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#635



In-car HMI UX Evaluations

# In-Car HMI UX Evaluation & Benchmarking

## Nissan Ariya

In this edition, the UX team is testing the Nissan Ariya.

Overall, many features are delivered to an acceptable standard, with an impressive interior appearance and ADAS feature offering. However, poor presentation of some visual details throughout the HMI, an underwhelming feature set and struggling voice recognition system stand in the way of a higher overall score.

### COVERAGE



GLOBAL



NA



CHINA



EUROPE

### FREQUENCY



ANNUALLY



QUARTERLY



6 CARS PER YEAR

### PUBLICATION FORMAT



PDF



POWERPOINT



EXCEL



ONLINE

### PAGES



155

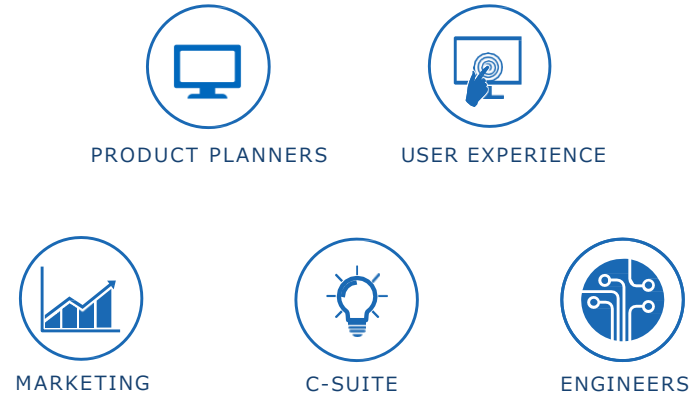
Request price



# 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

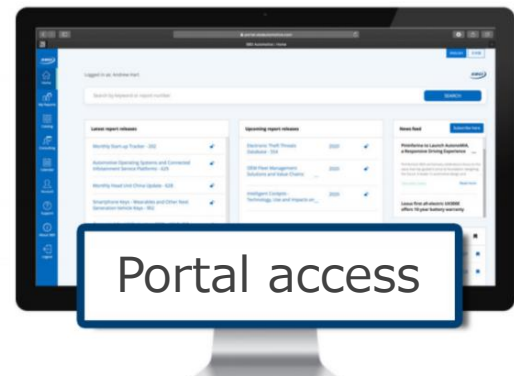


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Nissan Ariya

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June 2023  
**In-Car HMI UX Evaluation & Benchmarking**  
**Nissan Ariya**

635-23(23b)

## 635 - In-Car HMI UX Evaluation & Benchmarking – Nissan Ariya

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## Introduction

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# Aim of this report

Welcome to the 2023 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 US, European, 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 and autonomy domains.

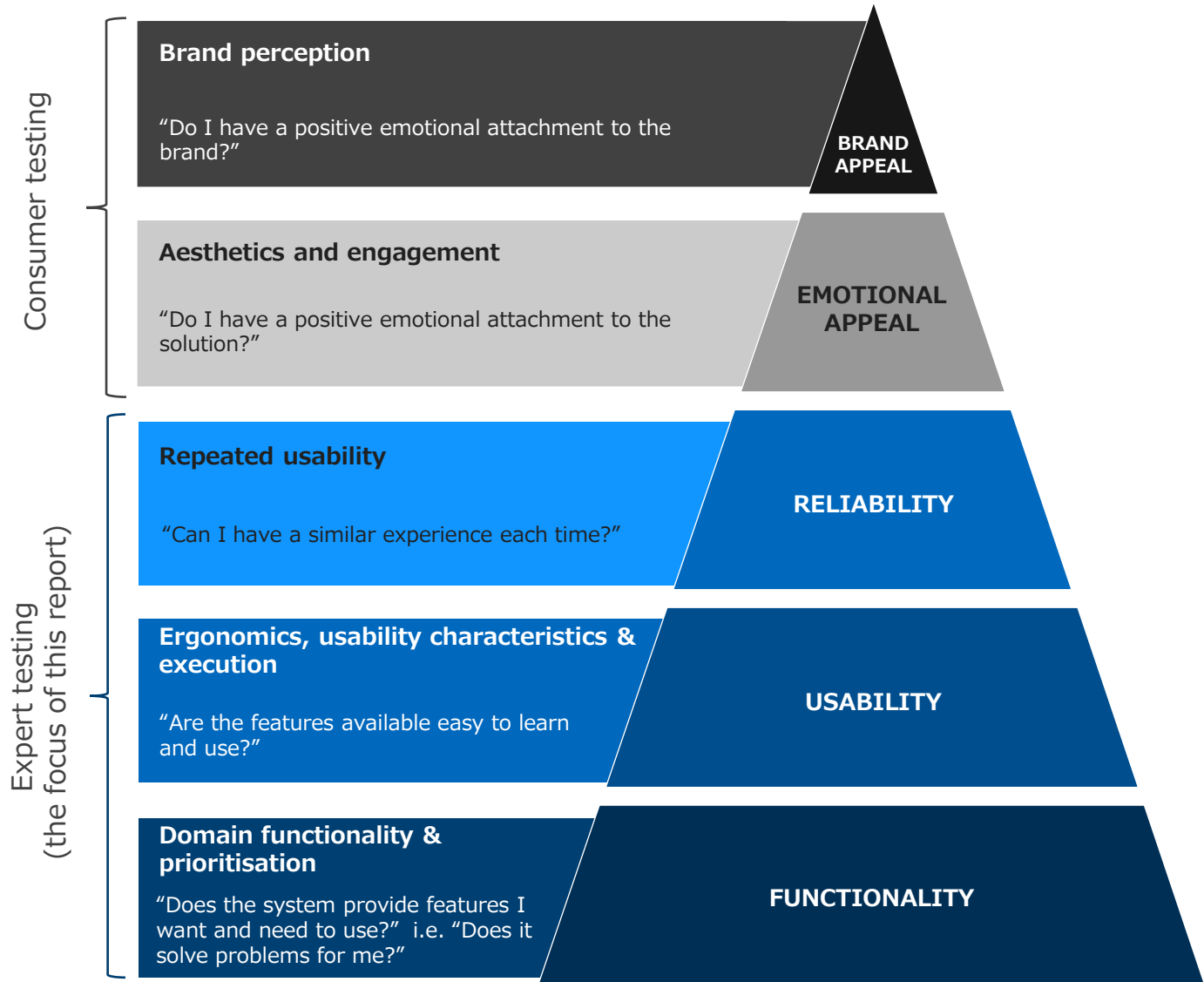
One of the core goals of these studies is to provide a true indication of what the final customer experience of each solution could be. To do this, evaluations are focused on providing scoring and analysis in the following areas:

- **Features and functionality:** evaluating whether the solutions provide features that customers expect and 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 consider 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.

Please note that due to the ever-evolving automotive technology market, SBD updates it's methodology each year, but does not update scores from the previous years. Therefore, please assume a slight drop in scores for both user experience (UX) and functionality from the previous year.



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 that the user interacts with is evaluated including steering wheel controls, touch screen displays, voice control, HUDs and digital keys. The features and services on offer have been grouped into the following domains (or test areas):

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







# 2023 vehicle list

SBD has chosen six cars to evaluate in 2023, based on two selection categories. New or 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 we make best efforts to adhere to the chosen cars and schedule, the last two years have seen release dates for new cars slipping significantly, so it may be necessary to make substitutions.

## Cars tested



**Jeep Grand Wagoneer**

- Passenger display
- Amazon Fire TV
- Active Drive Assist
- US market test



**Nissan Ariya**

- ProPilot Assist
- Unique HMI and interior
- EV SUV
- German Market Test

## Planned cars for 2023



**BYD Seal**

- Unique Home Screen HMI
- EV
- Chinese market test



**BMW X1**

- Expected iDrive 9 debut
- German market test



**Fisker Ocean**

- EV SUV
- Sustainable materials
- Large central display
- US market test



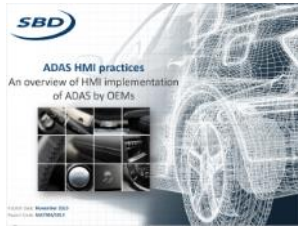
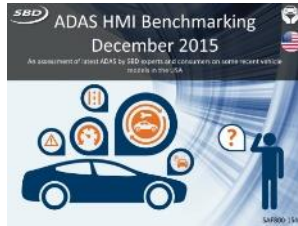
**Ford F-150 Lightning**

- Android-based OS
- EV Truck
- US market test



# SBD experience through years of testing in-car solutions

Over the last ten years, SBD has evaluated over 100 solutions from a Connected Car or ADAS perspective for our public report series (many more for private client evaluations). This current report series is an evolution of both test methodologies to provide a holistic view of in-car HMI. Furthermore, custom evaluations methodologies used across the globe for SBD clients have been included where applicable to enhance the overall approach.



# One page methodology overview

One of SBD's core goals is for this report series to be objective, fair and transparent. To achieve this, various methodologies are used throughout the testing to evaluate different areas of the solution in a range of conditions.

These methodologies are a mix of different types of tests:

- **Objective tests:** where the value provided is not influenced by a tester's viewpoint e.g. response time
- **Subjective tests:** the test score is based on the expert testers' viewpoints e.g. task ease of use
- **Task-based:** evaluations carried out based on a predefined task list e.g. navigate to a pizza restaurant near location X
- **Freeform:** random free testing by the tester with no clear pre-defined task list. This allows the testers flexibility to dig deeper into various parts of a solution when needed
- **Scoring range:** ranges and definitions of how to score a test element e.g. poor depth and accuracy score = the results provided are not in line with what is reasonably expected by the user
- **Static:** tests are carried out when the vehicle is not moving
- **Dynamic:** tests are carried out when the vehicle is moving in various road conditions and locations e.g. motorways/highways, cities, villages, country roads etc.
- **Misuse/failures:** carried out to evaluate the stability of the solution in unusual conditions e.g. repeatedly pressing the voice command button

This report does not provide a detailed description of the methodology and this page serves to provide an overview of the approach.

For a detailed discussion and presentation of SBD's methodology please [contact us](#).

Test area	Type of tests							
	Objective	Subjective	Task based	Freeform	Scoring range	Static	Dynamic	Misuse/failures
First impressions		✓		✓		✓	✓	
Static tasks	✓	✓	✓		✓	✓		
Dynamic tasks	✓	✓	✓		✓		✓	
Random free	✓	✓		✓		✓	✓	✓
Navigation specific tests	✓	✓	✓		✓		✓	✓
Voice recognition	✓	✓	✓	✓	✓	✓	✓	✓
Performance & response	✓		✓			✓	✓	✓
System Usability Scale (SUS)		✓			✓			
Final SBD UX score	✓	✓			✓			
ADAS	✓	✓	✓		✓	✓	✓	✓
UX heuristics	✓		✓			✓	✓	
Execution		✓			✓			
Ergonomics	✓	✓	✓			✓	✓	
Legibility & readability	✓		✓			✓	✓	
Perceived Quality (PQ)	✓	✓	✓	✓	✓	✓	✓	



# Example slides from the report

This is an example slide from the report, enclosed in a white border. The top portion of the slide features a photograph of a car's interior, showing the steering wheel, dashboard, and a central infotainment screen. Below the image is a blue banner containing the SBD logo on the left, the text 'June 2023 In-Car HMI UX Evaluation &amp; Benchmarking Nissan Ariya' in the center, and the reference number '635-23(23b)' on the right. At the bottom of the slide is a blue button with the text 'Request price' and a white right-pointing chevron symbol.



# Only minor delight features, voice recognition lacks flexibility

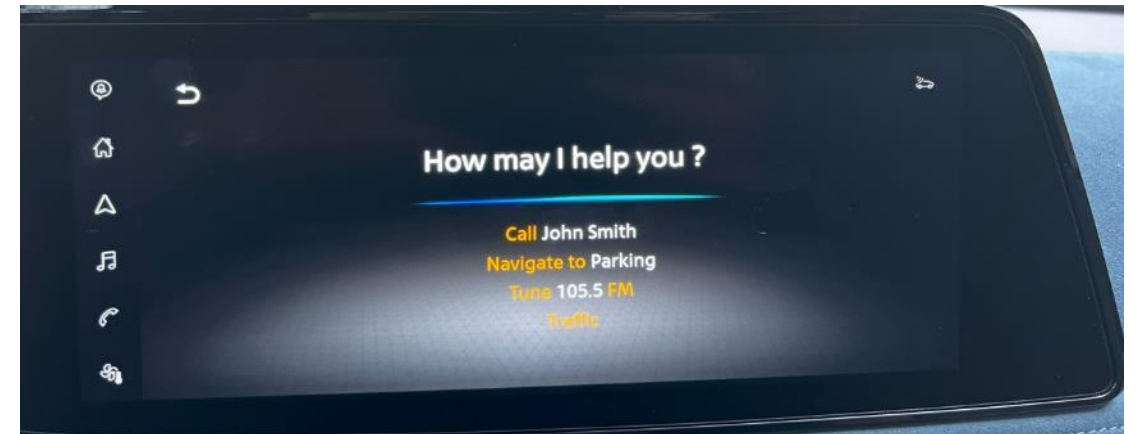
- Delight elements in this vehicle are only made up of a handful of minor features.
- The fully adjustable center console is a unique feature that can be moved forwards and backwards electrically. This moves the center arm rest along with the lower center console buttons and gear shifter.
- The HVAC button bar below the central display brings a unique look to the cabin. The laser etched buttons are novel and add to the futuristic look.



## Sliding lower center console is a minor wow-factor

One of the few minor delight features in the vehicle is the fully adjustable sliding lower center console section. The entire unit can be moved forwards and backwards electronically to bring the arm rest, gear selector and lower center console controls into the drivers preferred area of reach. While this isn't a major delight feature, it is likely to impress some users.

- The voice recognition system performs reasonably well, but is incredibly sensitive to accents, making it difficult to interact with at times.
- Piloted driving gives clear and bold warnings when hands are not detected on the steering wheel, but the sensitivity of this detection has room for improvement.
- At times the system can respond poorly to user input, often struggling to keep up with quick and successive inputs.



## Voice recognition struggles with accents and fails many media tasks

The voice recognition system offers an acceptable level use case completion for most users. However, the system does struggle with integration use cases (unless Alexa has been enabled) and some media tasks that most users would likely expect to be possible. The system struggles when English is spoken with a non-native English accent. The system offers no flexibility with accent detection and fails most tasks that would otherwise be possible.



# Visually supportive, dependent on ProPilot display

SBD tested six ADAS on the 2023 Nissan Ariya. These are Fully Automatic Park Assist (FAPA), Rear Cross Traffic Alert (RCTA), Lane Departure Warning/Lane Keeping Assist (LDW/LKA), Blind Spot Monitoring (BSM), Adaptive Cruise Control (ACC) and Piloted Driving (PD).

The level of visual feedback and system status for some systems is dependant on having the ProPilot display chosen in the cluster. The ProPilot icon could cause confusion for some users initially, but once familiar ProPilot is largely intuitive. Most system are turned ON and adjusted via the cluster while the HUD provides a good reflection of ADAS information. ACC and PD offer a good level of visual support for the driver while PD issues comprehensive warnings during a hands-off event. FAPA provides intuitive operation, but graphics are somewhat limited and fall below expectation.

LKA/LDW lacks lane tracking status. When the ProPilot display is chosen there is a very subtle indication of tracking and differentiation between LKA and LDW but this is not obvious enough.

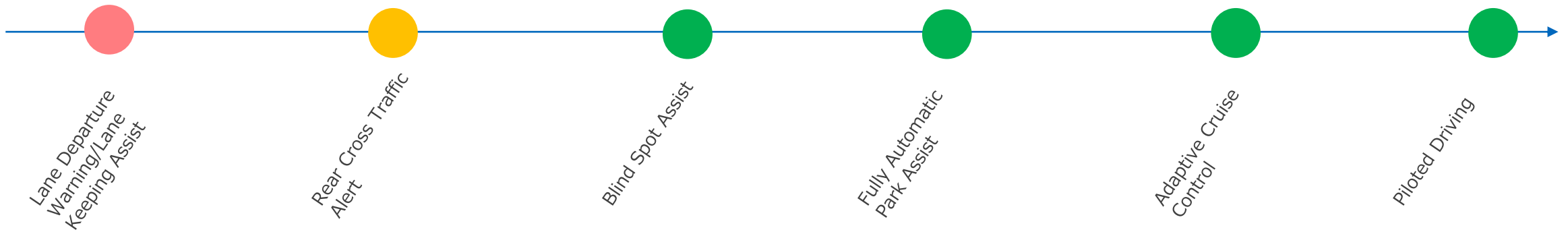
RCTA warnings are subtle in the central display and utilize BSM warnings icons in the side mirrors. However, when Moving Object Detection is enabled, the visual warnings for objects moving around vehicle are greatly enhanced.

BSM gives the expected level of visual and audio warning through the side mirrors and repeater icon in the cluster. When the ProPilot display is chosen, the warning in the cluster is greatly enhanced. Improvement to the side mirror warnings could be made by using the BSM ISO icon.

FAPA is easily activated and iconography is clear and logical. Space selection is mostly intuitive, but graphics lack detail and feedback while a procedure is active. Excellent safety measures in place to prevent ADAS misuse.

ACC is supported by clear and intuitive graphics in the cluster. The driver is supported well in stop & go traffic with prompts. Some icons are spread throughout the cluster and system naming is not always clear.

PD provides clear and comprehensive warning in the cluster during a hands off event. However, sensitivity to the users hands being off the wheel is sometimes lacking.

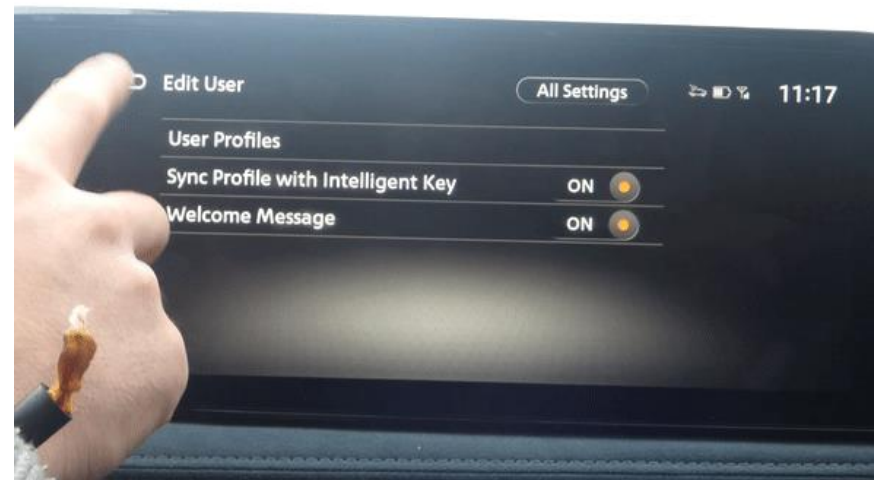




# Unresponsive back button forces return to home screen

## 1. General

While using the user profile menu, the 'back button' in top left hand corner of the screen became unresponsive to user input. Several attempts were made to press the button but no response was given. The only way to resolve this issue was to select the home shortcut from the shortcuts bar on the left hand side of the screen.



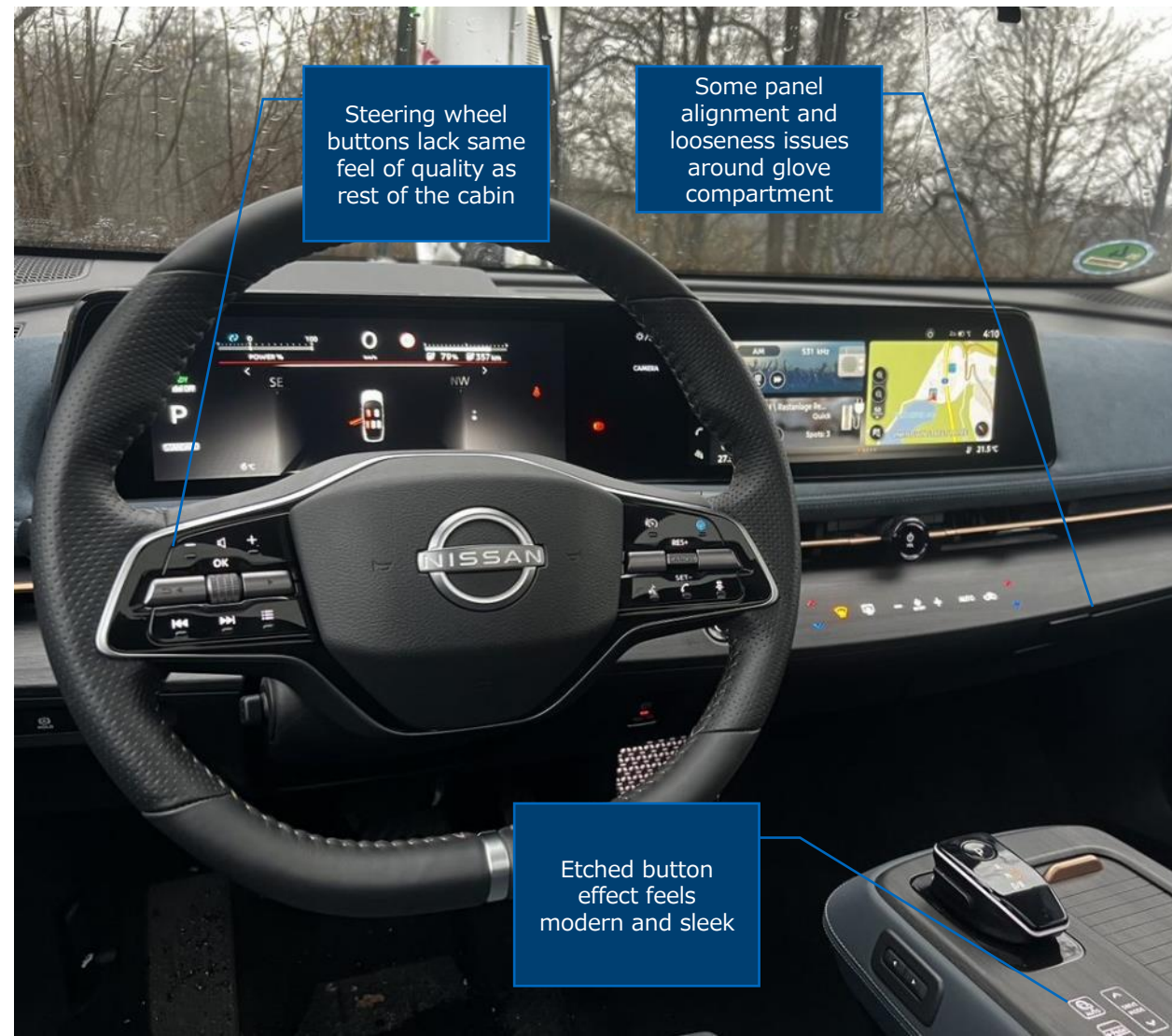
Frequency	Low	Medium	High
Severity	Minor	Major	Critical



# Perceived Quality: Tactile

Level 1	<b>Tactile</b>
SBD viewpoint	<p><b>Stiffness &amp; looseness:</b> Tolerances between most surfaces are tight and prevent wobble or unintended movement. Gaps around the passenger glove box compartment are wide, making the door to the compartment feel loose.</p> <p><b>Force feedback:</b> Force feedback is given for touch buttons used on the HVAC button bar on the center console. The volume rotary switch feels solid with good indents.</p> <p><b>Material quality:</b> The Alcantara covering the upper dashboard conveys a sense of quality and luxury. Steering wheel buttons use a hard gloss black plastic which gives an impression of cheapness. The wood effect finish on the HVAC bar feels premium and solid.</p> <p><b>Material harmony:</b> Steering wheel buttons lack the same feeling of quality as other components. Material used on lower door cards feels lower quality.</p> <p><b>Geometric &amp; positioning:</b> The 'etched' effect of HVAC buttons and settings button around gear selector is aesthetically pleasing and gives a modern look and feel. Appearance of the HVAC panel creates a talking point and provides a quality appearance to the cabin.</p>

Level 2 scoring				
Stiffness & looseness	Force feedback	Material quality	Material harmony	Geometric & positioning
Good	Good	Good	Fair	Good





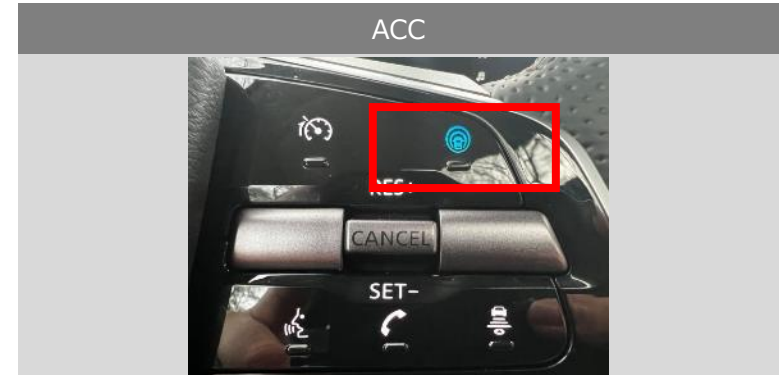
# SAE Level 1 & level 2 ADAS - ACC



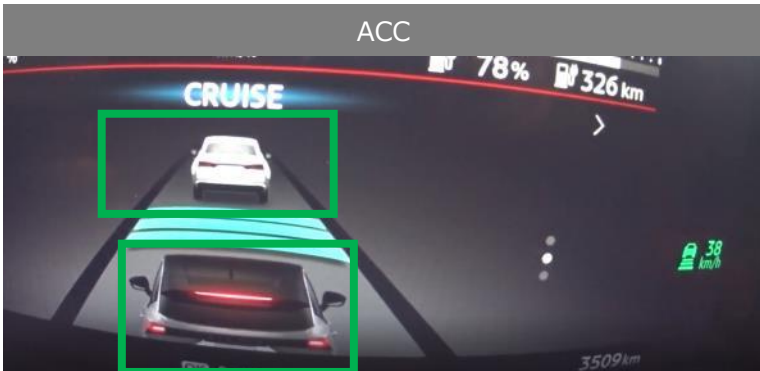
CRUISE text is potentially confusing



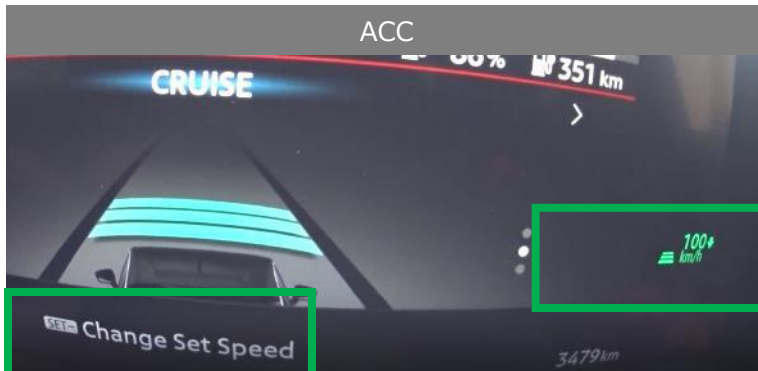
Single headway button



Icon hard to relate to ACC



Target car and dynamic host car shown



Speed limit adjustment



Good prompt when in stop & go traffic



# Good level of Google search destination information

When inspecting a search result using Google search, the level of information shown is comprehensive.

- Next to each POI result in Google search suggestions is an 'I' icon. When pressed, a selection of information is shown including star rating, contact information and opening hours. Also given is the option to show reviews, satellite view and street view.
- Street view is comprised of 4 views taken in opposing directions and can be viewed by using the on-screen arrow buttons. This helps to give some visual context of where the destination is located.
- Review data is detailed and shows the review text, reviewer name, star rating given and date the review was made.

The additional POI information shown by Google search offers an additional layer of contextual information and public reviews. This is a nice additional feature that many users will likely find useful.

SBD viewpoint

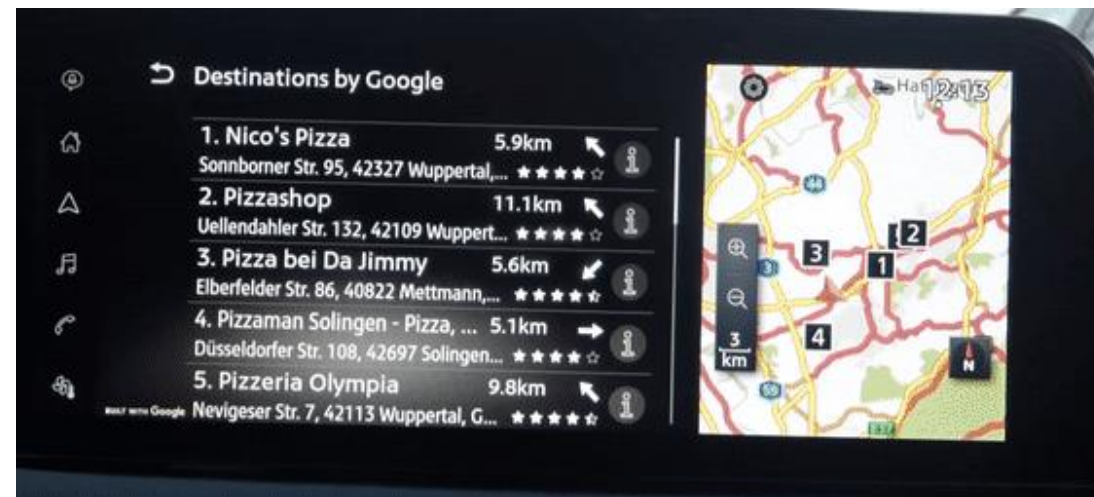
UX impact

Major Negative

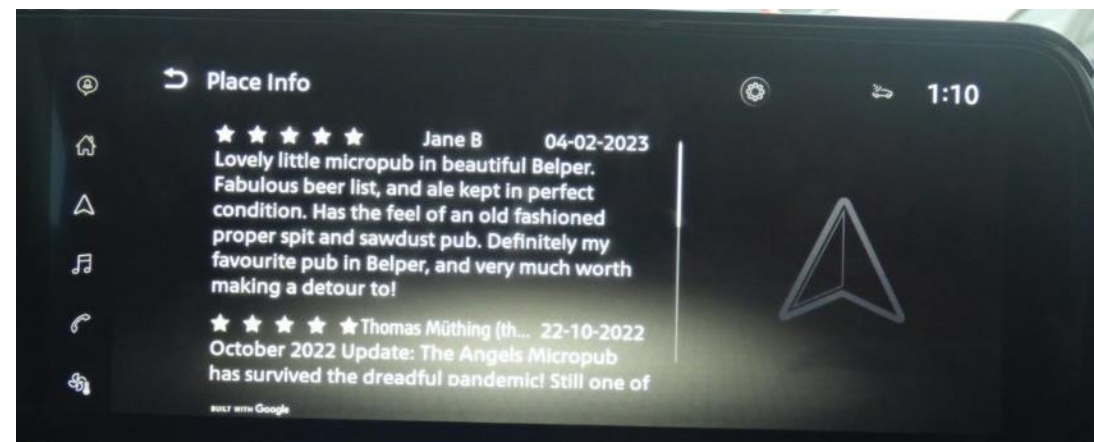
Minor Negative

Minor Positive

Major Positive




Google street view for POI




Detailed review data



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the full report



The thumbnail image shows the interior of a car, focusing on the dashboard and steering wheel. The dashboard features a large, wide infotainment screen displaying a navigation map. The steering wheel has the Nissan logo in the center. The overall design is modern and minimalist.

 June 2023 635-23(23b)  
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## Do you have any questions?

If you have any questions or feedback about this research report or SBD Automotive's consulting services, you can email us at [info@sbdautomotive.com](mailto:info@sbdautomotive.com) or discuss with your local account manager below.



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