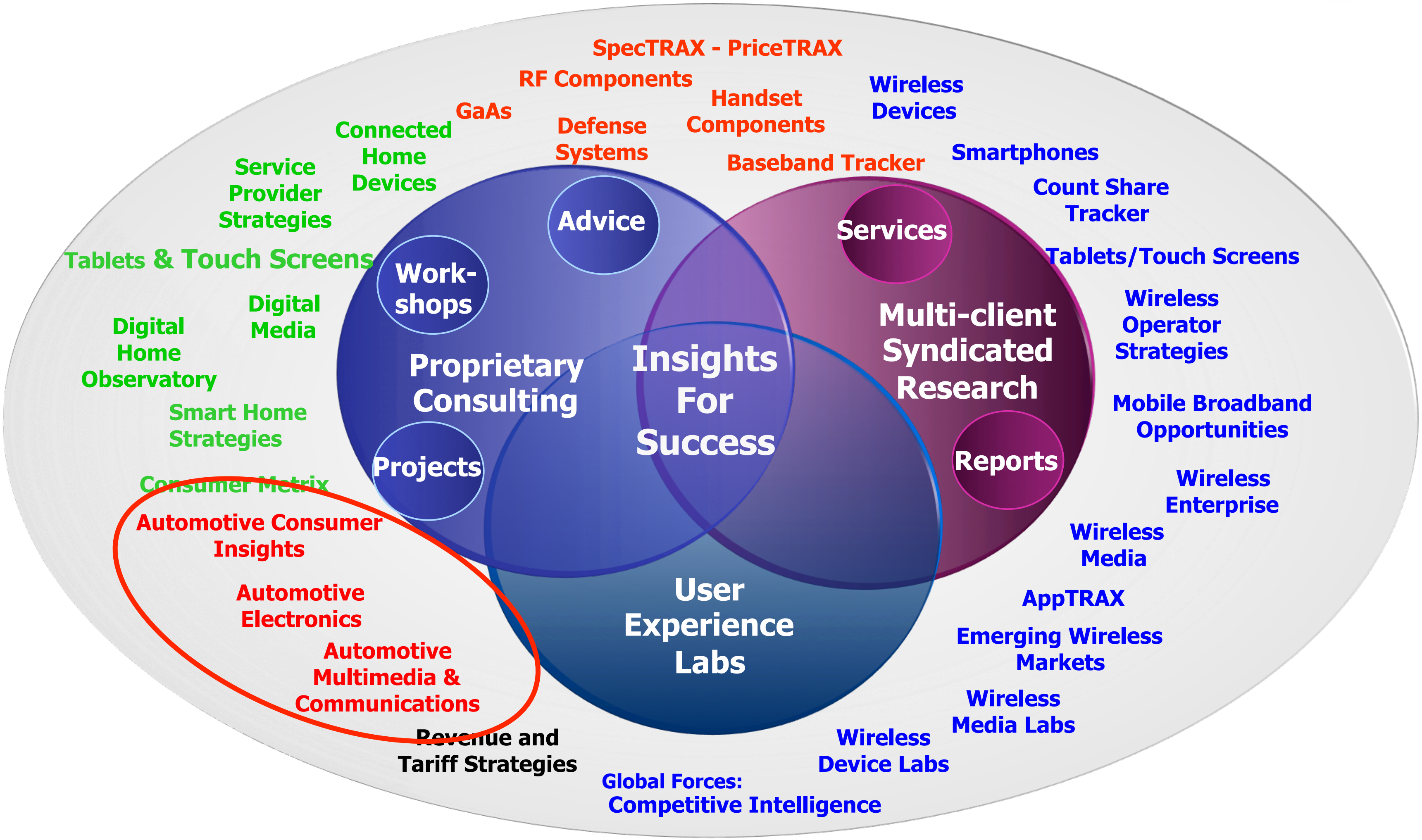
The Connected Car: It's All About the HMI

November 2012 - Rome

STRATEGY ANALYTICS

Custom Insights to Support Client Business Planning



STRATEGY ANALYTICS

AMCS
Infotainment & Telematics Market Briefing

- Introduction to AMCS
- Vehicle Production and Sales Update
- Infotainment Design: Industry Trends
- Automotive Consumer Insights Research
- Key Revenue Generators
  - Headunits
  - Telematics
  - Connectivity
  - Navigation
- Media and Storage Trends
- Digital Terrestrial and Satellite radio
- Software, OS and Services
- Infotainment Semiconductors
  - Overall Market opportunity
  - OEM Silicon opportunity by Semi Type
  - Headunit opportunity
  - Application Specific opportunity

Home

STRATEGY ANALYTICS

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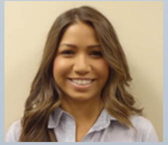


Taryn Tulay
Analyst

The Big Picture

The car as a "persistent inquiry"

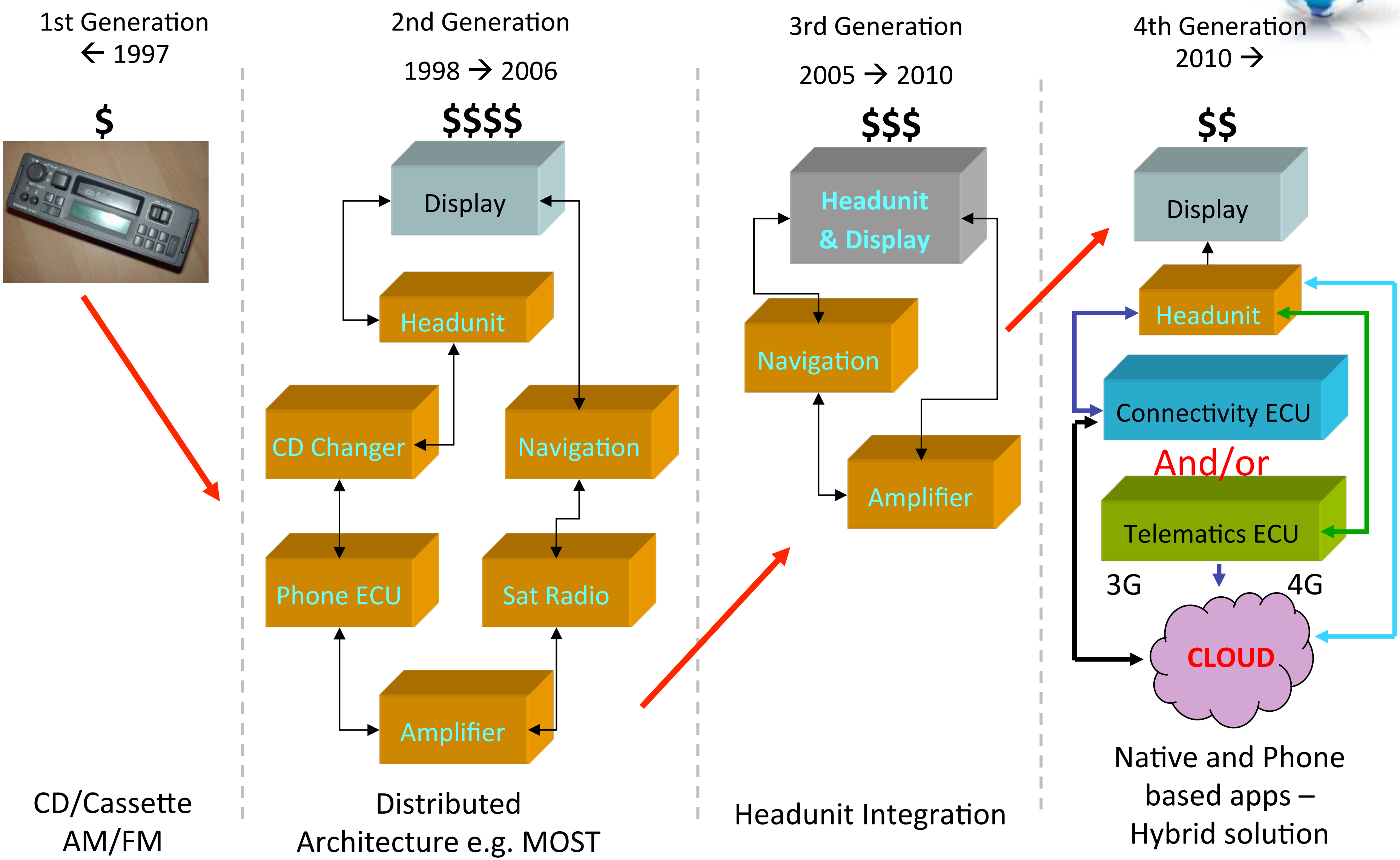
- Fundamentally different use case from desktop or phone
- Encompasses safety, security, social, status, location
- Always on – constant contextual awareness of vehicle, driver and external conditions

Beyond the icon

- We already know this is not working
- What's next?
- Re-imagining the car – can't just steal from mobile

The Details

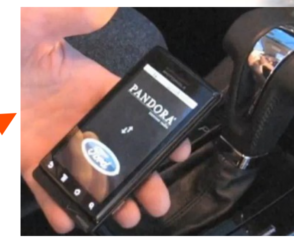
Infotainment Design Trends



Source: Automotive Multimedia & Communications - AMCS

MyFord Touch: 4th Gen Segment leader?

SYNC
Powered by Microsoft

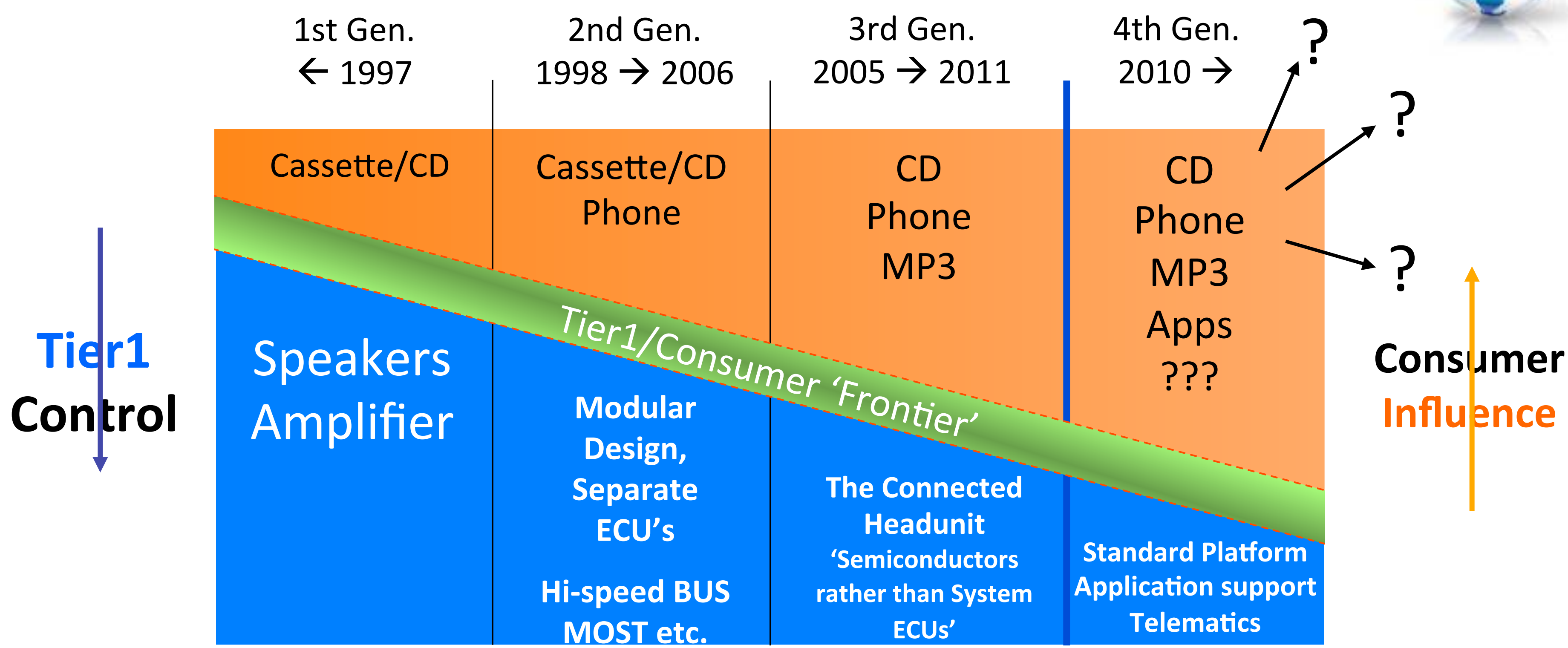


Apps Download

Navigation on SD card

- **Manufacturer:** Flextronics (‘Non-traditional’ automotive Tier1)
- **Architecture:** ‘Open’ for user customization
- **Navigation:** Add SD card or ‘Off-board’ = No additional HW required
- **Interface and control:** Multiple-Display, Voice, Steering buttons
- **Product Focus:** Consumer ✔ (Not-Automotive ✘)

Tier 1 Suppliers:
The 1st to 4th Generation Challenges



Tier 1 Supplier Value Add?

Hardware → Software/Services

Source: Automotive Multimedia & Communications - AMCS

STRATEGY ANALYTICS

The Automotive Cloud Has Arrived

Content
Apps
Services

Brought in
Built in
Beamed in

Gov't & Law Enforcement	OEMs & Dealers	Service Providers Wireless Carriers
Communication (incl. safety/sec'y)	Navigation	Entertainment
Satellite Infrastructure	Terrestrial Infrastructure	Telecom Infrastructure
Vehicle Status	Driver Status	Environment (Weather, Traffic)
Wireless carriers	Clouds: Apple, Google, etc.	Billing, Call Centers, etc.

DTCs
Position
Sensors
UGI
Status
Speed
Voice
Text

What is the Automotive User Experience?

Questions are:
How will connectivity be monetized?
How will the user experience change?
What will happen to the industry eco-system?

Source: Automotive Multimedia & Communications - AMCS

HMI Trends

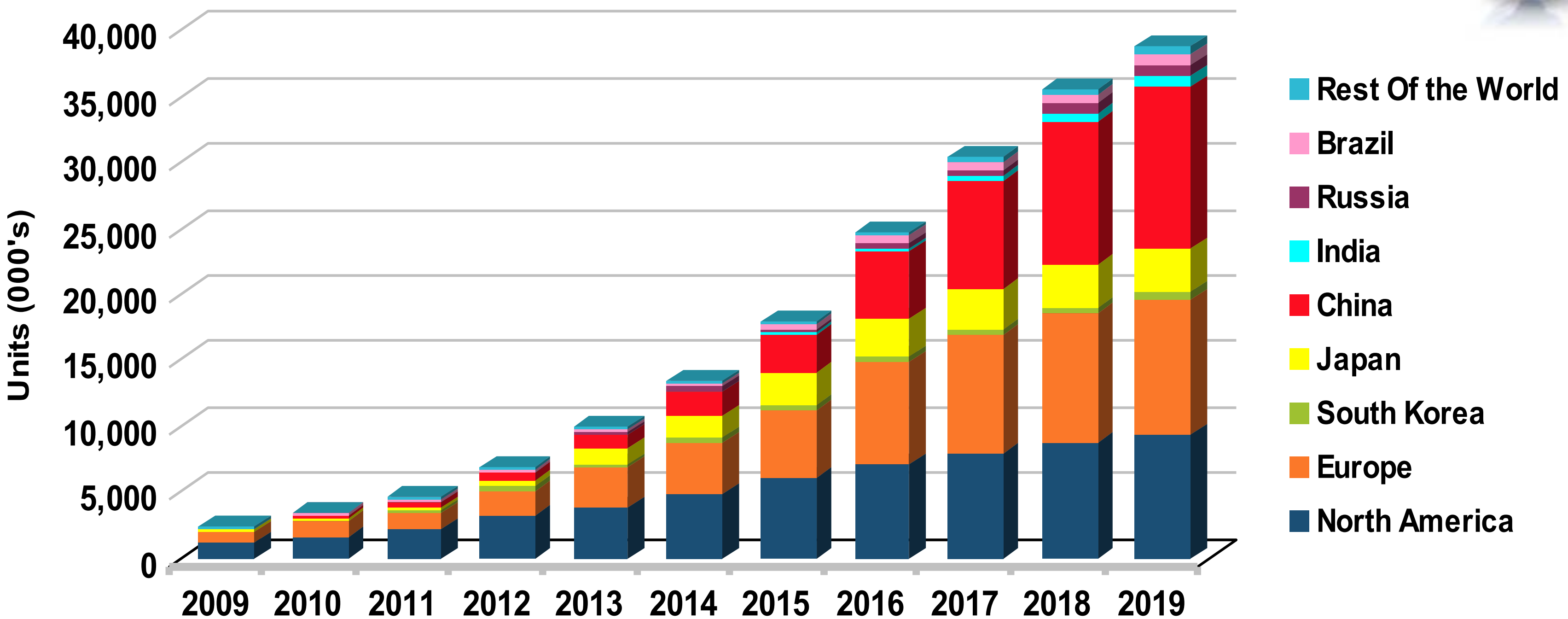
- European automakers finally adopting touchscreens
  - Additional services make navigating menus through traditional controls complicated and time consuming
- Proximity sensors & gestures making their way into the vehicle
  - Proximity sensors in Cadillac CUE not compelling and potentially distracting
  - Gestures have limited intuitive gestures, and others would be hard for consumers to learn
- Natural language voice key to connected services
  - Limits on manual interaction due to driver distraction and complexity of menus call out for a voice solution
  - Natural language (e.g. Siri) step in the right direction
    - Still need usable and accurate solutions

Connecting the Car: The Details

- Drives – OUT; Displays - IN
- 3G/LTE Connectivity on the way for CRM/VRM
- Smartphone accommodation to sell cars
- Digital radio for low cost, low distraction content delivery

Connectivity ECU - OEM: Regional Shipments

STRATEGY ANALYTICS

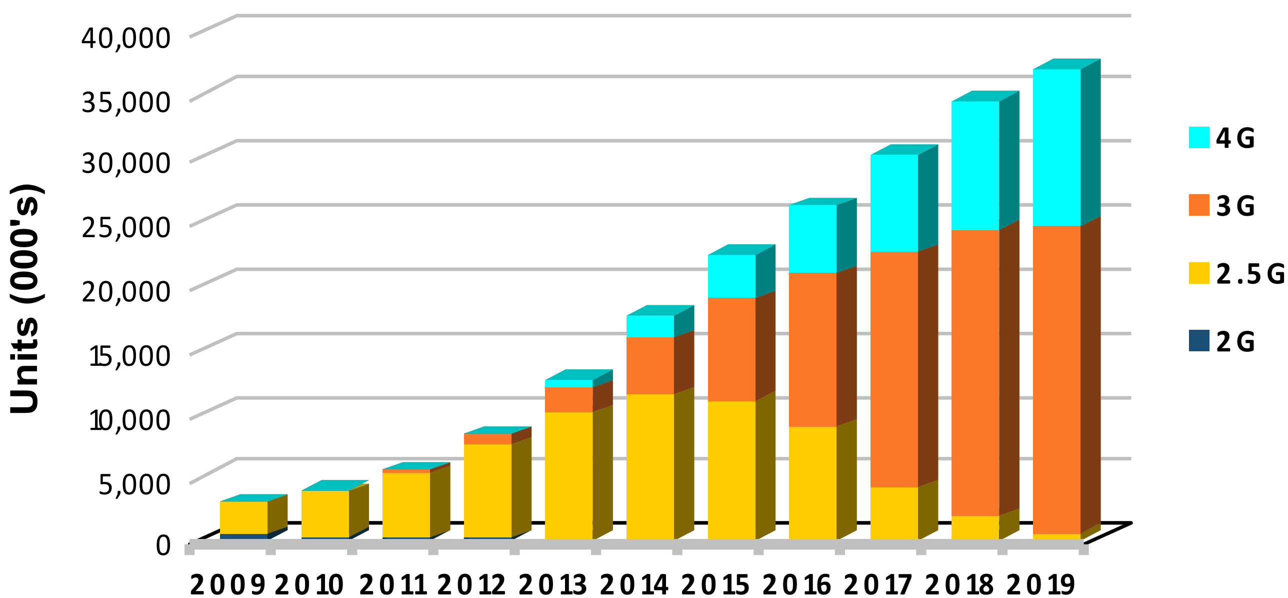


- Connectivity ECU growth opportunity 2011 vs. 2019:
  - ECU Shipments: 4.5 mil units in 2011 to 38.7 million units in 2019 (CAGR 31%)
  - ECU Revenues: $460 mil in 2011 to $2.9 Billion in 2019 (CAGR 26%)
  - Average Selling Price:
    - $100/unit in 2011 → $75/unit in 2019

Source: Automotive Multimedia & Communications - AMCS

Global Wireless Players in Automotive Embedded Telematics Demand

- New business models enable new growth phase
- Safety, CRM, advanced infotainment
- Long-term outlook - V2V, V2I, autonomous cars, etc.
  - Different regional strategies – Europe/Mobility, U.S./Safety



Global

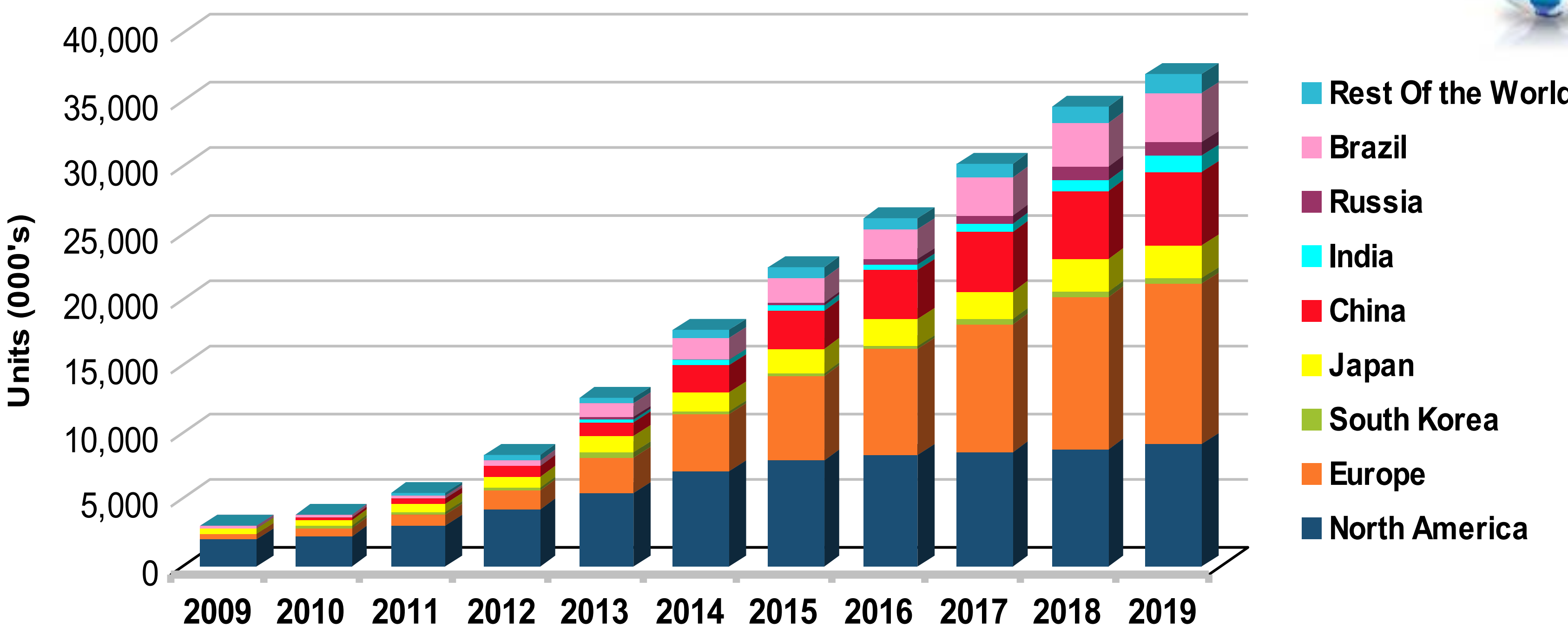
3G Wireless Network:
24 Mil units in 2019

4G Wireless Network:
12.3 Mil units in 2019

Source: Automotive Multimedia & Communications - AMCS

Telematics ECU: OEM Regional Shipment View

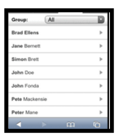
STRATEGY ANALYTICS

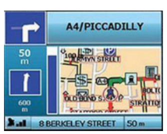


- **North America: eCall/Telematics highly dependent on car maker strategies**
- **Europe: eCall telematics highly dependent on regulatory activity and selected OEMs**
- **Japan: Navigation is still dominant, Telematics roll-out is lead by Toyota**
- **China: Forecast to be #3 Player in embedded Telematics ECU Globally by 2014**

Source: Automotive Multimedia & Communications - AMCS

Automotive HMI:
The Rise of the Display – 2012 update



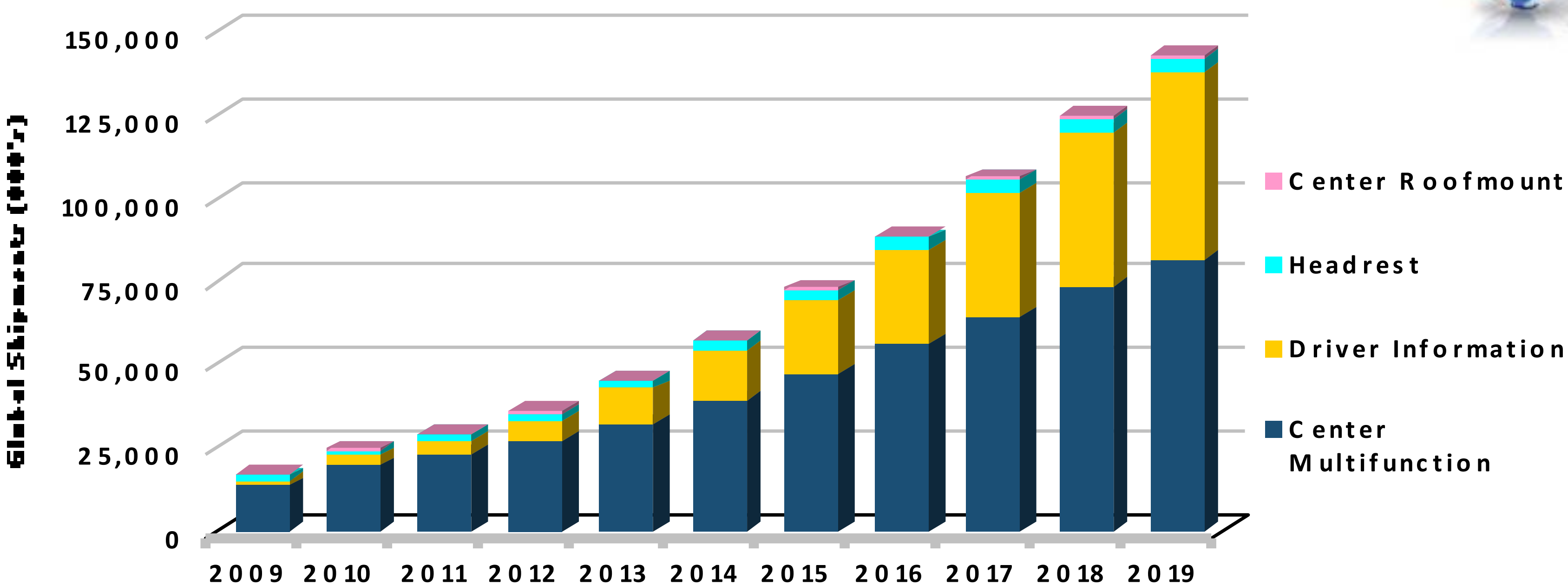


	Infotainment Display Requirement			
	<-- 1997	1998-2006	2006-2010	2010 -->
'Pre-iPhone' Phase →	1st Gen	2nd Gen	3rd Gen	4th Gen
ADAS	•			
Connected Services	•			
Telematics	•			
Enhanced Audio Control	•			
Audio/Phone Library Access	•			
Device Connectivity	•			
Digital/Satellite Radio	•			
Navigation	•			
AM/FM Radio Selection	● (Low)			
Volume Control	● (Low)			
Display Need ▶	• N/A	● Low	● Med	● Hi

Source: Automotive Multimedia & Communications - AMCS

OEM Display Deployment: Global Shipments by Position

STRATEGY ANALYTICS



- **OEM Display Growth Opportunity 2011 vs. 2019**
  - Center Multifunction: **+250%** (23.3 Mil in 2011 → 81.7 Mil in 2019) CAGR 17.0% ✓ ✓ ✓ ✓ ✓
  - Driver Information: **+1000%** (4.4 Mil in 2011 → 56 Mil in 2019) CAGR 37.4% ✓ ✓ ✓ ✓ ✓
  - Headrest: **+123%** (1.8 Million in 2011 to 4.1 Million in 2019) CAGR 10.6% ✓ ✓
  - Center Roof mount: **+38%** (300,000 in 2011 to 420,000 in 2019) CAGR 4.1% ✓

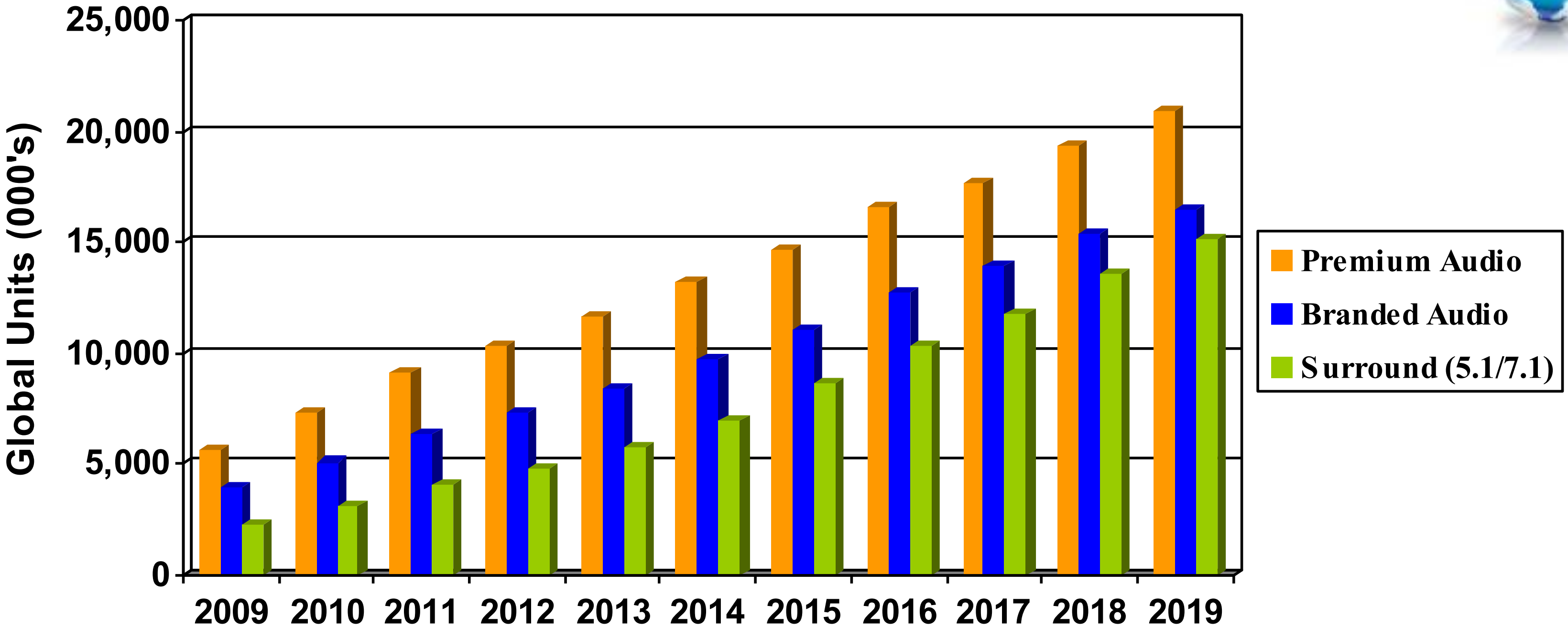
→ **The Display becomes a key Human Machine Interface (HMI) point for: Audio, Media, HVAC, Telematics, Navigation, Social networking**

→ **The Display provides users with a flexible interface tool that will future proof vehicle systems**

Source: Automotive Multimedia & Communications - AMCS

OEM Headunit:
Prem. & Branded Audio Shipments

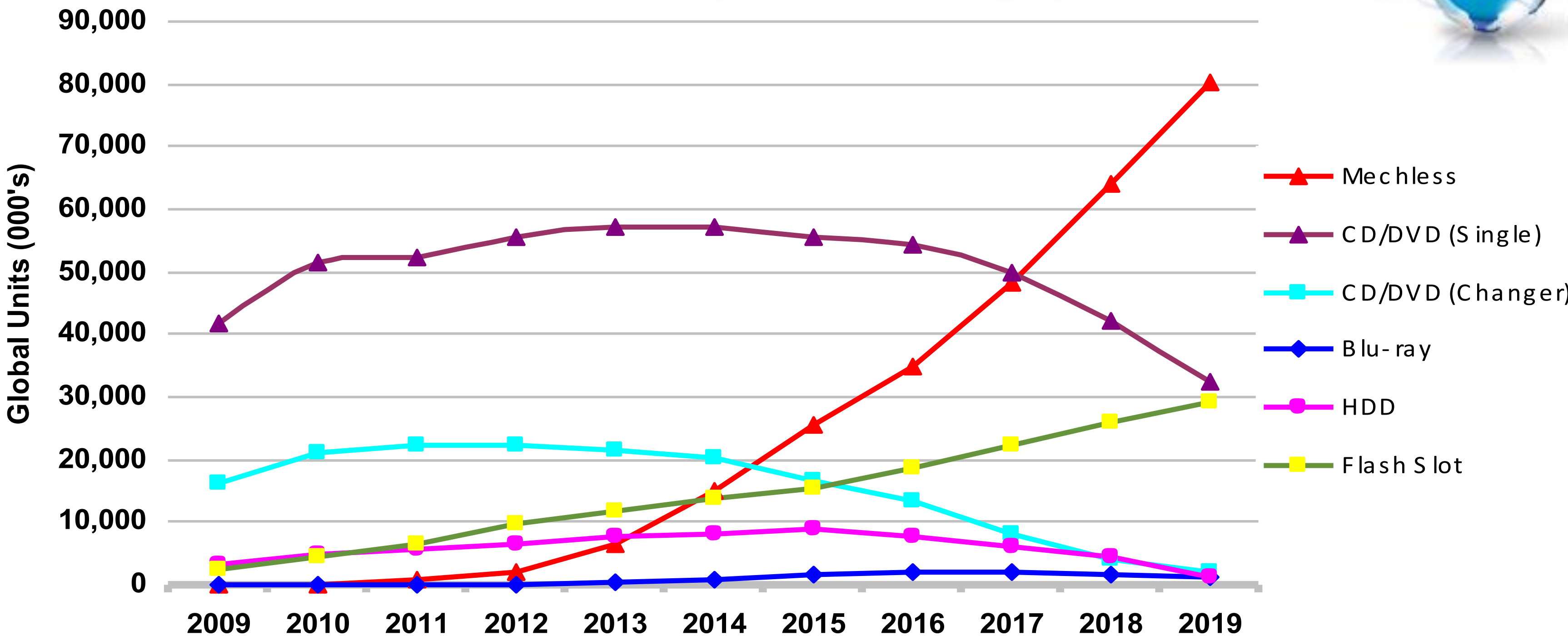
STRATEGY ANALYTICS



- Feature Trend/Opportunity: 2011 vs. 2019
  - Premium Audio: Growing interest in midrange vehicle segment
    - **Market Shipments: 9.0 Mil to 21 Mil units (130% Growth, CAGR 11%)** ✔ ✔ ✔ ✔ ✔
  - Branded Audio: OEM's are adopting 'Brands' to add value to Premium audio
    - **Market Shipments: 6.4 Mil to 16.4 Mil units (156% Growth, CAGR 12.5%)** ✔ ✔ ✔ ✔ ✔
  - Surround Sound (5.1/7.1): Currently low penetration across all vehicle segments
    - **Market Shipments: 4 Mil to 15.1 Mil units (270% growth, CAGR 17.9%)** ✔ ✔ ✔

Source: Automotive Multimedia & Communications - AMCS

OEM Headunit:
Optical Media and Storage



- Headunit Feature Trend/Opportunity: 2011 vs. 2019

  Mechless: 69% of vehicles worldwide will be 'solid-state' by 2019 (2.6% in 2011) ✔ ✔ ✔ ✔ ✔

  – **CD/DVD Changer:** Headunit availability falls to 1.9% WW by 2019 (29% in 2011) ✘

  – **Blu-ray:** Compatible drive in 1.0% of headunits WW by 2019 (0% in 2011) ✘

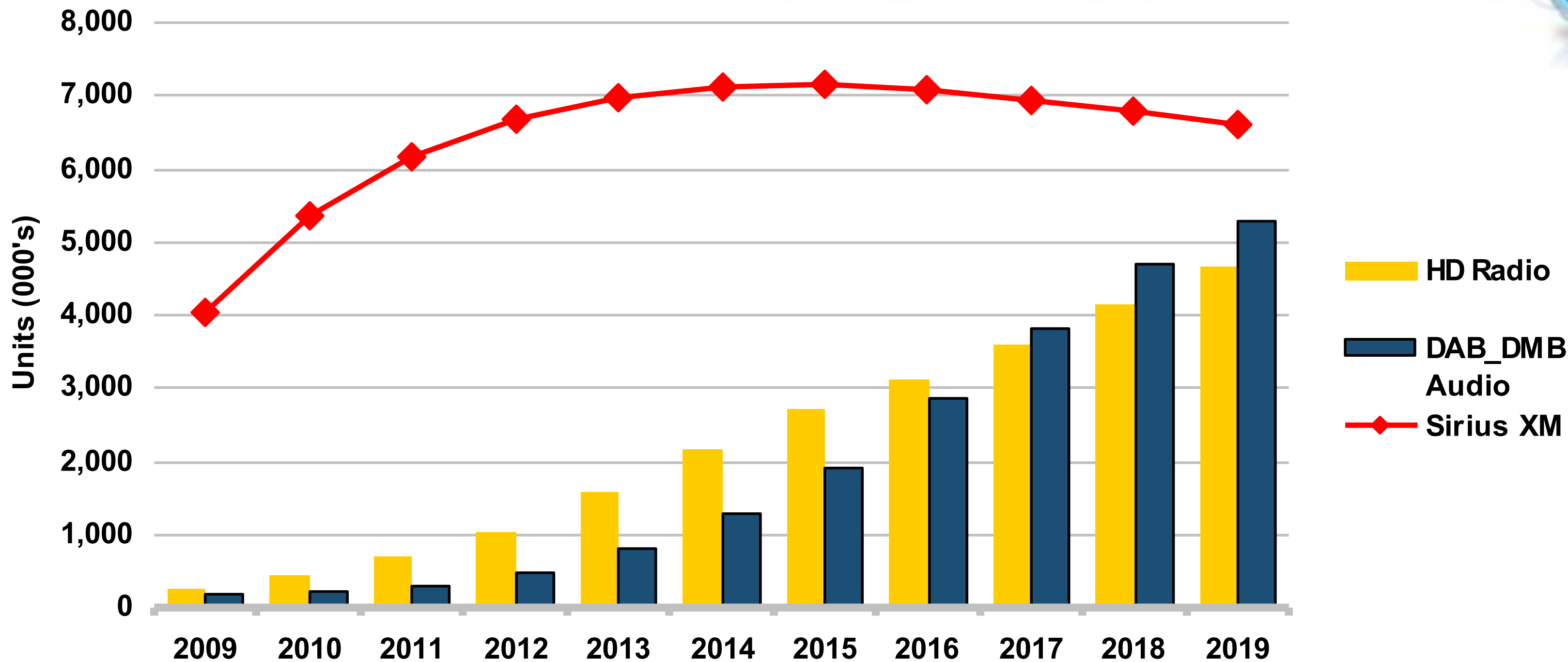
  – **HDD:** Available on 1.1% of headunits WW by 2019 (7.6% in 2011) ✘

  – **Flash card slot:** Available on 25% of headunits WW by 2019 (8.3% in 2011) ✔ ✔ ✔

Source: Automotive Multimedia & Communications - AMCS

OEM Digital Radio Terrestrial and Satellite

STRATEGY ANALYTICS



- Digital Radio Growth opportunity 2011 vs. 2019:
  - Sirius XM shipments will grow at a slow 1% CAGR between 2011 and 2019

    → 6.1 million units in 2011 to 6.6 million units in 2018.
  - HD Radio shipments will expand at a CAGR rate of 27% between 2011 and 2019

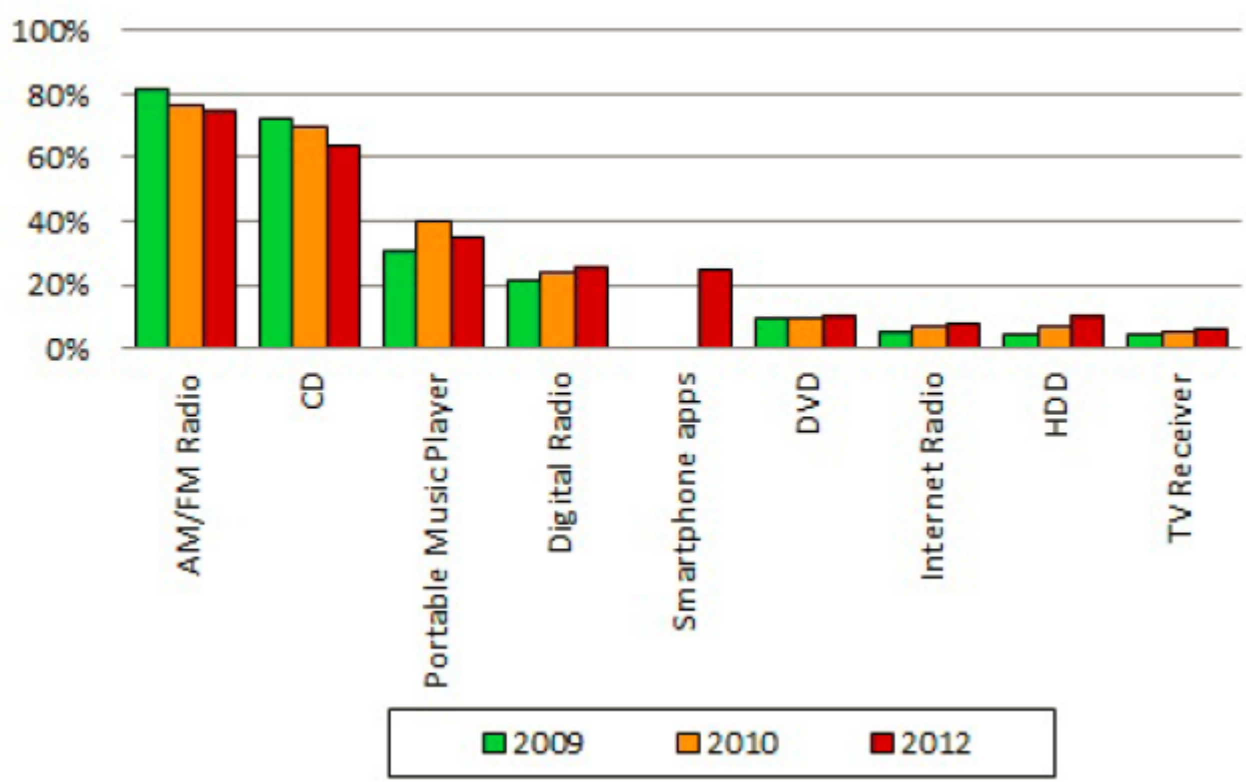
    → 690, 000 units in 2011 to 4.6 million units in 2019.
  - DAB shipments will increase at a CAGR rate of 43% between 2011 and 2019

    → 300,000 units in 2011 to 5.2 million units in 2019.

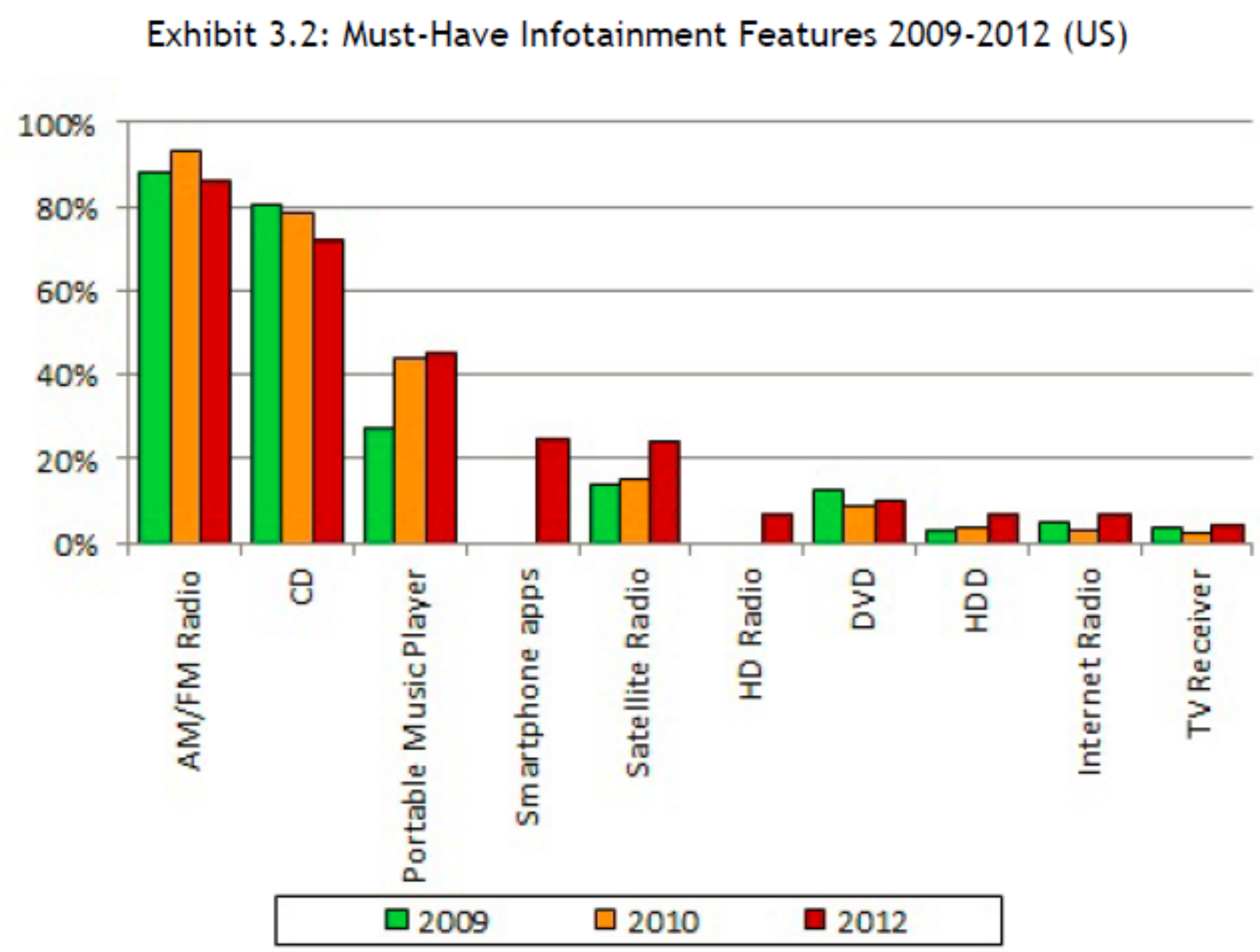
Source: Automotive Multimedia & Communications - AMCS

Must Have Infotainment – Western Europe

Exhibit 3.5: Must-Have Infotainment Features 2009-2012 (Western Europe)



Must Have Infotainment – U.S.



STRATEGY ANALYTICS

Smartphone's Impact on the In-Vehicle Experience

43%

Messaging = "Eyes Off Road Time"

- Need to look to decide if message is important
- Unaware or distrust voice control/read out
- Check messages at stop lights
- Keep phone low, so moving eyes more

41%

Inbound Calls are Usually Answered

- Need to pick up device to decide if call is important
- Bluetooth headsets are owned but not used because they are a pain to keep charged
- They try to use phone speaker, but max volume is too low

78%

Navigation Difficult to Interact With

- Don't use it enough to buy a dock/stand
- So keep it in cup holder and need to pick it up to look at it
- Or, put it in dashboard blocking the instruments
- Can't hear TBT because max volume is too low

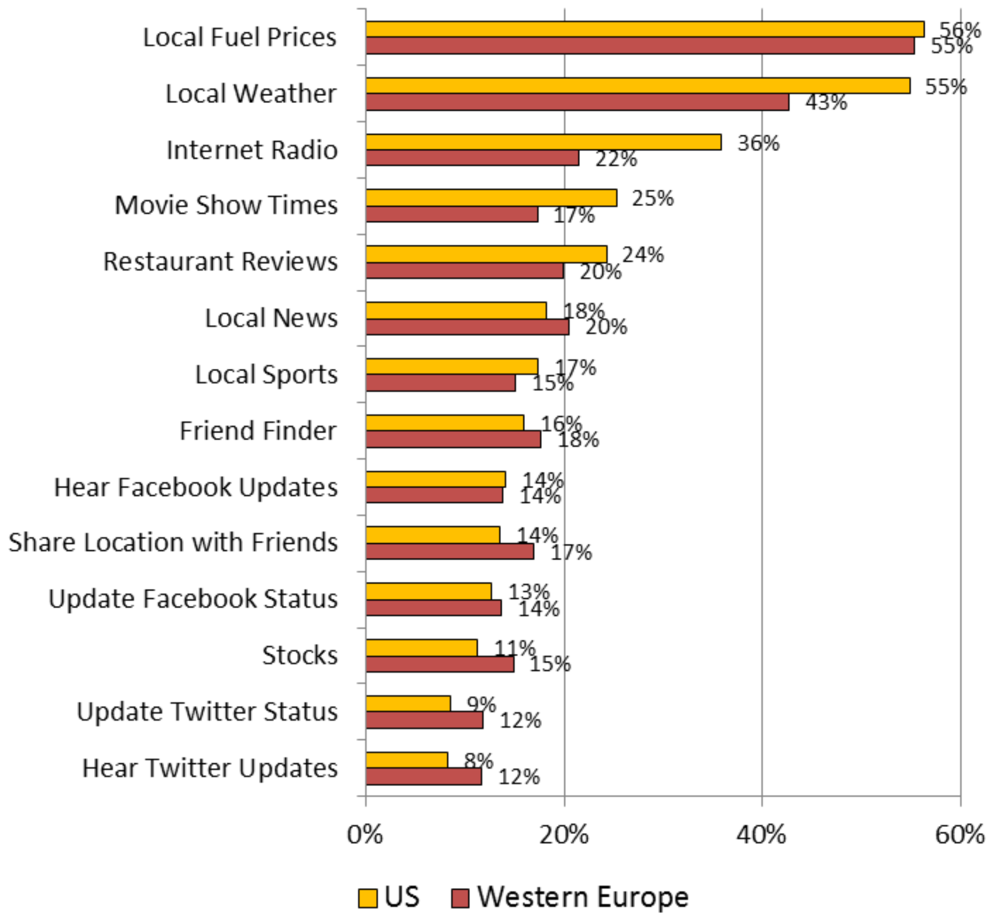
40%

Streaming Media Difficult to Consume

- Want to listen to streaming music from smartphone apps (e.g. Pandora)
- Awkward to control app while driving
- Speakers on phone too quiet; want to connect to their car stereo speakers

STRATEGY ANALYTICS

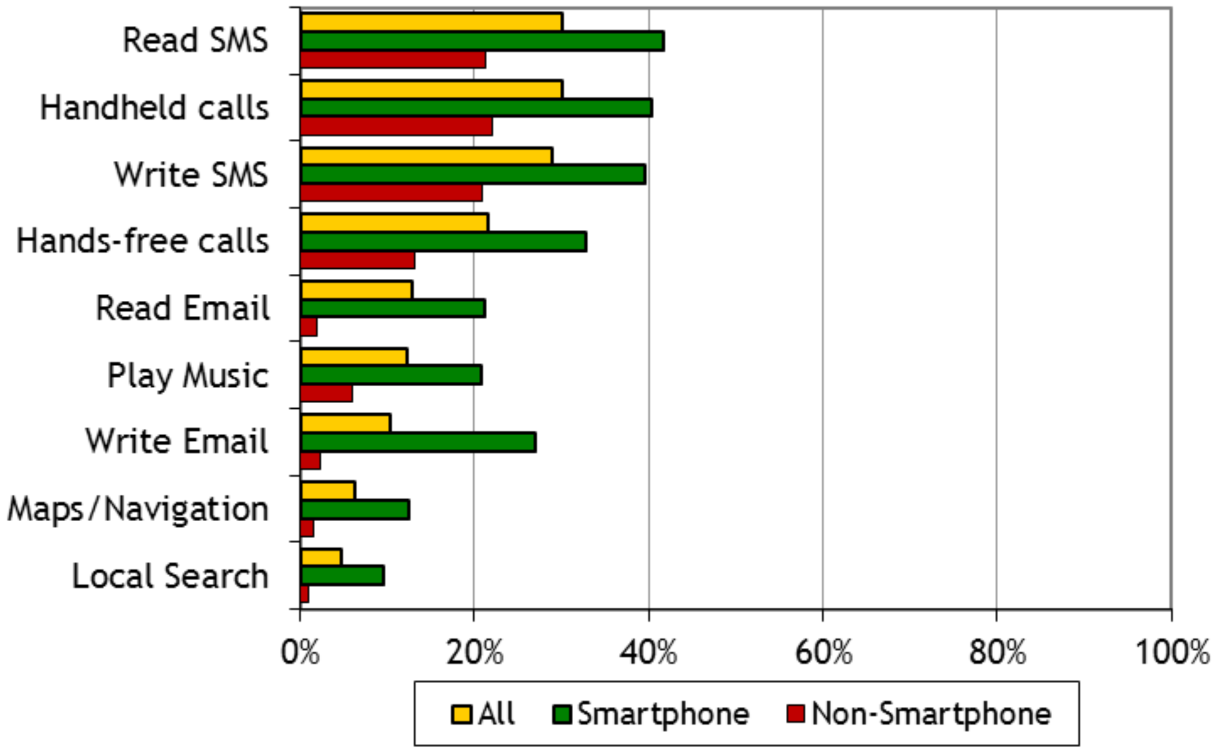
Interest in Connected Services: US & Western Europe



Source: Strategy Analytics Automotive Consumer Insights Jan 2012

- Consumers in US and Western Europe most interested in local fuel prices and local weather
- Social networking low on list of connected features
  - User testing shows UX in-vehicle is poor
- Stripped down versions of Facebook and Twitter cause them to be passive experiences instead of interactive

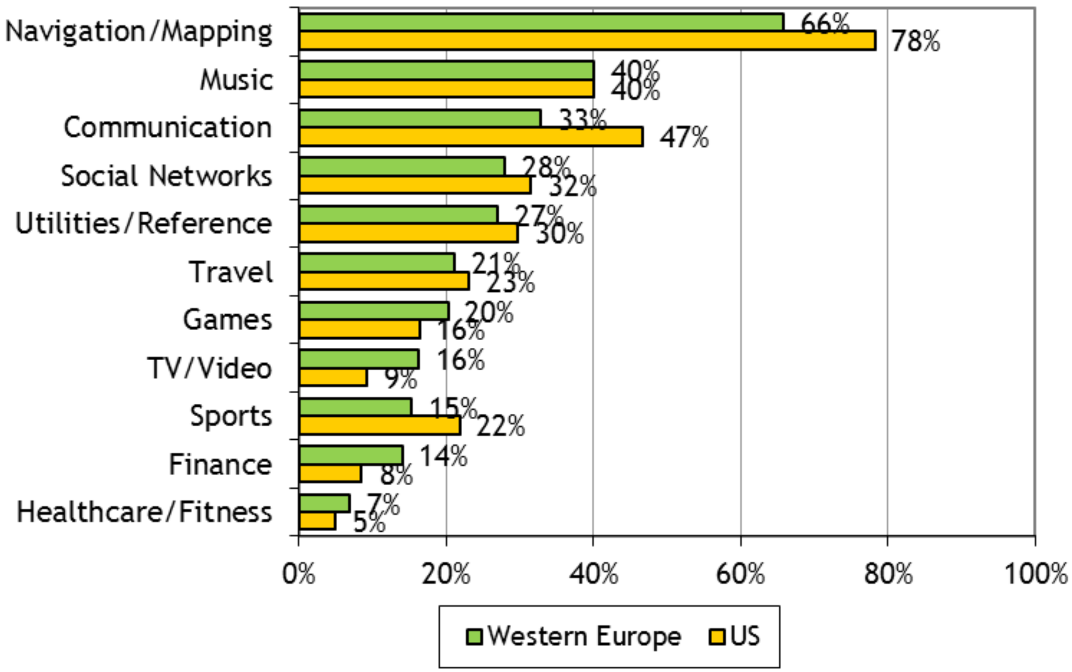
Mobile Phone Usage in Vehicle – Western Europe



Source: Strategy Analytics Automotive Consumer Insights, Feb 2011

- In Western Europe, about 40% of smartphone owners read and write at least one SMS while driving per day

Smartphone App Usage While Driving



Source: Strategy Analytics Automotive Consumer Insights Feb 2011

- **More than two-thirds of smartphone owners in the US and Western Europe currently use navigation and mapping applications on their smartphone in the vehicle.**
  - 66% of smartphone owners in Western Europe and 78% in the US use navigation or mapping apps in the vehicle.
  - 40% of smartphone owners use music applications while driving
  - 32% of smartphone owners in the US and 28% in Western Europe use social networking applications in the vehicle.

Car Connectivity a Mobile Mess

Popular Mechanics

The Mobile Mess: Why Isn't Car Connectivity Better?

With smartphone integration and Internet connectivity, automakers are in unfamiliar territory. While systems such as Ford's Sync, Nokia's MirrorLink, and Cadillac Cue are bringing the Web and apps increasingly into the car, they are also showing the delicate line car companies must walk between connectivity and distracted driving.

"It's kind of a mess," says Roger Lanctot, a senior analyst at technology research firm Strategy Analytics. "Because all of these systems are proprietary, it's expensive to deploy content app by app. They are also all brand-new, and they all work differently, so you have usability issues and glitches galore."

Smartphone's Impact on the In-Vehicle Experience

STRATEGY ANALYTICS

CE OUTLOOK

TRACKING THE CAR AUDIO, VIDEO & ELECTRONICS MARKET

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Car Radio Makers Cite Problems with iOS6

September 25, 2012 by Amy Gilroy 2 Commen

Filed under Car News, Home Page Featured, Industry news

If you upgraded your iPhone 4/4S to the new iOS 6 you may lose Bluetooth control over your phone in many car radios.

According to Alpine and 200 complaints on the Apple user forums, certain radios from VW, Alpine, Pioneer, Kenwood, Clarion and others have Bluetooth issues. Some will no longer work with steering wheel controls and no longer show meta data info, nor let you control your phone from the radio buttons over Bluetooth.

MyFord Touch – Coming to China

GM CUE - Home


3:22
AUDIO
PHONE
NAV
SETTINGS
PANDORA
CLIMATE
OnStar
R. CLIMATE

GM CUE – Radio Station Search

Renault ZOE introduces R-Link - YouTube.wmv

UConnect in the 2013 RAM 1500 - YouTube.wmv

The Takeaway

Car Makers Need

- Global solutions
- Upgradable, updatable
- Accommodate smartphones, other devices
- Allow extraction of vehicle data
- Provide for persistent/ad hoc connectivity
- “Persistent inquiry” – the “where” machine
- Standards-based solutions
- Ultimate objective - $M’s in cost savings + superior customer/vehicle relationship mgmt.

Thank you!

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