AAA CENTER FOR DRIVING SAFETY & TECHNOLOGY

2017 VOLVO XC60 T5 INSCRIPTION

INFOTAINMENT SYSTEM* DEMAND RATING

Very High Demand

The Volvo XC60 T5 Inscription's Sensus Connect infotainment system created very high demand levels in the on-road study for phone calls, text messaging and navigation. Overall, the XC60 system had poor on-road performance, in terms of low usability and high levels of demand. Drivers were free to operate the vast majority of the system, unchecked, while the vehicle was in motion.

Standard and Optional Features in the 2017 Volvo XC60

○ Optional
● Standard

	T5 Dynamic	T5 Inscription	T6 AWD Dynamic	T6 AWD Inscription	T6 AWD R-Design
Android Auto					
Apple CarPlay					
Mobile App Support	●	●	●	●	●
Text Messaging	●	●	●	●	●
Navigation	●	●	●	●	●
Touch Screen					
Gesture Control					
Heads-Up Display					
Voice Commands	●	●	●	●	●
Console Control	●	●	●	●	●

Additional trim levels available.

ABOUT THE STUDY

Researchers evaluated 30 new 2017 vehicles' infotainment systems* to measure overall demand** placed on a driver when using voice command, touch screen and other interactive technologies to make a call, send a text message, tune the radio or program navigation, all while driving down the road.

STRENGTHS

- Drivers are able to make audio selections quickly using the center console controls.
- The vehicle does not allow drivers to send or reply to a text message.

WEAKNESSES

- Using the rotary wheel and buttons on the center stack results in a lengthy process when accessing any function.
- Voice recognition system frequently fails to understand voice commands with accuracy.
- Navigation menu center stack display is cluttered and difficult to understand at a glance.

* Infotainment System: Vehicle system that combines entertainment and information content
**Overall demand measured: visual (eyes-off road), cognitive (mental), and time-on-task

VEHICLE OVERVIEW: CONTROLS AND DISPLAYS

VOICE COMMANDS

STEERING WHEEL COMMANDS

INSTRUMENT CLUSTER

CENTER STACK

INFOTAINMENT SYSTEM

The Sensus Connect In-Vehicle Infotainment System offers the following features:

CALLING AND DIALING

The phone integration system lets drivers pair a phone, either while the vehicle is parked or in motion. To connect a phone with Bluetooth, drivers use the rotary wheel and refer to the center stack display. Once the phone is paired, drivers can dial numbers using the rotary wheel in the center stack and place calls to contacts in their phonebook using the XC60's rotary wheel. Alternatively, drivers can access phone-related controls using voice commands. No functions are locked out while driving.

When drivers used the center stack controls to access calling and dialing functions, they were met with long interaction times and very high visual (eyes-off-road) and cognitive (mental) demand. The center stack is cluttered with small buttons, including a full dial pad. Overall, using the center console controls for this function placed very high demand on drivers.

The on-road study data found voice commands for calling and dialing functions placed very high demand on drivers. Using voice commands to complete tasks was not only lengthy, taking an average of 40 seconds◆, but also imposed high levels of both visual (eyes-off-road) and cognitive (mental) demand on drivers. Researchers^ attribute this poor performance to the system's frequent misinterpretation of commands and long pauses while the system attempts to process commands, often leaving drivers confused and frustrated.

Overall, calling and dialing generated very high demand on drivers in the on-road study. Drivers using the calling and dialing functions in the Volvo XC60 struggled to do so in a timely manner, leading to excessive cognitive (mental) and visual (eyes-off-road) demand.

TEXT MESSAGING

With a phone paired, drivers can read text messages displayed on the center stack screen and have the voice command system read aloud message content. There is no function in the vehicle to send or reply to a text message.

Accessing text message functions via the center stack controls placed high demand on drivers in the on-road study. When drivers loaded messages on the center stack, the messages were displayed in their entirety on the screen for drivers to read while driving. This imposed high visual (eyes-off-road) and cognitive (mental) demand as drivers attempted to read the message while driving.

Voice commands for text messaging functions took an average of 27 seconds◆ to complete a task, resulting in a high demand on drivers. Voice commands were frequently misunderstood by the system during on-road testing, lengthening the time it took drivers to listen to a text message. High amounts of visual (eyes-off-road) and cognitive (mental) demand were observed as drivers looked to the screen in an attempt to reconcile errors made by the system.

Overall, while text messaging functions in the XC60 are limited to listening to or reading a message, and not replying, this function still places high demand on drivers.

^Researchers with expertise about how humans interact with technology evaluated the usability of the infotainment system in stationary vehicles.

◆Compared to a recommended maximum of 24 seconds

AUDIO ENTERTAINMENT

The audio entertainment system gives access to: AM, FM, and XM radio; CD player; USB port; Bluetooth; iPod audio; and an auxiliary audio input. Drivers can access audio using voice commands, the center stack display's rotary wheel and steering wheel controls. No functions are locked out while driving.

Using center stack controls to control audio entertainment placed high demand on drivers in the on-road study. While the Volvo XC60 does not have a touch screen, the rotary wheel and accompanying physical buttons on the center console force drivers to press multiple buttons around the console to complete a task, causing very high visual (eyes-off-road) and cognitive (mental) demand.

Drivers using voice commands to control audio entertainment were met with very lengthy interaction times and experienced very high cognitive (mental) demand. Using this function places high demand on drivers, as the voice commands are often misunderstood by the system, and subsequently, the system executed unintended actions.

Interacting with the audio system in the Volvo XC60 placed very high levels of demand on drivers in the study, both visually and mentally, regardless of how they attempted to access it.

TURN-BY-TURN NAVIGATION SYSTEM

The infotainment system includes turn-by-turn navigation, offering drivers visual and verbal directions to a location. Turn-by-turn navigation can be set via voice commands and the center stack display with the rotary wheel. No functions are locked out while driving.

Using center stack controls to interact with the navigation system in the Volvo XC60 placed very high demand on drivers in the on-road study. The display is cluttered and uses a split screen to show the navigation map in two different ways, confusing drivers about where to look for navigation options. There are a multitude of ways to select a destination, even by input of latitudinal and longitudinal coordinates. Overall, the system's slow processing of user input required major wait times, causing lengthy interactions with very high visual (eyes-off-road) and cognitive (mental) demand.

Voice commands used to interact with the navigation system placed very high demand on drivers in our on-road study. The XC60's voice command system is poor at understanding commands and the process to select a destination involves multiple steps. Drivers were met with high visual (eyes-off-road) and cognitive (mental) demand for an average of 76 seconds◆ as they searched through more than 20 point of interest categories for a destination.

The navigation system in the Volvo XC60 places very high demand on drivers, regardless of interaction type.

◆ Compared to a recommended maximum of 24 seconds

VEHICLE CONTROLS AND DISPLAYS

VOICE COMMANDS

The Volvo XC60 has a voice command system that lets drivers access audio entertainment, phone and turn-by-turn navigation. It includes a synthetic female voice that confirms entries and provides feedback when drivers give commands.

INSTRUMENT CLUSTER

The XC60's instrument cluster, located behind the steering wheel, has an 8-inch, all-digital display, replacing the standard dials and gauges. Drivers can control the display content using an additional switch located behind the steering wheel.

STEERING WHEEL CONTROLS

The steering wheel contains 17 dedicated buttons, including those found on the switch behind the steering wheel. Drivers can access cruise control, audio entertainment and voice commands using the steering wheel controls.

CENTER STACK DISPLAY

A 7-inch digital, non-touch screen display in the center stack gives access to audio entertainment, phone integration, turn-by-turn navigation, an internet browser and the vehicle's user manual. Drivers can control functions on the screen using a rotary wheel and accompanying buttons located in the center console.

As the central access point for infotainment system access, the center stack contains a total of 51 buttons and one rotary wheel.

Center stack controls provide access to audio entertainment, phone integration, interior climate, turn-by-turn navigation and vehicle settings. Drivers must use the upper right rotary wheel to navigate through the menus in the center stack display.

VEHICLE SALES SUMMARY

The 2017 Volvo XC60 is the 163rd best-selling vehicle in the United States, with 8,809 vehicles sold between June 2015 and June 2016[1].

[1] Source: Automotive News at autonews.com; Wall Street Journal at wsj.com – data updated to 11/25/2016.