

A Review of Technology related to Distracted Driving

CCMTA 2017 Annual Meeting



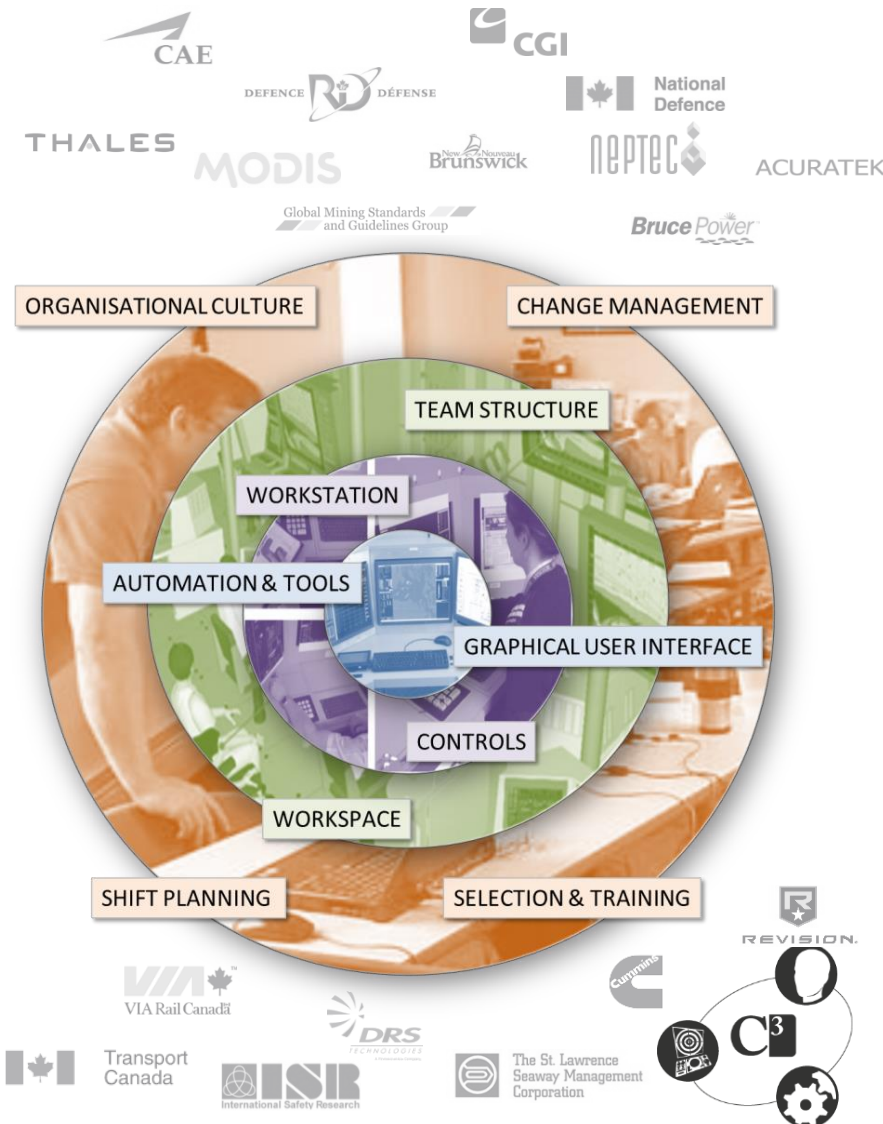
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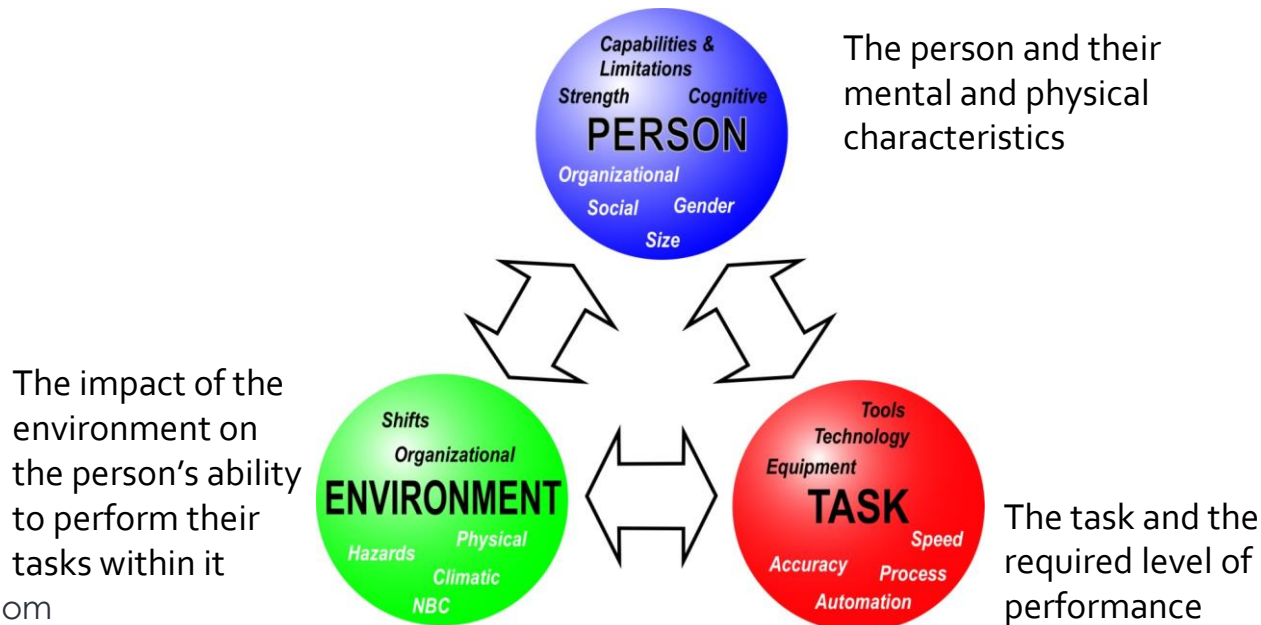
Who Are We

- C3 Human Factors Inc.
 - HF Consultancy with offices in Quebec City, Montreal, Ottawa and Toronto
 - Core group – 4 HF Partners/Specialists, all with 20+ years experience
 - Variety of domains including industrial, manufacturing, emergency management, public safety, nuclear and defence
- Expertise
 - Definition of User Requirements
 - User-Centred Design
 - Testing, Evaluation and Research
 - Selection and training
 - Teamwork and Team Design

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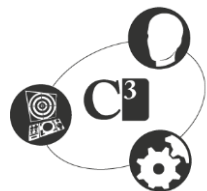
- Utilizes a user-centred design process
- Overall objective is to generate a match between user characteristics and task or system demands, resulting in safe and efficient task performance
 - Aim to answer the question in a rigorous, traceable manner:
 - Can these users....
 - Complete these tasks....
 - To the required level of performance....
 - In this operational environment?



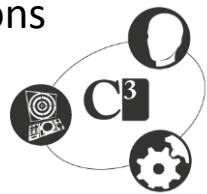


Project Objectives

- Overall objectives
 - Assist CCMTA in developing an in-depth understanding about the technologies implicated in distracted driving and support the CCMTA informing their stakeholders about issues that impact vehicle safety
- Project Tasks
 - Task 1: Identify ICTs (Information and Communication Technologies) that have the potential to distract drivers
 - Task 2: Identify the ICTs that have been designed to mitigate or eliminate distraction
 - Devices installed within a vehicle that are 'original equipment'
 - Devices that can be carried and used within a vehicle
 - Devices that can be integrated within a vehicle
 - Wearable technology
 - Task 3: Develop a survey to solicit information on roles, responsibilities and approaches taken by provincial/territorial legislation, federal and national regulations, and law enforcement communities to address distracted driving associated with technology use




- **Develop Search Criteria**
 - Reviewed literature related to distracted driving and use of ICT devices, as well as the use of technologies to mitigate/eliminate distraction
- **Define Search Criteria**
 - Criteria was based on the definitions and modes of interaction
 - Search terms addressed types of ICT devices and how they are used
- **Conduct Search**
 - General Internet search
 - Literature databases
 - Marketing research/reports
 - Consumer reports
- **Review Literature and Assess Distraction Type**
 - Each ICT device/mitigation technology was documented using a data collection table
 - Applications that can be used with ICT devices or applications that mitigate against distraction were also identified and described
 - An analysis of the ICT devices was conducted to categorize the type(s) of distractions (visual, manual, and auditory) that are implicated by each device



ICT Type	ICT Category	Device -1	Device -2	Device -3
Mobile phone	Smartphone	Samsung Galaxy S7	Apple iPhone	Huawei Mate 9
Mobile phone	Multimedia Phone	Motorola Barrage V860	Nextel i580	Telus
Wearable technology	Smart Watch	Garmin	Vector Luna	
Wearable technology	Voice-activated Smart Watch	Sony	Apple	Pebble
Wearable technology	Smart Glasses	Vuzix	OGD	Snapchat Spectacles
Navigation system	Portable Navigation System	Garmin Drive 50	TomTom VIA 1515M	Magellan RoadMate 2620-LM
Navigation system	Portable Voice-Controlled Navigation System	Garmin DriveLuxe 50LMTHD	Tomtom VIA 1535 TM	Magellan Maestro 4700

- Identified total of:
 - 9 ICT Types
 - 29 ICT Categories
 - Multiple categories identified per ICT Type based on different modes of interaction (e.g., voice versus no voice-activation)
 - Maximum of 3 per category

A) ID #	B) ICT DEVICE	C) DEVICE TYPE
DD-3.1	Smart watch - Garmin	Wearable technology
D) WEBSITE LINK		
Product website: https://buy.garmin.com/en-US/US/p/150767		
E) MODE OF INTERACTION	F) TYPE OF INFORMATION PRESENTED	
<p>Input: Tactile - through the touch and swipe of a touchscreen and hard buttons; Visual - view display</p> <p>Output: Visual - display on screen; Tactile - through vibration for alerts; Auditory - through alerts</p>	Will display and notify of incoming calls, text messages, emails, calendar items and additional notifications.	
H) FUNCTIONAL DESCRIPTION		
<p>This device is wearable and pairs with a user's smartphone to display information obtained from the primary device. It allows interaction with many of the applications of the paired device. The device allows for the notification of various types of communications including phone calls, text messages and email. The device additionally has the capability to provide calendar and other notifications. The device also has a sport and fitness feature that allows for tracking and measuring of various exercise metrics.</p>		
I) PICTURE		
		

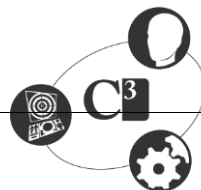
Applications Implicated in Distracted Driving

- Recognized that the type of distraction associated with certain devices (i.e., cell phone, smart watch, etc.) will vary depending on the type of application being used on the device

Application Type	Application 1	Application 2	Application 3
Social Media	Instagram	Snapchat	Twitter
Live Streaming	Xbox app	Twitch	Instant esports
Gaming – Playing	Pokemon Go	Clash of Clans	Mario Run
General Entertainment	Youtube – video watching	Spotify – music	Audible – audiobooks/ magazines

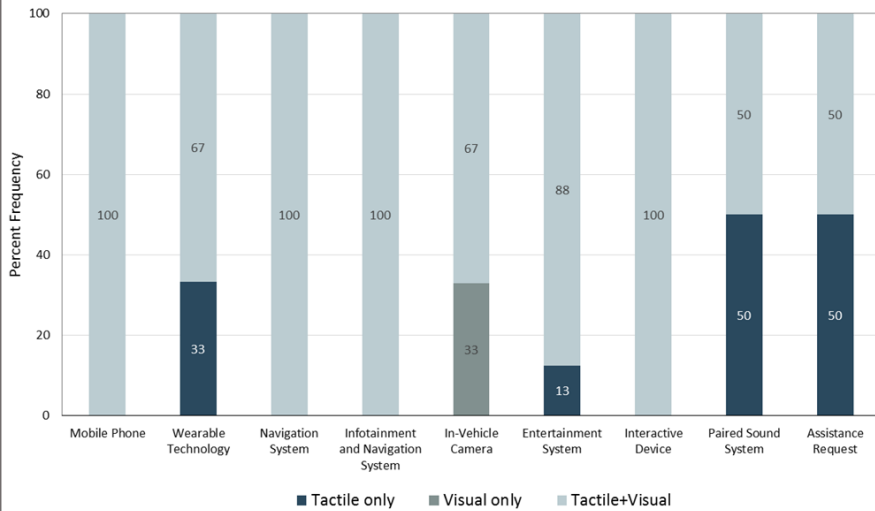
- Identified total of:
 - 12 Application types

A) ID #	B) CATEGORY	C) APPLICATION TYPE
AD-12.1	Skype	Business Productivity
D) WEBSITE LINK		
iTunes: https://itunes.apple.com/ca/app/skype-for-iphone/id304878510?mt=8 Android: https://play.google.com/store/apps/details?id=com.skype.raider&hl=en		
E) MODE OF INTERACTION	F) PAIRING/DRIVING MODE	G) DEVICE USED TO INTERACT WITH APPLICATION
Input: Tactile – application interface and messaging; Visual – view display and view people in real-time; Speech – hands-free calling or through video Output: Auditory – from single and group calls and video content presented on app; Visual – application interface, messaging and photos; Tactile – through vibration for notifications	No	iOS and Android devices
H) FUNCTIONAL DESCRIPTION		
Skype keeps the world talking. Say “hello” with an instant message, voice or video call—all for free, no matter what device they use Skype on. Skype allows users to talk face to face with a video call. This includes group video calls with up to 25 people. Users can message friends in an instant and add up to 300 people to a group chat. Voice calls to mobiles and landlines can be made at low rates (Skype to Skype calls are always free). Users can share photos, video messages, location and add emoticons and Mojis to chats. Notifications can be set to vibration. This app is offered by Skype located in Luxembourg.		
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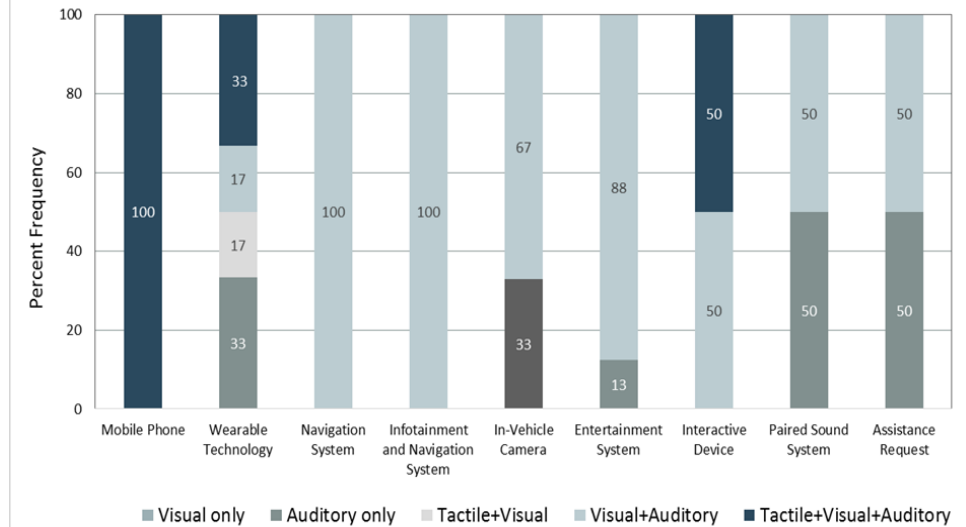


- Identified the type(s) of distraction implicated by the devices
 - Recorded for both ‘input’ and ‘output’ mode of interaction
 - Based on the device that presented the ‘**worst case scenario**’ for each ICT Category
 - Types of distraction included:
 - Tactile only, Visual only, Auditory only OR any combination of these
 - Assumed a cognitive component was associated with each of these distraction types
 - Speech component also recorded
 - Verbal Communication (e.g., phone calls), Voice Commands, Video
 - Assumptions
 - Device’s intended use (typical usage)
 - Default setting
 - Use of device while driving, and not in parked position
 - Literature provided in marketing material/reports and manufacturing information
 - Devices were assessed in isolation and not in combination with another device (or application)
 - Feedback provided only to make a decision (i.e., background noise not considered)

Distraction Devices - Types of Distraction (Input)

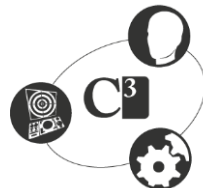


Distraction Devices - Types of Distraction (Output)

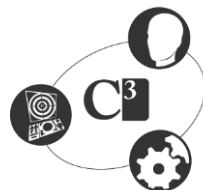
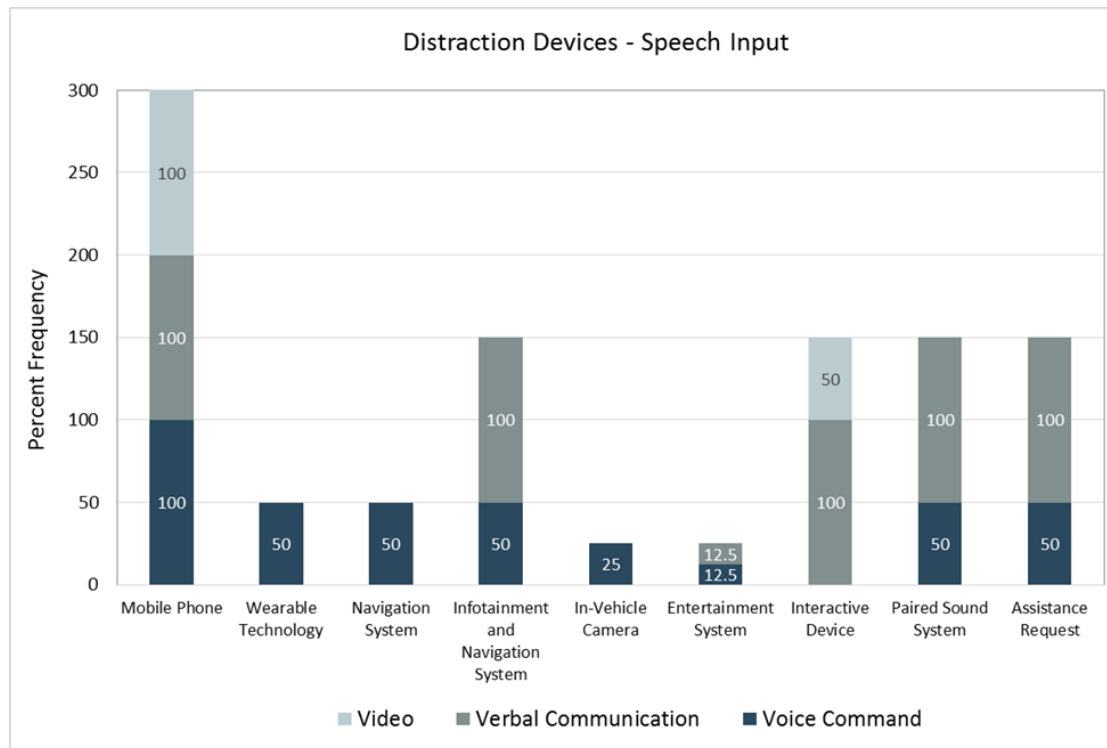


- 3 types of distraction associated with driver input
 - Majority associated with Tactile/Visual (completing a manual task while viewing display)
 - Tactile only associated with headphones, portable audio devices

- 5 types of distraction associated with device input
 - Majority associated with Visual/Auditory (ICTs are generally associated with a display, providing alerts, notifications, verbal speech)
 - Tactile/Visual/Auditory distractions associated with mobile phones, wearable technology (smartwatch/smart glasses, hand), interactive devices (hand held computer)



- All ICT types incorporated devices that facilitate speech input by the driver
 - Majority incorporated voice commands, followed by verbal communication (speaking in real-time)




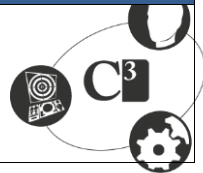


Technologies that Eliminate/ Mitigate Distracted Driving

ICT Type	Device -1	Device -2	Device -3
Hardware-enabled Interception	Dongle - Katasi Groove	Dongle - Cellcontrol	Dongle - Kyrus Fleet Solution
Hardware-enabled Integration	Windshield mount - Hudly		
Handsfree Communications	Hands Free Speakerphone Speaker Car Kit Multipoint Visor Clip	Xtreme Car Bluetooth Handsfree Speakerphone	Bluetooth speakers – Jabra Clip-on
Automotive Co-Pilot	Apple Car Play	Android Auto	

- Identified total of:
 - 18 ICT Types

A) ID#	B) CATEGORY	C) TYPE OF APPLICATION
MD-1.1	Dongle - Katasi Groove	Hardware-enabled interception
D) WEBSITE LINK		
Product website: http://katasi.com/distracted-driving-solution-products/ Supplementary information obtained from: http://www.chicagotribune.com/bluesky/technology/ct-distracted-driving-text-blocking-wpsi-20161211-story.html ; https://www.youtube.com/watch?v=3K--NeqZgiU		
E) MODE OF INTERACTION	F) PAIRING/DRIVING MODE	G) DEVICE USED TO INTERACT WITH TECHNOLOGY
Input: N/A Output: N/A	Yes	Any smartphone device
H) FUNCTIONAL DESCRIPTION		
<p>The Groove module is an intelligent carrier-level solution. It connects the car to the 'cloud' and is compatible with any mobile phone, including the iPhone, and all vehicles made since 1996. The Groove module is paired with any mobile phone and is used in conjunction with the carrier-level service providers. The device is connected to the vehicle via the On-Board Diagnostics (OBD) II port that is under the steering wheel. When the Groove module is plugged into the OBD II port and the vehicle exceeds 5 miles per hour for the first time, the paired smartphone does not receive incoming alerts or texts from the service provider. Once the vehicle stops and is turned off, the driver received a message from Groove that indicates how many transmissions were intercepted and allows the transmissions to be sent to be completed.</p> <p>The Groove is intended to be used by drivers who are alone in the car. According to Katasi, drivers are more likely to text when they are alone in the car compared to when there are passengers; this was not confirmed through the current research study. Senders receive an automatic reply indicating that their text was blocked.</p> <p>There is no driver interaction with the device. The device does not require the use of any apps however, there is a dashboard app that can be downloaded to optimize performance. The Groove does not interfere with voice transmissions. The module is approximately 30 USD and 8 USD per month for the carrier-level service.</p>		
I) PICTURE		
		

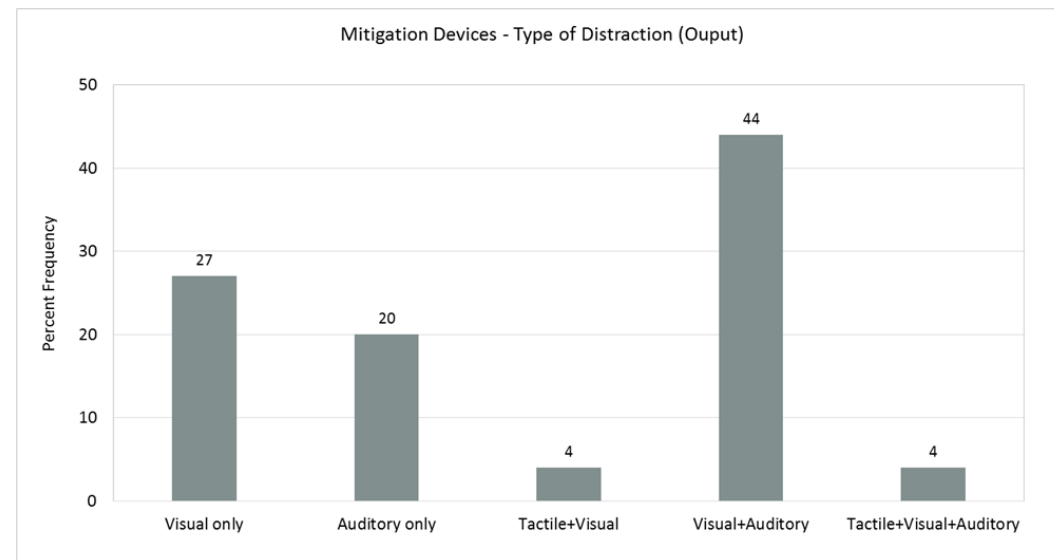
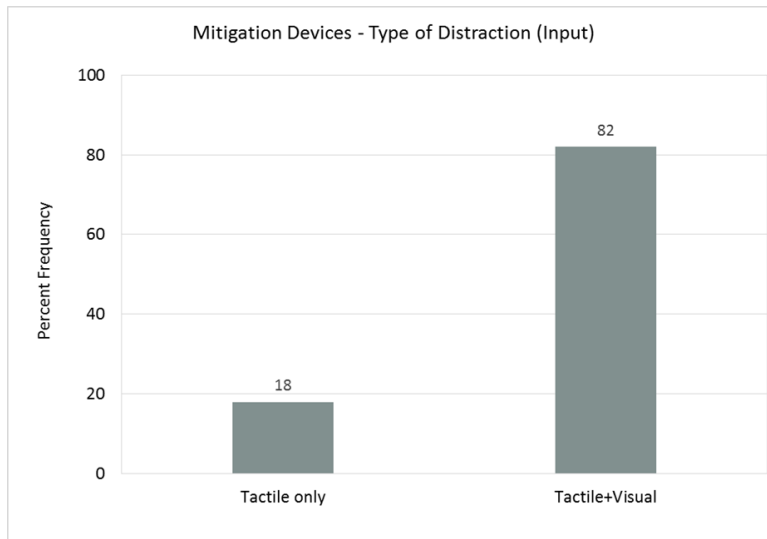


- Each device was reviewed to determine type of mitigation that the device was designed to address while driving

ICT Type	Device	Hand-Held Phone	Texts	Alerts / Notifications	Application Use	Messaging (E-mail)	Social Media	General Website Use	Photos/ Videos
Hardware-enabled Interception	Dongle - Katasi Groove		√	√					
	CellControl	√	√	√		√	√		√
	Kyrus Mobile Solution	√	√	√	√	√	√	√	√
Hardware-enabled Integration	Hudly	√							
Hands-free Communications	Hands Free Speakerphone Speaker Car Kit Multipoint Visor Clip	√							

- Majority of mitigation devices only facilitate hands-free calling, followed by preventing texting and application use
- Devices such as CellControl, Kyrus Mobile Solution, Apple Car Play and Android Auto mitigate against majority of potential driver interactions
- Hands-free communication devices, wearable technologies and paired sound systems only facilitate hands-free calling

- Approximately 1/3 (35%) of the devices still require driver input for operations, although they are marketed/designed to mitigation distraction
- Majority of devices also provide output to the driver that has the potential to distract

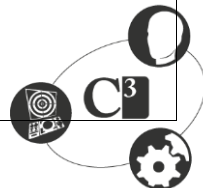


Applications Designed to Mitigate Distracted Driving

Application Type	Application 1	Application 2	Application 3
Head-Up (HUD) – Google-enabled	Navier HUD	Hudway HUD	Headup Nav
GPS-enabled HUD	Speed Pro	DigiHUD Speedometer	Digital GPS Speedometer
Digital speedometer	Speedometer	GPS Speedometer Trip Meter	Speed Box – Speedometer
OEM automotive App	Pioneer Advanced Remote Control (ARC)		
Interception	LifeSaver	TXtBlocker	DriveSafe.ly
Carrier-enabled	Sprint’s Drive First	AT&T DriveMode	Safely Go by Verizon Wireless

- Identified total of:
 - 9 Application Types

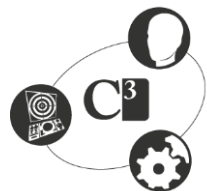
A) ID #	B) CATEGORY	C) APPLICATION TYPE
AM-5.1	LifeSaver	Interception
D) WEBSITE LINK		
Product website: https://lifesaver-app.com/		
E) MODE OF INTERACTION	F) PAIRING/DRIVING MODE	G) DEVICE USED TO INTERACT WITH TECHNOLOGY
Input: N/A Output: N/A	No	iOS and Android devices
H) FUNCTIONAL DESCRIPTION		
<p>The free LifeSaver app can be downloaded to any smartphone. There is no hardware required for this system to work. The driver must have a data plan for LifeSaver to work properly and report information to the dashboard. Drivers can earn rewards (e.g., iTunes) for safe driving.</p> <p>LifeSaver uses some GPS and several other battery saving technologies to lock the driver's smartphone while the car is in motion. LifeSaver stays quiet running in the phone's background and is transparent to the driver when not driving.</p> <p>The phone will be locked as quickly as 3-4 seconds when driving starts. When driving stops, LifeSaver can unlock just as quickly, or it can be configured to unlock up to 60 seconds (Android) after driving stops to discourage phone access at stoplights.</p> <p>Although the app is free, there is a fee associated with the optional solution available to fleets and the parent portal.</p> <p>The developer is Life Apps LLC.</p>		
I) PICTURE		



- Each application was reviewed to determine type of mitigation that the application was designed to address while driving

ICT Type	Device	Hand-Held Phone	Texts	Alerts / Notifications	Application Use	Messaging (E-mail)	Social Media	General Website Use	Photos/ Videos	Interrupted View of Road - Device	Interrupted View of Road -Steering Console
Head-Up Google Enabled	Navier HUD				√					√	√
	Hudway HUD									√	√
	Headup Nav									√	√
Interception	LifeSaver		√		√	√	√				
	TxtBlocker	√	√			√					
	Drivesafe.ly	√	√								
Carrier Enabled	Sprint Drive First	√									
	ATT DriveMode	√	√	√		√					
	Safely Go by Verizon Wireless	√									

- Head-up Google Enables and GPS Enabled HUD application are designed to maintain a direct line of sight between a driver and the road
- Interception, Reward Based and AT&T DriveMode applications design to facilitate hands-free calls and prevent texting
- Virtual Assistant and Automotive applications facilitate hands-free calls only



- ICTs assessed in isolation
 - Many ICTs enable multiple functions that can be used simultaneously
 - **Need to characterize the impact of multi-tasking on driving distraction**
- Level of distraction was not addressed
 - Some progress to develop an approach towards rating the level of distraction when using ICTs (has not been identified as a standardized approach within industry)
 - **The level of distraction needs to be represented**
- Technologies are constantly being introduced and evolving
 - Endeavoured to represent a wide range of devices and applications throughout the analysis

