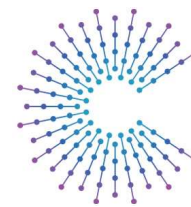


# EV POWER OPTIMIZATION

Guidelines/Attributes to increase travel range for fixed battery

20 October 2022



## COVESA

Accelerating the future of connected vehicles

본 내용은 외부에 당사 사유로 관련 법규에 의해 공개될 수 있습니다.

# AGENDA/OBJECTIVE

## Why?

- Need to understand the importance of Power optimization during critical SOC stage
- Backup the travel range effecting parameters data on cloud

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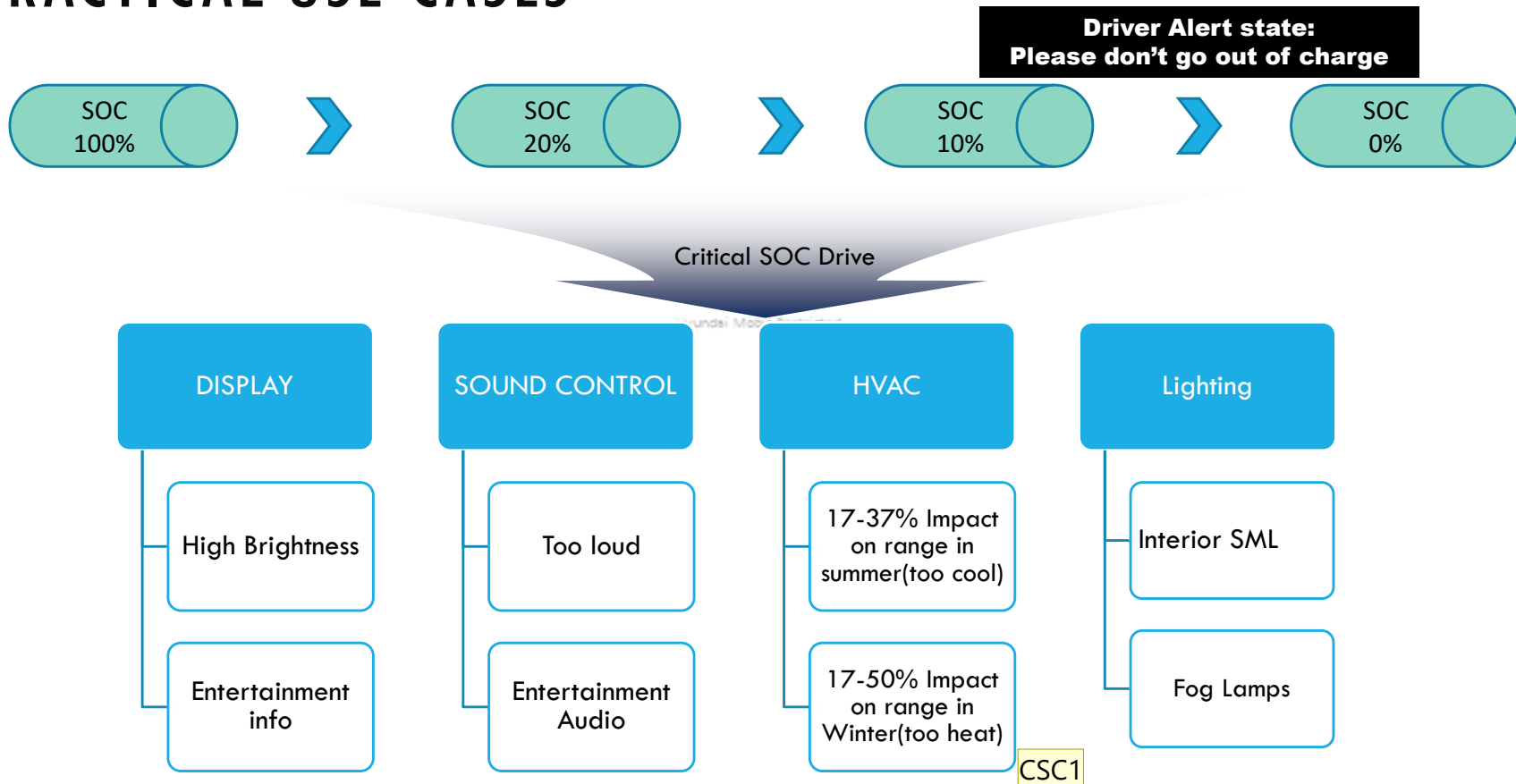
## Where?

- Appliance of backup data in crisis situations like running out of battery
- Support OEMs to analyze and derive power efficient algorithms

## What?

- Seek Collaboration from the industry players

# PRACTICAL USE-CASES

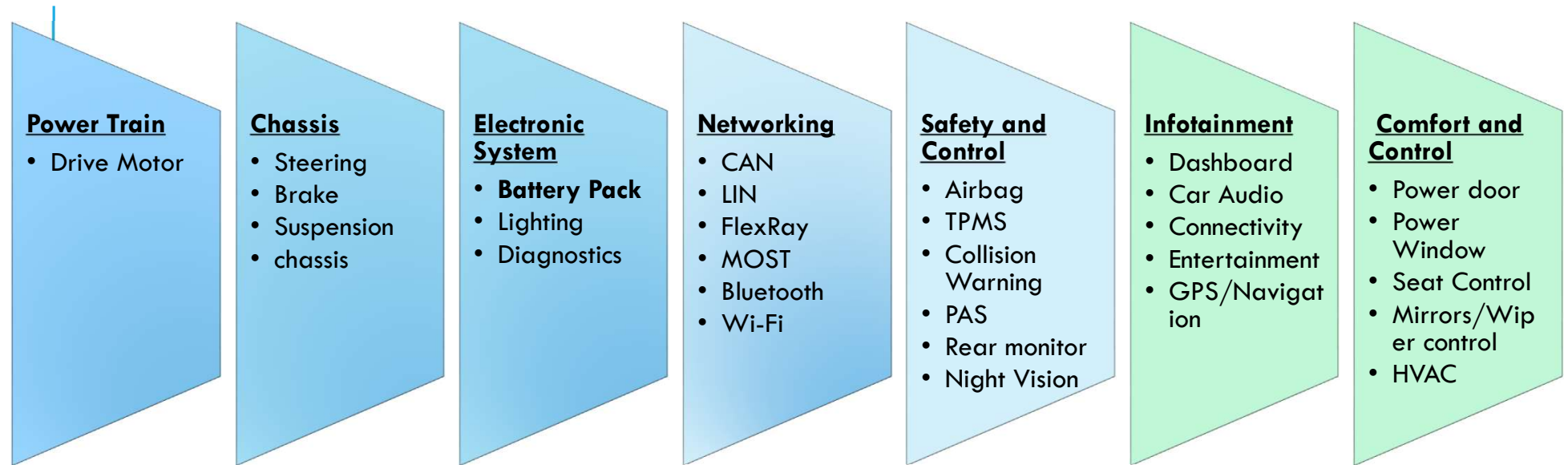


## Slide 3

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**CSC1** <https://www.mdpi.com/1996-1073/12/5/946>  
Chandra Sekhar Chitikela, 10/17/2022

# PARAMETERS EFFECTING TRAVEL RANGE



**External:**

- Drivers Behavior, weight
- Traffic, Weather
- Charge station infra.



**Range Calculations:**

Score/Rating	Wh/mile	Miles/kWh
Excellent	190-225	5.0+
Good	226-260	4.0-4.9+
Average	261-295	3.0-3.9+
Poor	296+	0-2.9+

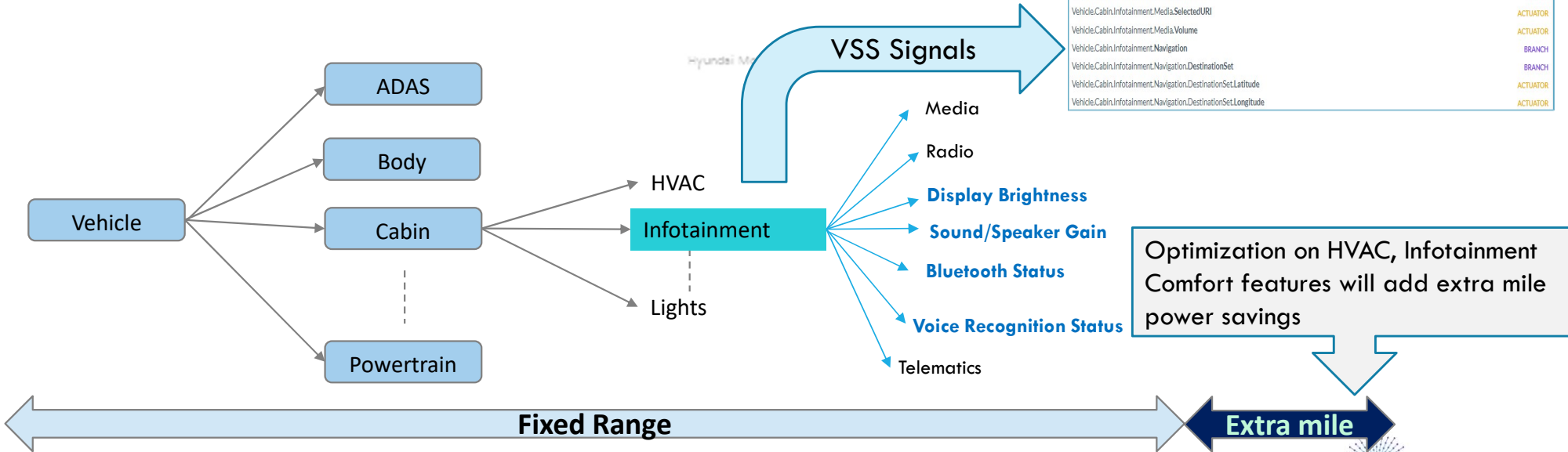


# PARAMETERS EFFECTING TRAVEL RANGE

Available Guidelines	To be introduced
Vehicle pre-conditioning	Infotainment
Regenerative braking	HVAC control
Routine Maintenance	Comfort features
Remove extra weight	Lighting

Range Effecting Electronic Loads	% Effect on Range
Infotainment	~1%
HVAC	~17 to 40%
Power windows/Mirrors	~2%
lighting	~5 to 10%
Sunroof control etc.	~ 2%

Vehicle.Cabin.Infotainment	BRANCH
Vehicle.Cabin.Infotainment.HMI	BRANCH
Vehicle.Cabin.Infotainment.HMI.CurrentLanguage	SENSOR
Vehicle.Cabin.Infotainment.HMI.DateFormat	ACTUATOR
Vehicle.Cabin.Infotainment.HMI.DayNightMode	ACTUATOR
Vehicle.Cabin.Infotainment.HMI.DistanceUnit	ACTUATOR
Vehicle.Cabin.Infotainment.HMI.EVEconomyUnits	ACTUATOR
Vehicle.Cabin.Infotainment.HMI.FuelEconomyUnits	ACTUATOR
Vehicle.Cabin.Infotainment.HMI.TemperatureUnit	ACTUATOR
Vehicle.Cabin.Infotainment.HMI.TimeFormat	ACTUATOR
Vehicle.Cabin.Infotainment.Media	BRANCH
Vehicle.Cabin.Infotainment.Media.Action	ACTUATOR
Vehicle.Cabin.Infotainment.Media.DeclinedURI	SENSOR
Vehicle.Cabin.Infotainment.Media.Played	BRANCH
Vehicle.Cabin.Infotainment.Media.Played.Album	SENSOR
Vehicle.Cabin.Infotainment.Media.Played.Artist	SENSOR
Vehicle.Cabin.Infotainment.Media.Played.Source	ACTUATOR
Vehicle.Cabin.Infotainment.Media.Played.Track	SENSOR
Vehicle.Cabin.Infotainment.Media.Played.URI	SENSOR
Vehicle.Cabin.Infotainment.Media.SelectedURI	ACTUATOR
Vehicle.Cabin.Infotainment.Media.Volume	ACTUATOR
Vehicle.Cabin.Infotainment.Navigation	BRANCH
Vehicle.Cabin.Infotainment.Navigation.DestinationSet	BRANCH
Vehicle.Cabin.Infotainment.Navigation.DestinationSet.Latitude	ACTUATOR
Vehicle.Cabin.Infotainment.Navigation.DestinationSet.Longitude	ACTUATOR

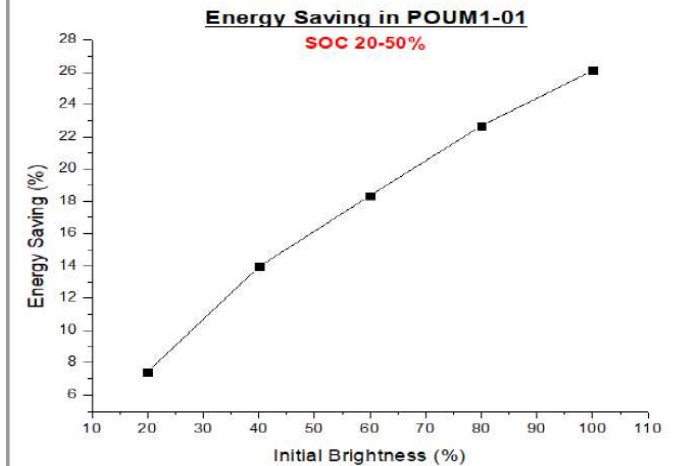




# ❖ IVI USE CASES : DISPLAY(8" TFT)- POWER OPTIMIZATION

	Display (System)						
<b>Description/Objective</b>	Display Turn off for Energy Conservation.						
<b>Pre-condition</b>	ACC OFF		ACC ON	IGN ON	Start		
	Sleep	ACC ON (Timeout)			Stationary	Moving	ISG
	X	X	○	○/X	○	○	X
<b>Optimization Rules</b>	<p>Rule: For SOC 20-50% -</p> <p>1) Display goes to backlight off for 10 minutes of inactivity.</p>						
<b>User Impact</b>	1) Screen will not show anything unless activated or navigation is going on.						
<b>Special conditions</b>	Option will be given to driver to choose the Level of Power Saving desired.						
<b>Power Savings:</b>	10-25%						

Initial Brightness(%)	P <sub>initial</sub> (W)	P <sub>off</sub> (W)	P <sub>saving</sub> (%)	E <sub>in</sub> (KJ)	E <sub>final</sub> (KJ)	E <sub>saving</sub> (%)
100	18.83	12.935	31.306	67.788	50.103	26.088
80	17.773	12.935	27.221	63.982	49.468	22.684
60	16.59	12.935	22.031	59.724	48.759	18.359
40	15.535	12.935	16.736	55.926	48.126	13.947
20	14.203	12.935	8.927	51.130	47.326	7.439



## ❖ USE CASES: POWER OPTIMIZATION

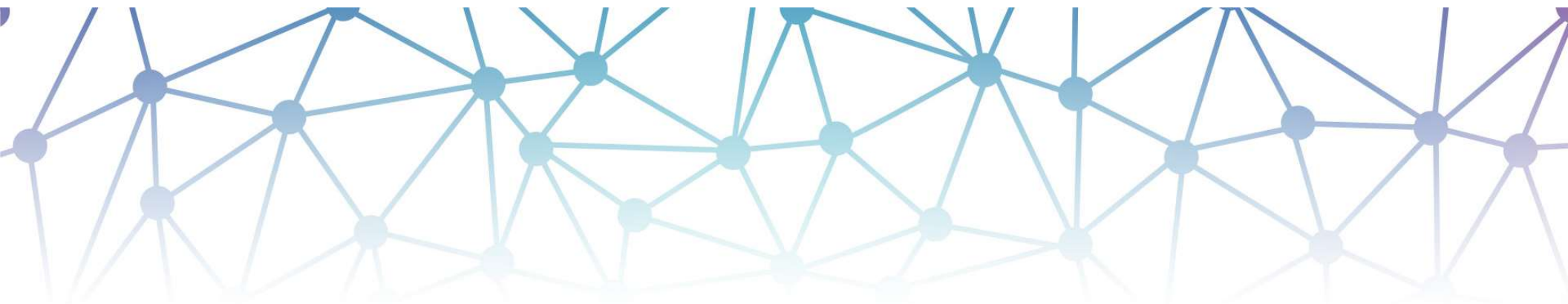
Use case 1(Infotainment): The Display on/off status with power efficiency parameter signal makes OEMs to analyze the optimization algorithms and select the suitable display unit

Use case 2(Infotainment): The Speaker gain status with power efficiency parameter signal makes OEMs to analyze the optimization algorithms and collective data is useful for selection of speakers

Use case 3(HVAC): HVAC operation status with power efficient parameter(Compressor status{Max, Min} and other parameters)

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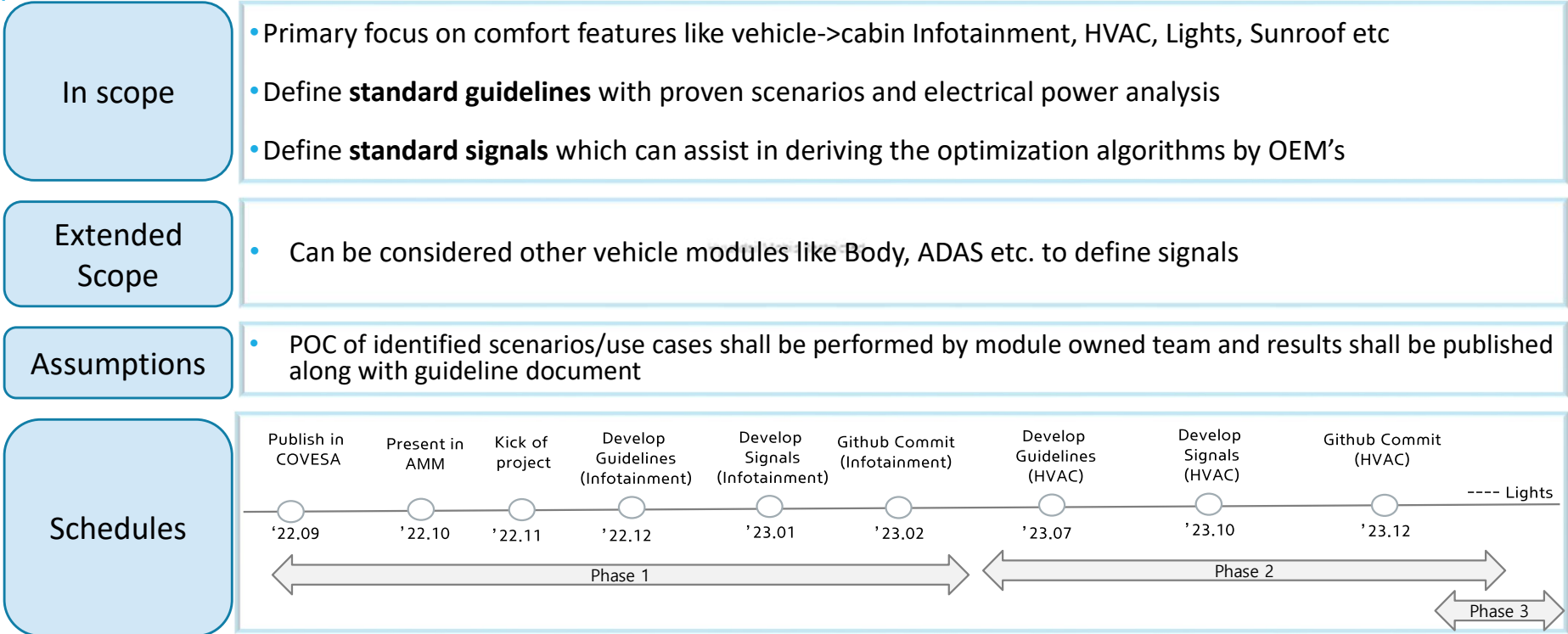


# EV POWER OPTIMIZATION IN VSS

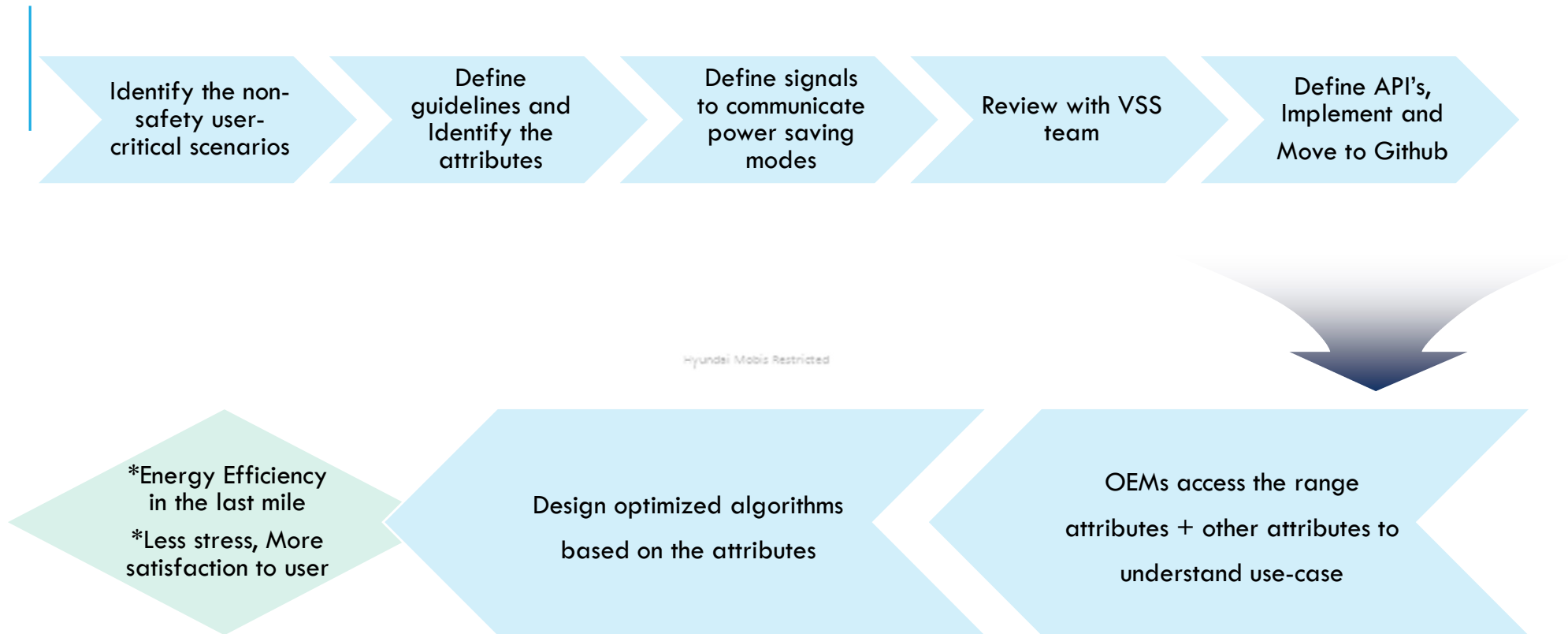
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Integration of EV Power optimization signals in VSS

# PROJECT SCOPE

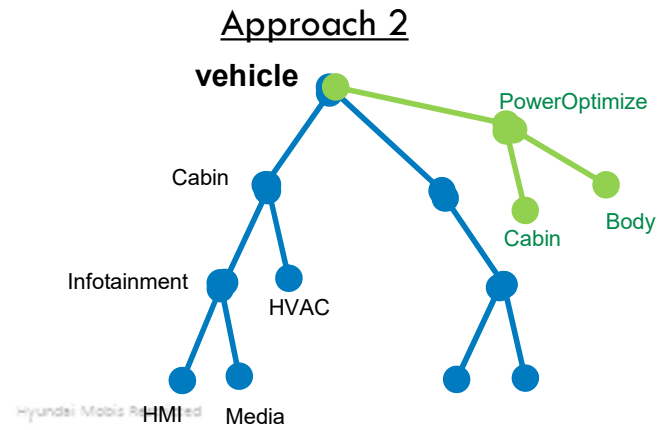
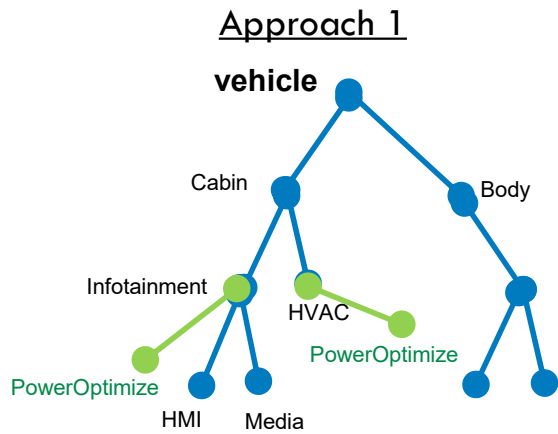


# APPROACH IN TRACKING TRAVEL RANGE ATTRIBUTES



Seek Collaboration to brainstorm and define power optimization attributes

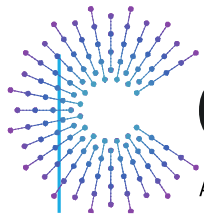
# DATA MODEL APPROACHES



## New Signals\*

Vehicle.PowerOptimize	Infotainment	DisplayBrightnessLevel
		Sound/SpekareGain
		BluetoothStatus
		Wi-Fi Status
		AA/CP Status
		VRStatus
Vehicle.PowerOptimize	HVAC	Compressor Status

\* To be discussed with VSS core team



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