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In-car HMI UX
Evaluations

#635

In-Car HMI UX Evaluation & Benchmarking

Cadillac Escalade

In this edition of SBD Automotive's HMI UX Evaluation report series, the UX Team tests the new Cadillac Escalade.

The infotainment system in the Cadillac Escalade presents a mature solution which is visually and functionally impressive. It is well-conceived in terms of hardware, software and information architecture, yet it still leaves room for improvement in several key areas.

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619 – UX Benchmarking Series

A precursor to the new **In-Car HMI UX Evaluation & Benchmarking Series**, SBD Automotive's UX Team evaluates the infotainment user experience of over 40 vehicles.

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NA



CHINA



EUROPE

FREQUENCY



ANNUALLY



QUARTERLY



CARS PER YEAR

PUBLICATION FORMAT



PDF



POWERPOINT



EXCEL



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PAGES



150+

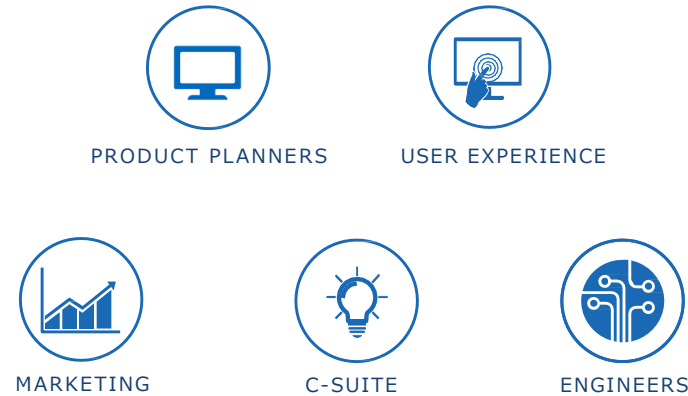
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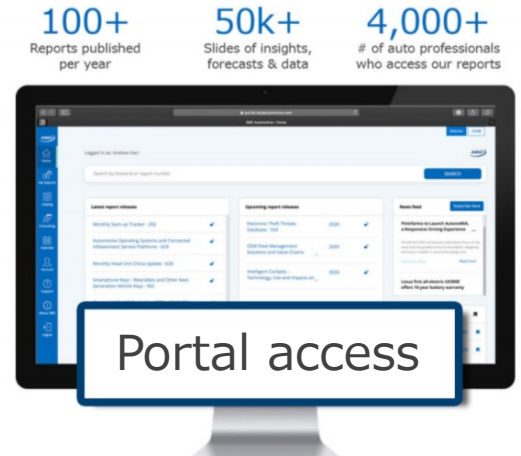
Scoring

- > **Features and functionality:** evaluating whether the solutions provide features that customers expect, need and solve problems (or provide a wow factor).
- > **Reliability/stability:** evaluating the repeated usability and whether the users can have a similar (positive) experience each time.
- > **Usability:** evaluating whether the features available are easy to learn and use. This considers areas such as ergonomics, legibility, usability characteristics and how the system implements the various features.
- > **Perceived quality:** evaluating the potential perception in quality of the HMI components and how this contributes to the overall customer experience.

This research is useful for



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Cadillac Escalade

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In-Car HMI UX Evaluation & Benchmarking Cadillac Escalade

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In-Car HMI UX Evaluation & Benchmarking
Cadillac Escalade

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Introduction



Aim of this report

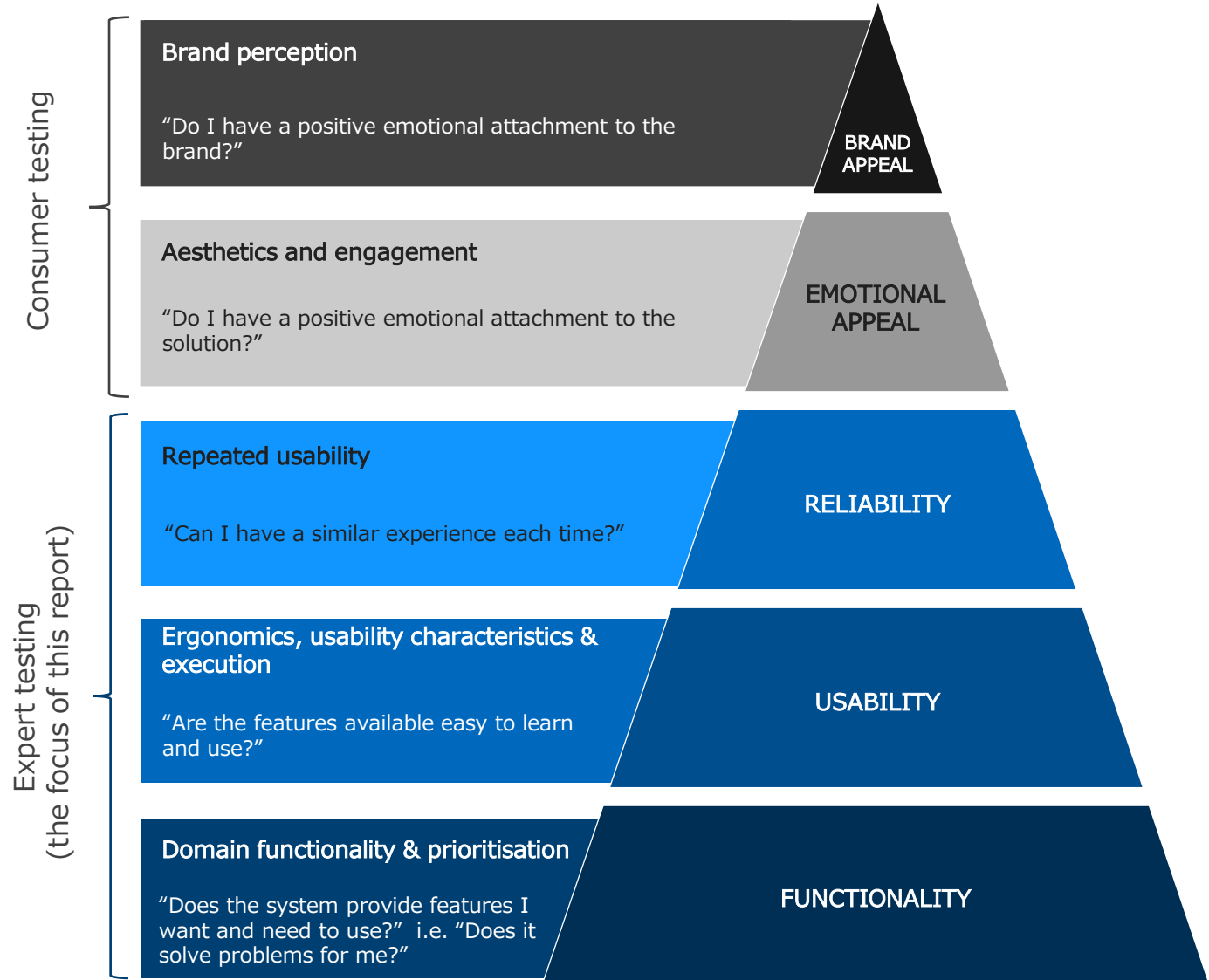
Welcome to the 2021 HMI benchmarking report series. This report has been created to provide a fair, unbiased and objective view of the latest in-vehicle HMI solutions in the European, US and Japanese markets. Evaluations are carried out by SBD usability experts with a deep understanding of CASE domains such as the Connected Car and ADAS & autonomy domains.

One of the core goals of these studies is to provide a true indication of what the final customer experience of each solution could be. To do this evaluations are focused on providing scoring and analysis in the following areas:

- **Features and functionality:** evaluating whether the solutions provide features that customers expect & need, and solve problems (or provide a wow factor)
- **Usability:** evaluating whether the features available are easy to learn and use. This considers areas such as ergonomics, legibility, usability characteristics and how the system implements the various features
- **Reliability/stability:** evaluating the repeated usability and whether the users can have a similar (positive) experience each time
- **Perceived quality:** evaluating the potential perception in quality of the HMI components and how this contributes to the overall customer experience

SBD supports clients throughout the development of new HMI and products from a relatively simple companion app to a more complex multi-domain infotainment solution. The methodologies used in these reports take into account many years of experience with consumer testing and custom client projects to provide a fair and, as much as possible, objective methodology.

All viewpoints and analysis within the report are aimed at defining areas of concern through a data driven approach. This report aims to benchmark and score solutions whilst also being able to provide actionable recommendations to design and development teams.



SBD's view on the hierarchy of needs for CX benchmarking



Scope of report: focus on in-car HMI evaluations

The scope of evaluations in this report are constrained to the in-car HMI experience, in both static and dynamic conditions. One notable element is driver distraction which SBD covers at only a high level in this study as carrying out a full driver distraction evaluation requires biometrics test equipment to ensure the collected data is unbiased and objective.



A full evaluation of the end-to-end customer experience is not within scope of this report, but it is something which SBD has many years experience in from both a consumer and expert perspective. Other areas such as the companion app, online portal and in-home smart devices are not in scope as they are defined as “out of car” experiences.

Within the vehicle, any HMI element the user interacts with is evaluated including steering wheel controls, touchscreen displays, voice control, HUDs and digital keys. The features and services on offer have been broadly grouped into the following domains (or test areas):

- ADAS domain
- Infotainment domain
- Navigation domain
- Voice recognition domain
- Connected services domain
- Convenience domain





Vehicle list

SBD has chosen eight cars to evaluate in 2021, based on two selection categories. New/interesting UX focuses on systems with never-seen-before features or functionality, or the implementation of a solution that has previously been a challenge or pain-point for end-users. New mass-market UX includes vehicles in segments that are sold in high numbers and are entering a new generation of UI for that vehicle. While best efforts have been made to adhere to the chosen cars and schedule, slippages in release dates have continued and been exacerbated by the chip shortage, so it has been necessary to make some substitutions.

Cars tested so far in 2021



Mercedes-Benz
S-Class



CUPRA
Formentor



Tesla
Model S



Hyundai
IONIQ 5



Lexus
LS



Cadillac
Escalade

Remaining cars due for testing in 2021



BMW
iX

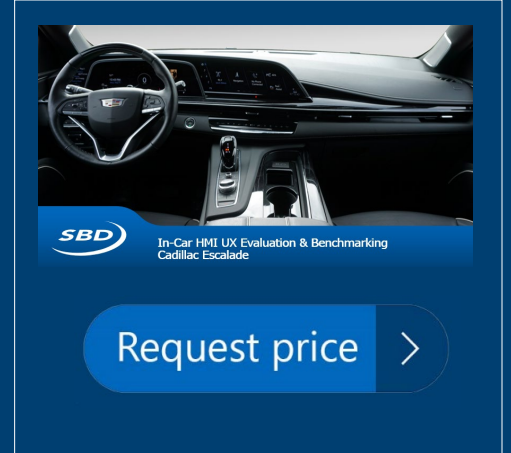


NIO
ES8

- New generation of iDrive
 - Expanded BMW VPA
 - Most advanced BMW ADAS
 - Digital Key Release 3.0
- Latest OS3 software
 - Fully updated GUI
 - European market car



Example slides from the full 150+ page report





No hygiene features of note missing, some notable navigation features

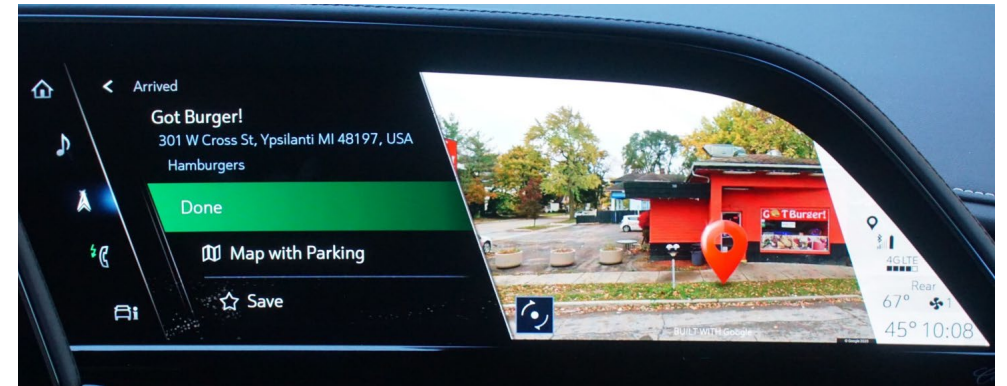
- No hygiene features of note are missing from the system. All expected features for all core elements of the system (navigation, ADAS, radio, media, phone and HVAC) are included and for the most part, function very well.
- HVAC makes use of a fully manual primary interface for both front and rear controls. A secondary on-screen interface is provided to allow control of rear settings from the front of the car.
- Within navigation, offboard destination search results appear very quickly after the user has submitted the query, speeding up the search process and giving the impression of a fast and responsive system.



Access to all major menus throughout the system

A fixed navigation bar provides access to core system elements throughout the system. The initial home screen additionally gives users one touch access to commonly used aspects of the system, can offer proactive recommendations and can also be customized to the user's preference. A dedicated HVAC control area is located below the touchscreen, providing one touch access to all front HVAC controls.

- Route re-calculation in the case of an unintended/unexpected change to the route is fast and efficient, with effective suggestions for the new route.
- "Personalized Navigation" allows the user to save favorite destinations. It can also learn from the user's usage patterns and make contextual recommendations based on time of day and location. Additionally, contextual messages are shown in some cases, for example if the destination POI may be closed on arrival.
- Augmented reality navigation view in the instrument cluster is well implemented and in can offer useful additional route guidance where some intersections may be unclear.



Detailed destination arrival screen

On arrival at a destination, a detailed "Arrived" screen is displayed on the central display, which includes an accurate image of the destination along with the POI name and address. Additionally, further options are shown, for example, "Map with Parking" to show the nearest parking to the destination, "Save" to add the destination to favorites and "Report an Issue".

Hood opened while driving

2. General system

At one point while driving the hood popped open without any input from the driver, and an error message was shown on the instrument cluster. Due to the fact the safety latch prevented it from fully opening, this is rated Major.

Frequency	Low	Medium	High
Severity	Minor	Major	Critical



Key lowlights



Placement of “Home” button not optimised for LHD

Lower centre console controls

Awkward placement of some elements

Although only a relatively minor criticism, the ‘Home’ button is placed to the rear right of the rotary controller. In a right hand drive car this configuration would function effectively as it could be accessed by reaching back with the thumb of the left hand. However, in a left hand drive car this is the most difficult of the four buttons to access, requiring the thumb to be folded under the palm of the hand. This button is likely to see relatively frequent use, so its positioning would be better suited to an area with easier manual access.

Two further minor comments are that the volume control can be slightly hard to make out from the driver’s seat and the Lane Departure Warning button can be visually obscured by the gearshift.



Perceived Quality: Tactile

Level 1

Tactile

Stiffness & looseness: Buttons and switches have a good tolerance, not too loose and not too firm. This aligns well with the user expectations of the brand.

Force feedback: Buttons operate with a satisfying feedback, providing an appropriate sense of quality hardware.

Material quality: A number of the buttons (e.g. steering wheel buttons, central controller buttons) have a fairly basic plastic finish that isn't necessarily bad quality, but may leave owners wanting a little more. The silver colored aluminum finish buttons provide a genuine impression of metal construction which is satisfying and meets user expectation.

Material harmony: Materials are consistent across zones where used, however a small variety of different materials are used – plain plastic, glossy plastic and metal (or metal-like).

Geometric & Positioning: The vast majority of the buttons and switches in the Escalade are likely to meet user expectation, with only a minority of exceptions that show scope for improvement. The first of these being the location of the home button on the central controller, which being positioned to the lower-right of the rotary dial places it in an awkward location to interact with for a button that is expected to be used with relatively high frequency. The other controls which show some room for improvement are the buttons on the driver's lower left panel, which is an area seeing innovation from some brands recently to improve visibility through a higher placement on the instrument panel.

SBD viewpoint

Level 2 scoring

Stiffness & looseness

Force feedback

Material quality

Material harmony

Geometric & positioning

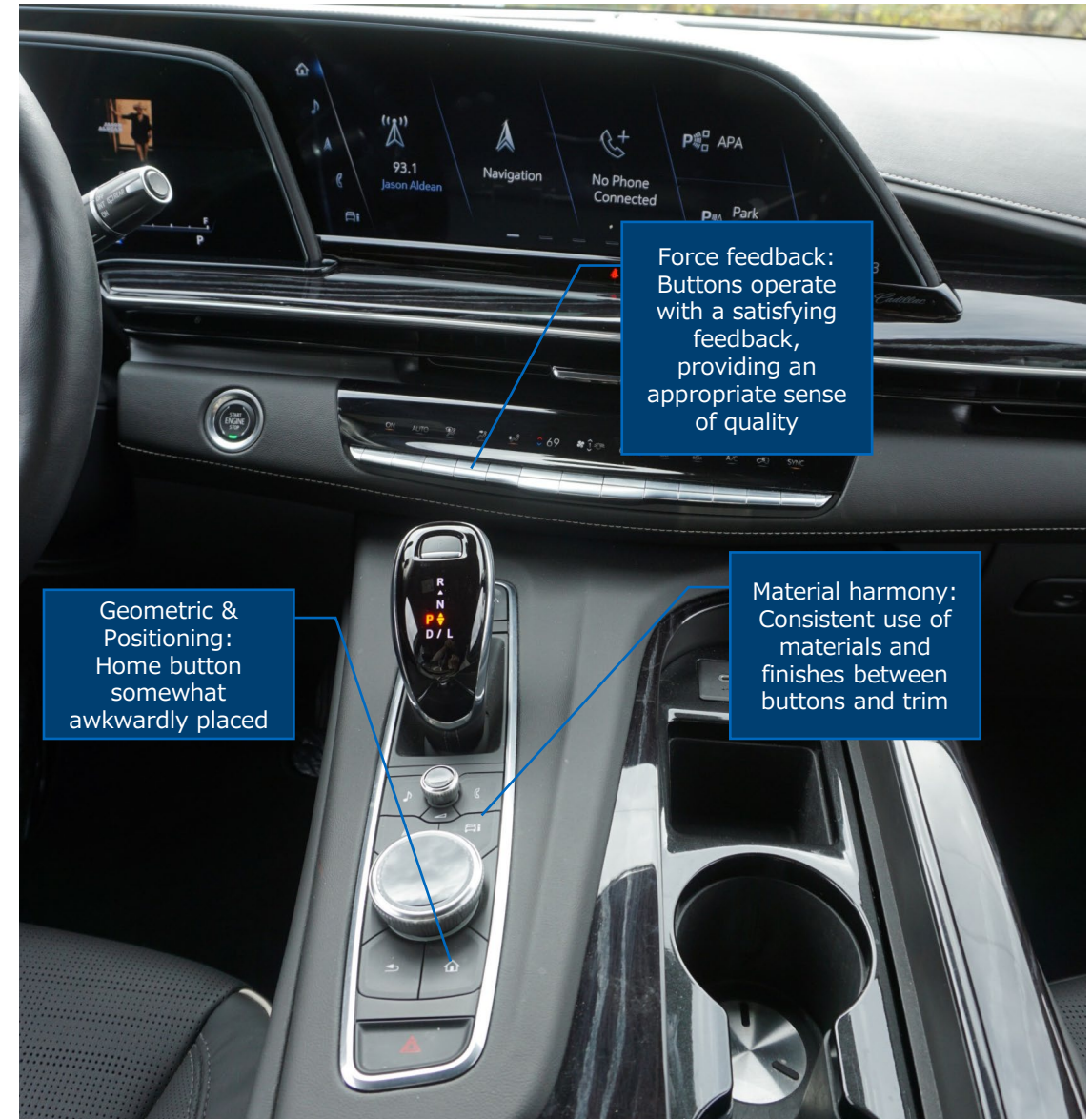
Good

Good

Good

Good

Good





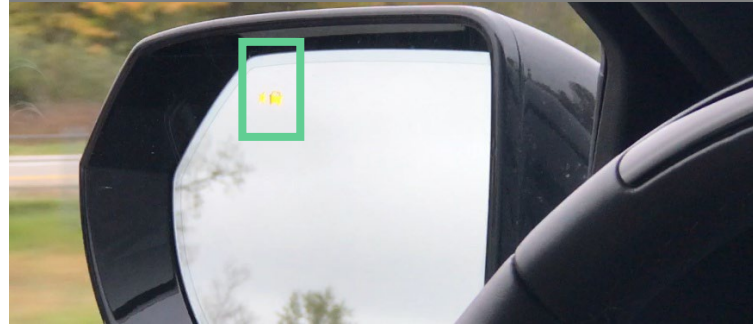
SAE Level 0 ADAS: System usage

System usage: LKA



LKA does not support when PD is overridden

System usage: BSM



Safety Alert Seat vibrations are effective

System usage: RCTA



Safety Alert Seat vibrations are effective

System usage: LKA



Safety Alert Seat vibrations are effective

System usage: BSM



No option for both seat vibrations and audible beeps

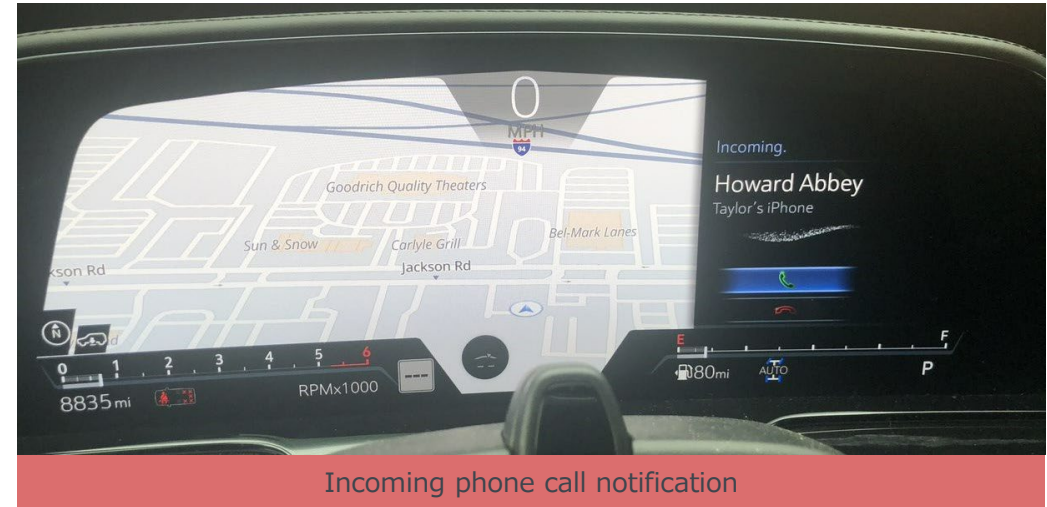
System usage: RCTA



No option for both seat vibrations and audible beeps

System forces interface switch on answering phone

Category	Infotainment
Description	System forces interface switch on answering incoming call
SBD viewpoint	<p>The primary method for receiving and answering phone calls in the Escalade's infotainment system resulted in a forced interface switch from the vehicle's instrument cluster to the central display.</p> <ul style="list-style-type: none"> When receiving a phone call, the user is first notified through the vehicle's instrument cluster, with no notification showing on the central display. Upon acceptance of the incoming call, an interface switch from cluster to central display takes place. It is expected that users may initially be confused as to which screen has the most relevant information on the status of their phone call. Initially this could cause some level of distraction. <p>The conventional approach would be to show primary information in the central display with a smaller prompt in the instrument cluster and/or HUD to enable the driver to see details of the call with the minimal level of distraction.</p>
UX impact	<div>Major negative</div> <div>Minor negative</div> <div>No impact</div> <div>Minor positive</div> <div>Major positive</div>





Not all system settings can be found in main settings menu

Category	Infotainment				
Description	Main settings menu does not include navigation settings				
SBD viewpoint	<p>The main settings menu does not provide access to all system settings as would be conventionally expected.</p> <ul style="list-style-type: none">Navigation settings must be accessed through the navigation section, and is not included within main settings.Adding a second link to navigation settings within main settings would increase flexibility and cater for different user expectations.The main menu structure is additionally too deep, adding extra steps and increasing complexity. <p>Adding a shortcut to navigation and providing a broader and shallower interface would provide faster and more convenient access to many settings that can currently be slightly harder to locate.</p>				
UX impact	Major negative	Minor negative	No impact	Minor positive	Major positive



Main menu settings fails to include all settings



Navigation settings are only found under navigation

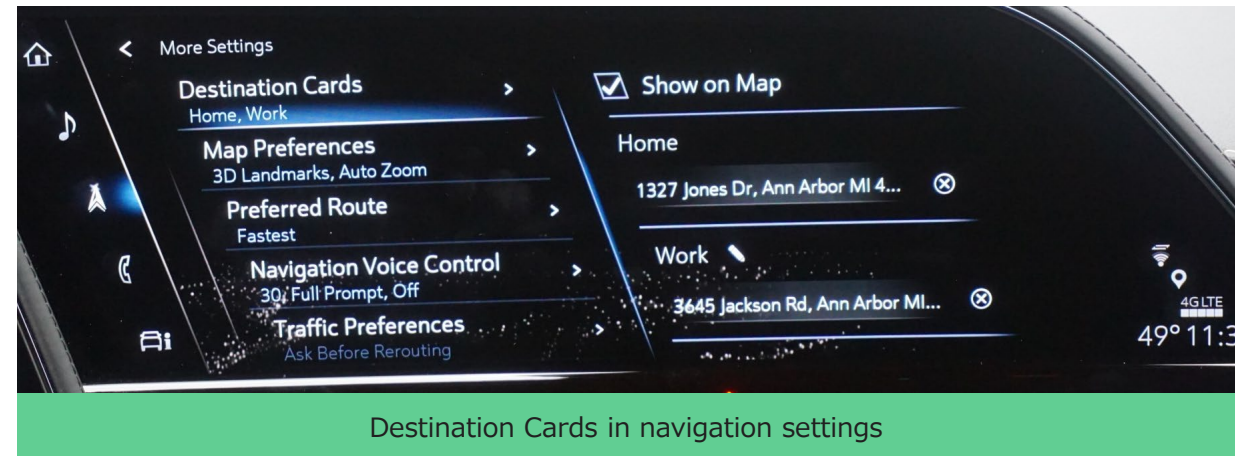


Proactive and contextual destination suggestions

Category	Navigation				
Description	Proactive and contextual destination suggestions based on saved destinations				
SBD viewpoint	<p>The Cadillac solution offers “Personalized Navigation” and the ability for the user to favorite and save destinations, referred to as “Destination Cards”.</p> <ul style="list-style-type: none">Personalized Navigation learns preferences by remembering where the vehicle has been and also uses locations and navigation history to personalize routes and results.According to the vehicle owner’s manual, Personalized Navigation may learn elements such as: personalized routes based on preferred streets, search results that provide best matches at the top of the list, predictive traffic and local map content updating.The user can save Home and Work destinations: these Destination Cards were set up at the start of testing.During testing, SBD discovered that on the main home menu, a shortcut to Home with estimated time to destination appeared above the Navigation shortcut.This proactive destination suggestion for Home appeared on the main home menu when it was typically a time that the driver would be heading home from work. <p>This contextual notification helps the Cadillac solution provide a pleasing level of personalization to the driver.</p>				
	UX impact	Major negative	Minor negative	No impact	Major positive



Home with estimated time to destination appears above Navigation



Destination Cards in navigation settings



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