Day or Night based on environment lighting.	
(activity) Lighting Feature Controller		
(activity) WF Motion Features Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Motion Features to enable or disable accordingly.	
(activity) WF Ambient Lighting Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Interior AmbientLighting Features to enable or disable accordingly.	
(activity) Interior Light Function	(activity) External Function that receives instructions to activate or deactivate the various Interior Lighting Features.	
(activity) Door Status Function	(activity) External function that provides information on Door Ajar/not Ajar.	
(activity) WF Courtesy Lighting Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Courtesy Lighting Features to enable or disable accordingly.	



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Function Name	Description	Comments
(activity) WF Interior Lighting Determination	(activity) This Function receives/reads the current State for Welcome/Farewell and requests Interior Lighting Features to enable or disable accordingly.	
(activity) Vehicle Lock Function	(activity) External function that provides information on vehicle lock status (locked/unlocked).	

Table 12: List of Functions

8.2 Logical Architecture

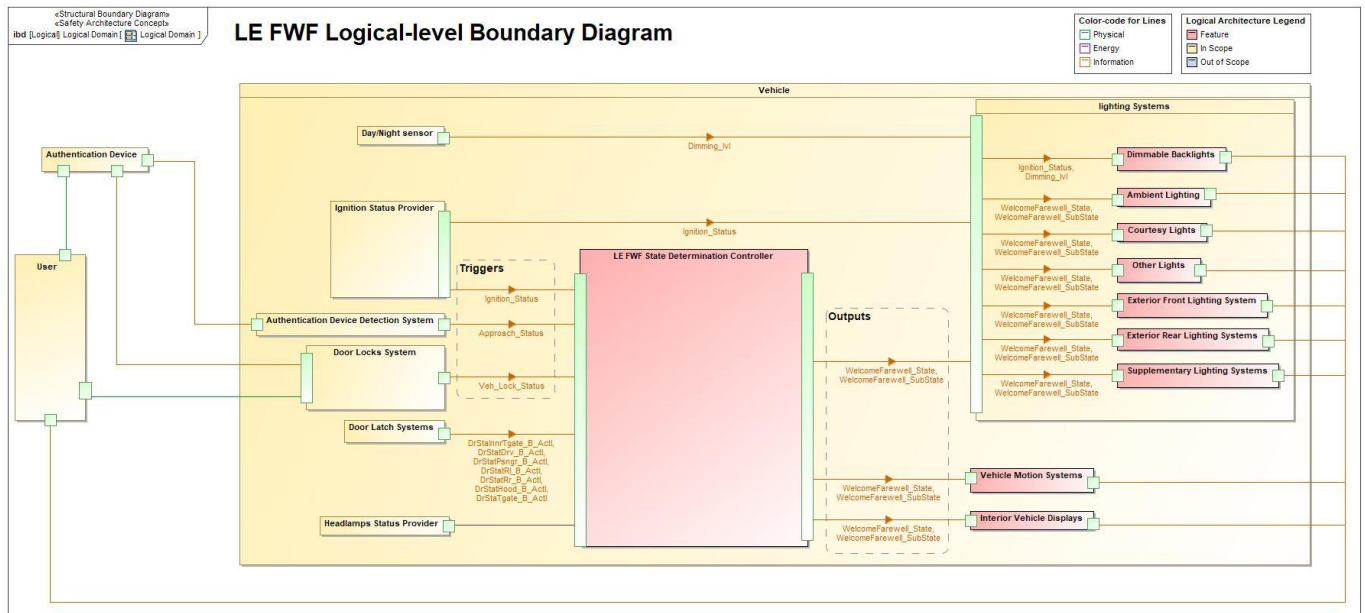


Figure 6: Logical Domain

8.2.1 Logical Elements

Element Name	Description	Allocated Functions	Comments
Ambient Lighting System	Vehicle lighting systems (Interior and Exterior).	• WF Ambient Lighting Determination	
Approach Detection System	System that detects an authorized user coming close to the vehicle.	• Approach Detection Proximity Sensing	
Authentication Device	Device held or carried by a user that identifies him/her as an authorized vehicle user.	• Approach Detection Proximity Sensing	
Courtesy Lighting System	Lighting that helps user get in and out of vehicle.	• WF Courtesy Lighting Determination	
Day/Night sensor	Provides information on day/night status of environment.	• Provide Day-Night Status	
Dimmable Backlights System	Backlights for switches and buttons.	• WF Dimmable Backlighting Determination	
Door Latch Systems	System that provides information on doors ajar/not ajar.	• Door Status Function	



Feature Document MyFeature

Door Locks System	System that provides information on doors locked/unlocked.	• Vehicle Lock Function	
Exterior Front Lighting System	Exterior front lights.	• WF Exterior Front Lighting Determination	
Exterior Rear Lighting System	Exterior rear lights.	• WF Exterior Rear Lighting Determination	
Headlamps Status Provider	System that provides information on Headlamps switch status (On/Off/Auto).	• Headlamp Switch Function	
Ignition Status Provider	System that provides information on Ignition Status (Off/Acc/Start/Run).	• Ignition Status Function	
LE FWF State Determination Controller	Element of Interest. Feature that delivers an experience to the users as they approach, enter, start, turn off, exit and walk away from the vehicle.	• Lincoln Embrace / Ford Welcome Farewell Stm v3 • Welcome Farewell State and Substate Determination	
Lighting System			
Other Lighting	Interior lighting elements.	• Interior Light Function • WF Interior Lighting Determination	
Supplementary Lighting System	Puddle lights and door handle pocket lights.	• WF Exterior Side Lighting Determination	
User	Vehicle user to whom the Welcome/Farewell experience is delivered.		
Vehicle	Vehicle with the Welcome/Farewell feature.		
Vehicle Displays System	Infotainment screens.	• WF Displays Determination	
Vehicle Motion System	Vehicle features that involve motion such as, but not limited to, Vehicle Kneeling, Power-folding Mirrors, and Power Running Boards.	• Vehicle Motion Function • WF Motion Features Determination	

Table 13: Logical Elements

8.2.2 Logical Interfaces

Interface	Direction	Description	Value Range
Approach_Status	p2 (Approach Detection System) To in (LE FWF State Determination Controller)	Signal indicating if an authenticated user is within range.	
Dimming_IVI	in_LEFWF_signals (Lighting System) To LEFWF signals (Dimmable Backlights System)	Intensity level of dimmable backlighting.	Value as Dimming_IVI_Kind: • Off • Night_1 • Night_2 • Night_3 • Night_4 • Night_5 • Night_6 • Night_7 • Night_8 • Night_9



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			<ul style="list-style-type: none"> • Night_10 • Night_11 • Night_12 • Day_1 • Day_2 • Day_3 • Day_4 • Day_5 • Day_6
	o_DayNightSensor (Day/Night sensor) To in_LEFWF_signals (Lighting System)	Intensity level of dimmable backlighting.	Value as Dimming_Ivl_Kind: <ul style="list-style-type: none"> • Off • Night_1 • Night_2 • Night_3 • Night_4 • Night_5 • Night_6 • Night_7 • Night_8 • Night_9 • Night_10 • Night_11 • Night_12 • Day_1 • Day_2 • Day_3 • Day_4 • Day_5 • Day_6
DrStatInnrTgate_B_Actl	p1 (Door Latch Systems) To in (LE FWF State Determination Controller)	Tailgate ajar status	
DrStatDrv_B_Actl	p1 (Door Latch Systems) To in (LE FWF State Determination Controller)	Driver door status	
DrStaTgate_B_Actl	p1 (Door Latch Systems) To in (LE FWF State Determination Controller)	Tailgate ajar status	
DrStatHood_B_Actl	p1 (Door Latch Systems) To in (LE FWF State Determination Controller)	Tailgate ajar status	
DrStatPsngr_B_Actl	p1 (Door Latch Systems) To in (LE FWF State Determination Controller)	Passenger door status	



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DrStatRl_B_Actl	p1 (Door Latch Systems) To in (LE FWF State Determination Controller)	Rear left door status	
DrStatRr_B_Actl	p1 (Door Latch Systems) To in (LE FWF State Determination Controller)	Rear right door status	
Ignition_Status	in_LEFWF_signals (Lighting System) To LEFWF signals (Dimmable Backlights System)	The processed value for current Ignition state.	Value as Ignition_Status_Kind: • Off • Run • Acc
	p1 (Ignition Status Provider) To LEFWF signals (Ambient Lighting System)	The processed value for current Ignition state.	Value as Ignition_Status_Kind: • Off • Run • Acc
	p1 (Ignition Status Provider) To in (LE FWF State Determination Controller)	The processed value for current Ignition state.	Value as Ignition_Status_Kind: • Off • Run • Acc
	p1 (Ignition Status Provider) To in_LEFWF_signals (Lighting System)	The processed value for current Ignition state.	Value as Ignition_Status_Kind: • Off • Run • Acc
Veh_Lock_Status	p2 (Door Locks System) To in (LE FWF State Determination Controller)	Broadcast status of last electrically driven lock motor command (may not match last request due to voltage limitations or overheat protection).	
WelcomeFarewell_State	in_LEFWF_signals (Lighting System) To LEFWF signals (Ambient Lighting System)	Transmits the over-arching state of the Welcome-Farewell sequence	State as WelcomeFarewellState_Kind: • Null • Welcome • Farewell • Ignition Run Start
	in_LEFWF_signals (Lighting System) To LEFWF signals (Courtesy Lighting System)	Transmits the over-arching state of the Welcome-Farewell sequence	State as WelcomeFarewellState_Kind: • Null • Welcome • Farewell • Ignition Run Start
	in_LEFWF_signals (Lighting System) To LEFWF signals (Exterior Front Lighting System)	Transmits the over-arching state of the Welcome-Farewell sequence	State as WelcomeFarewellState_Kind: • Null • Welcome • Farewell • Ignition Run Start
	in_LEFWF_signals (Lighting System) To LEFWF signals (Exterior Rear Lighting System)	Transmits the over-arching state of the Welcome-Farewell sequence	State as WelcomeFarewellState_Kind: • Null • Welcome • Farewell



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			<ul style="list-style-type: none"> • Ignition Run Start
	in_LEFWF_signals (Lighting System) To LEFWF signals (Other Lighting)	Transmits the over-arching state of the Welcome- Farewell sequence	State as WelcomeFarewellState_Kind: <ul style="list-style-type: none"> • Null • Welcome • Farewell • Ignition Run Start
	in_LEFWF_signals (Lighting System) To LEFWF signals (Supplementary Lighting System)	Transmits the over-arching state of the Welcome- Farewell sequence	State as WelcomeFarewellState_Kind: <ul style="list-style-type: none"> • Null • Welcome • Farewell • Ignition Run Start
	out_LEFWF signals (LE FWF State Determination Controller) To LEFWF signals (Ambient Lighting System)	Transmits the over-arching state of the Welcome- Farewell sequence	State as WelcomeFarewellState_Kind: <ul style="list-style-type: none"> • Null • Welcome • Farewell • Ignition Run Start
	out_LEFWF signals (LE FWF State Determination Controller) To LEFWF signals (Vehicle Displays System)	Transmits the over-arching state of the Welcome- Farewell sequence	State as WelcomeFarewellState_Kind: <ul style="list-style-type: none"> • Null • Welcome • Farewell • Ignition Run Start
	out_LEFWF signals (LE FWF State Determination Controller) To LEFWF signals (Vehicle Motion System)	Transmits the over-arching state of the Welcome- Farewell sequence	State as WelcomeFarewellState_Kind: <ul style="list-style-type: none"> • Null • Welcome • Farewell • Ignition Run Start
	out_LEFWF signals (LE FWF State Determination Controller) To in_LEFWF_signals (Lighting System)	Transmits the over-arching state of the Welcome- Farewell sequence	State as WelcomeFarewellState_Kind: <ul style="list-style-type: none"> • Null • Welcome • Farewell • Ignition Run Start
WelcomeFarewell_ SubState	in_LEFWF_signals (Lighting System) To LEFWF signals (Ambient Lighting System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking • Illuminated Entry • Courtesy Lighting - All <ul style="list-style-type: none"> • Illuminated Exit • Courtesy Lighting Delay - All <ul style="list-style-type: none"> • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended <ul style="list-style-type: none"> • Ignition Run Start • Media Accessory Delay
	in_LEFWF_signals (Lighting System) To LEFWF signals (Courtesy Lighting System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking



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			<ul style="list-style-type: none"> • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	in_LEFWF_signals (Lighting System) To LEFWF signals (Exterior Front Lighting System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	in_LEFWF_signals (Lighting System) To LEFWF signals (Exterior Rear Lighting System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	in_LEFWF_signals (Lighting System) To LEFWF signals (Other Lighting)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	in_LEFWF_signals (Lighting System) To LEFWF signals (Supplementary Lighting System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking



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			<ul style="list-style-type: none"> • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	out_LEFWF signals (LE FWF State Determination Controller) To LEFWF signals (Ambient Lighting System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	out_LEFWF signals (LE FWF State Determination Controller) To LEFWF signals (Vehicle Displays System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	out_LEFWF signals (LE FWF State Determination Controller) To LEFWF signals (Vehicle Motion System)	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking • Illuminated Entry • Courtesy Lighting - All • Illuminated Exit • Courtesy Lighting Delay - All • Courtesy Lighting Delay - Extended • Courtesy Lighting - Extended • Ignition Run Start • Media Accessory Delay
	out_LEFWF signals (LE FWF State Determination Controller) To	Transmits the specific (sub)state of the Welcome-Farewell sequence	Substate as WelcomeFarewellSubState_Kind: <ul style="list-style-type: none"> • Null • Approach Detection • Vehicle Locking



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	in_LEFWF_signals (Lighting System)		<ul style="list-style-type: none">• Illuminated Entry• Courtesy Lighting - All<ul style="list-style-type: none">• Illuminated Exit• Courtesy Lighting Delay - All<ul style="list-style-type: none">• Courtesy Lighting Delay - Extended• Courtesy Lighting - Extended<ul style="list-style-type: none">• Ignition Run Start• Media Accessory Delay
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Table 14: Feature Interactions



9 OPEN CONCERNS

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

Table 15: Open Concerns *(Not supported by MagicDraw report generation)*



10 REVISION HISTORY

No Revision History found.



11 APPENDIX

11.1 Definitions

Definition	Description
FWF	Ford Welcome Farewell
LE	Lincoln Embrace

Table 16: Definitions used in this document

11.2 Abbreviations

Reference the RLIS “Ford Speak” website for acronym definitions.



Document ends here.