

Open Source in Automotive Infotainment

Taeyong Kim (ty.kim@windriver.com)

Services & Solutions

Wind River Systems



AN INTEL COMPANY

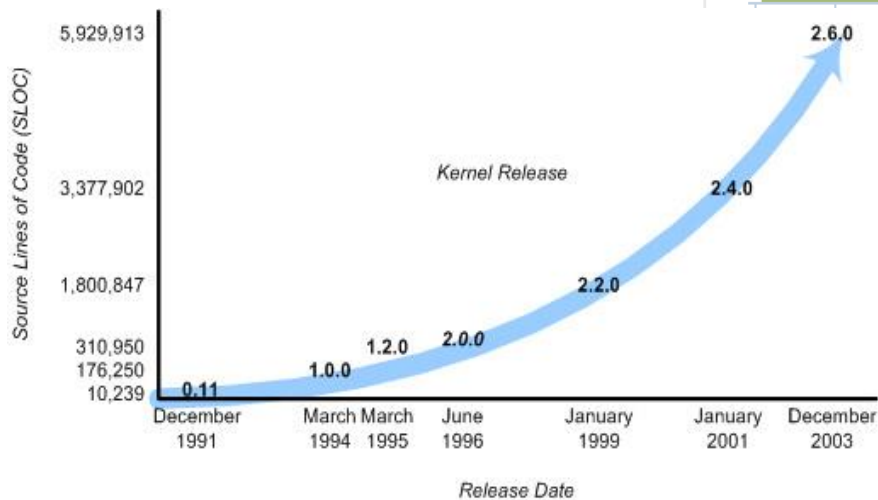


Why using Open Source in IoT?

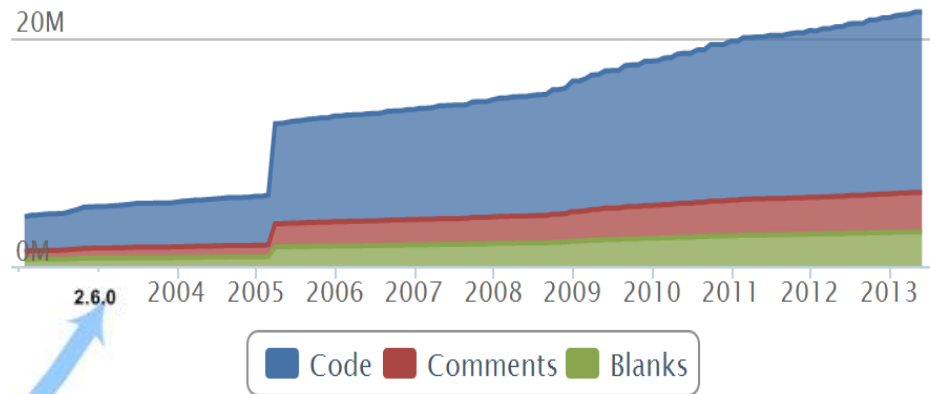
- Internet of Things needs Interoperability
- Server systems for cloud computing more and more Linux based
- Open Source is
 - Ubiquitous
 - data centers, embedded devices, network and cloud infrastructure,...
 - Scalable
 - vertical and horizontal scaling, from small to titanic
 - Critical
 - de facto standardization and interoperability for a range of critical functions (like connectivity itself,...)
 - open standards and open source implementations (e.g. HTTP and HTML, Java, SSH/SSL, OSGi, XMPP, MQTT,...)



Linux Kernel LoC



Lines of Code



<http://www.ibm.com/developerworks/library/l-linux-kernel/>

<http://www.ohloh.net/p/linux>



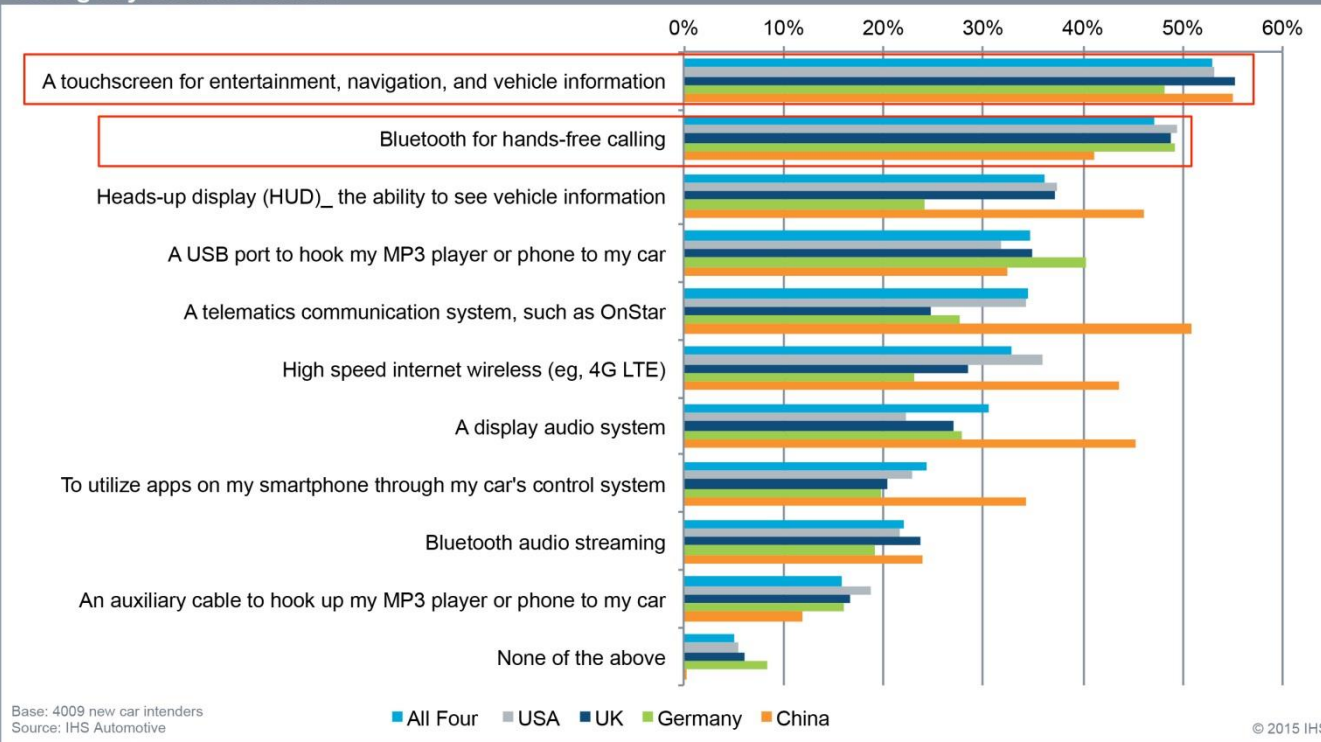
OSS History

- Free Software movement started in 1983
- 1991 First public release of Linux (1992 under GPL)
- 1998 renamed to Open Source
- 2005 Android development starts
- 2006 first Linux A-Sample
- 2007 Android licensed under Apache License (OHA)
- 2009 GENIVI public launch
- 2008 first Android powered phone
- 2012/13 first GENIVI product launch
- 2012/13 first Android Infotainment launch

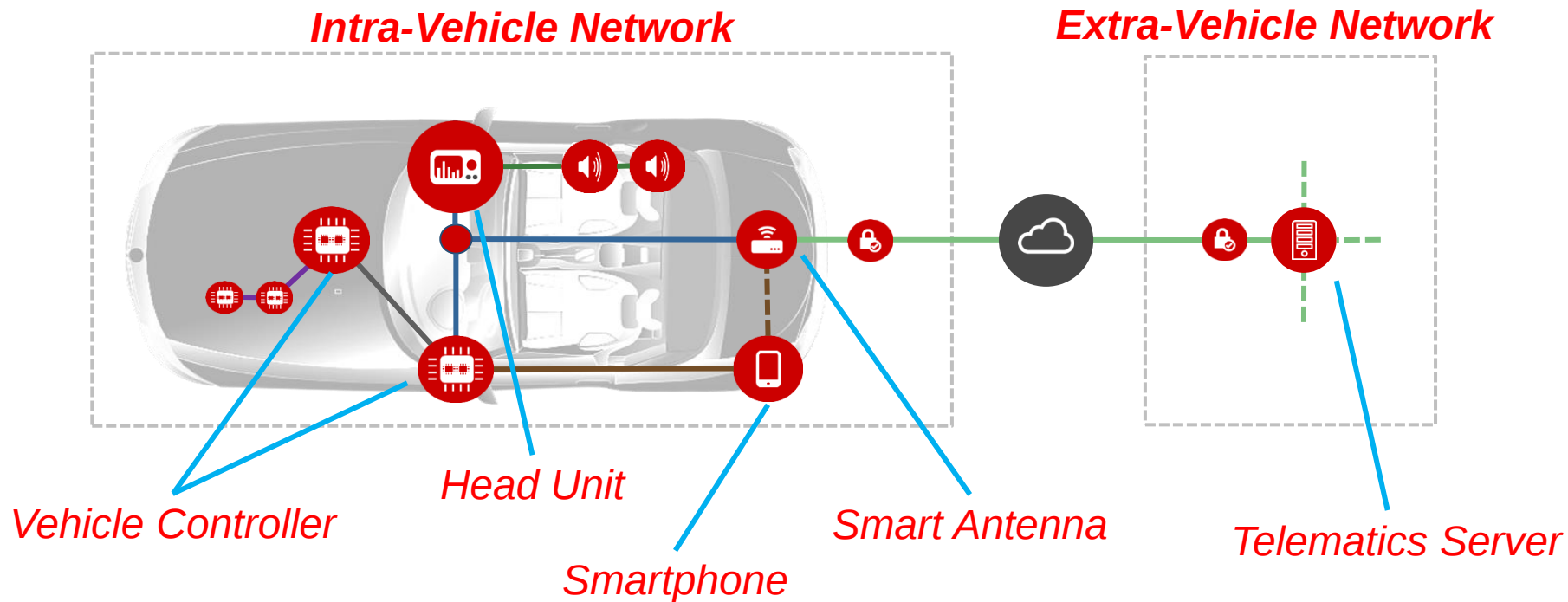


In-Vehicle Features

Still thinking about features in your next new car, could you please select up to 4 features you are interested in having in your next vehicle?



Automotive Network Architecture



Software Components

Intra-Vehicle Devices

- RTOS, Linux, Android
- ECU and Application Processors
- Access to CAN bus
- AUTOSAR
- ISO26262 Certification
- Ethernet AVB

Gateway

- Linux or RTOS
- Gateway between Intra-Vehicle Network and Extra-Vehicle Network
- 3G/LTE
- Firewall
- Telematics Features

Extra-Vehicle Devices

- Linux
- Telematics Server
- Cloud Service
- TCP/IP, MQTT
- Remote manager
- OTA SW update



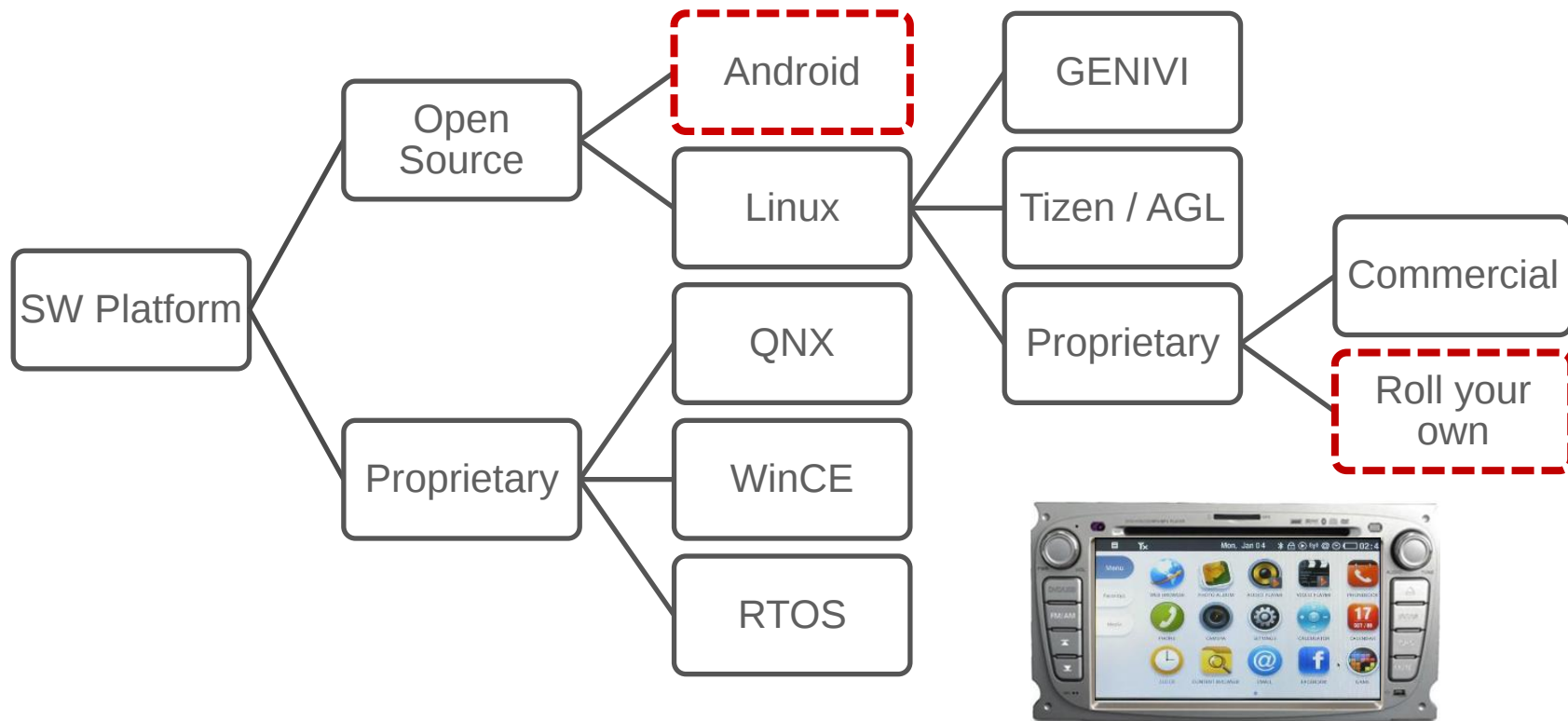
The Automotive SW Use cases

- Long development + maintenance cycle
- Customized HMI (Human-Machine Interface)
- 3rd party integration
- Safety consideration
- Security consideration

Difficulty of filed upgrade once deployed



SW Platform Choices for Infotainment Head Unit



Comparison Summary

Android

- Very mature, great ecosystem but controlled by Google

Proprietary Linux

- Flexibility, lightweight but need effort to put things together

GENIVI

- OEM requirement, compliance exists but still under development

Commercial OS (WinCE, QNX, Etc)

- Market proven but vendor dependency and slow innovation

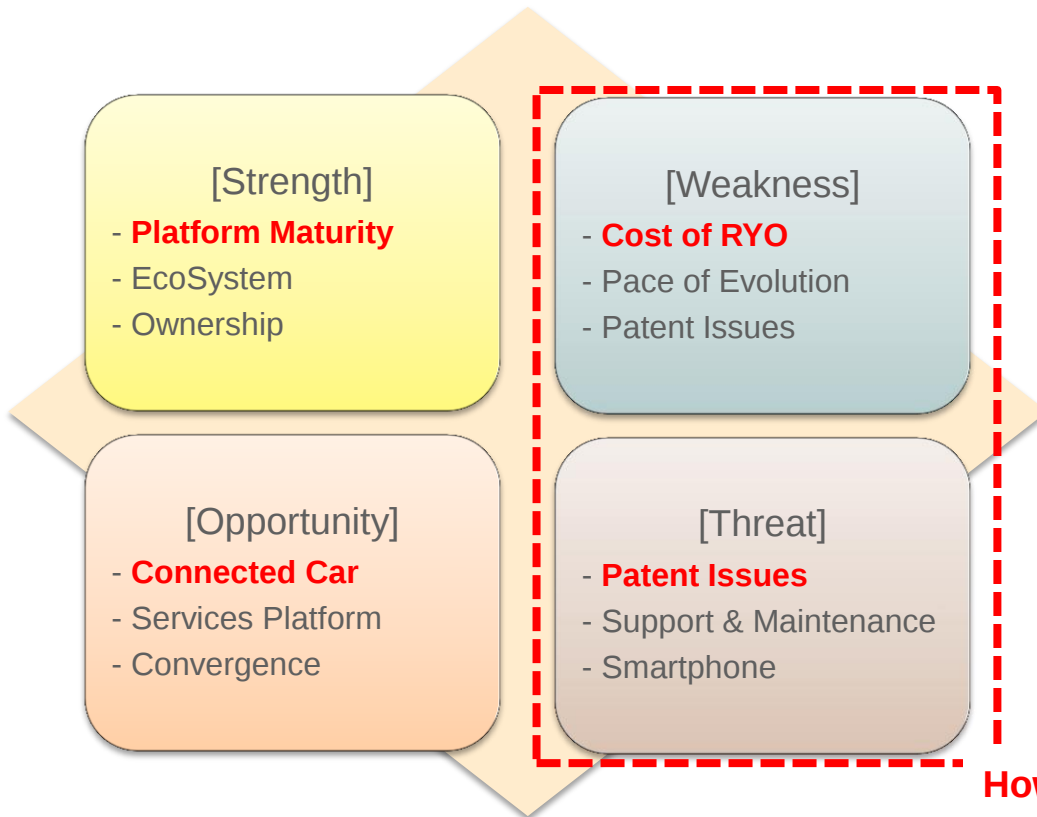


Comparison between Linux and Android

	Linux	Android
CPU Usage	Reasonable	High
Memory Footprint	256MB ~ 512MB	1GB ~ 2GB
SW Framework	Flexible	Well Defined
Pros	• Differentiation • (Relatively) Straightforward Customization & Optimization	• Maturity • Ecosystem • Pace of Innovation
Cons	• Burden of designing and maintaining RYO (role your own) platform	• Google Dependency • Mobile Oriented Features

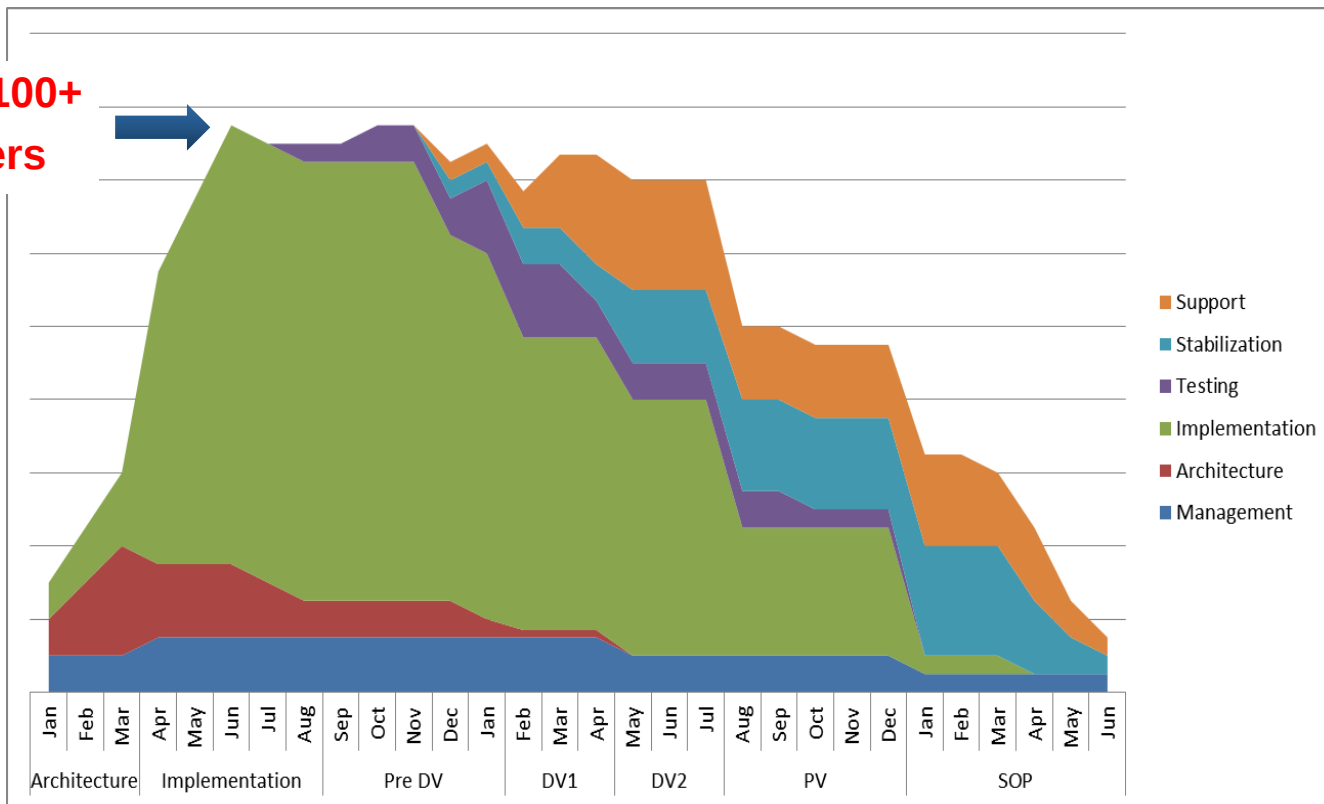


SWOT Analysis of Open Source in Automotive



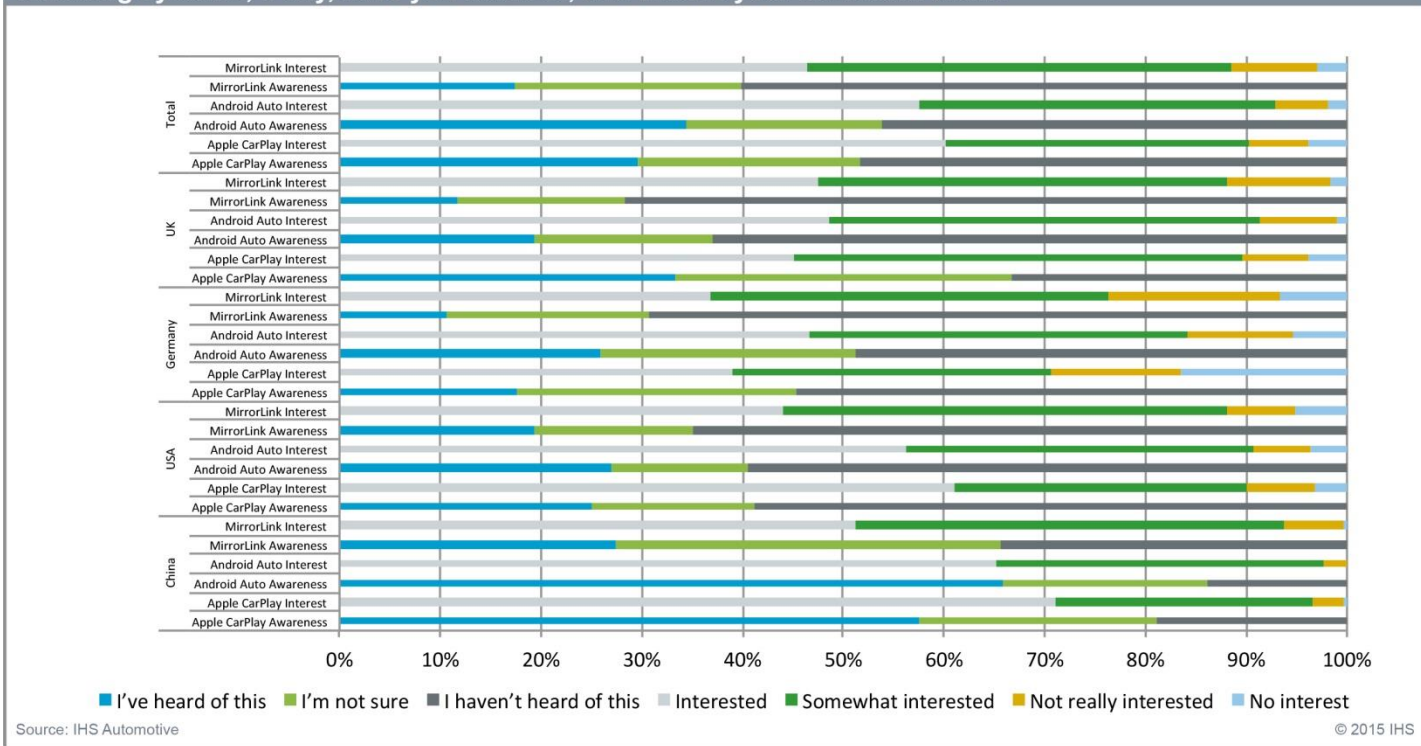
Resource Plan

Could be 100+ Engineers

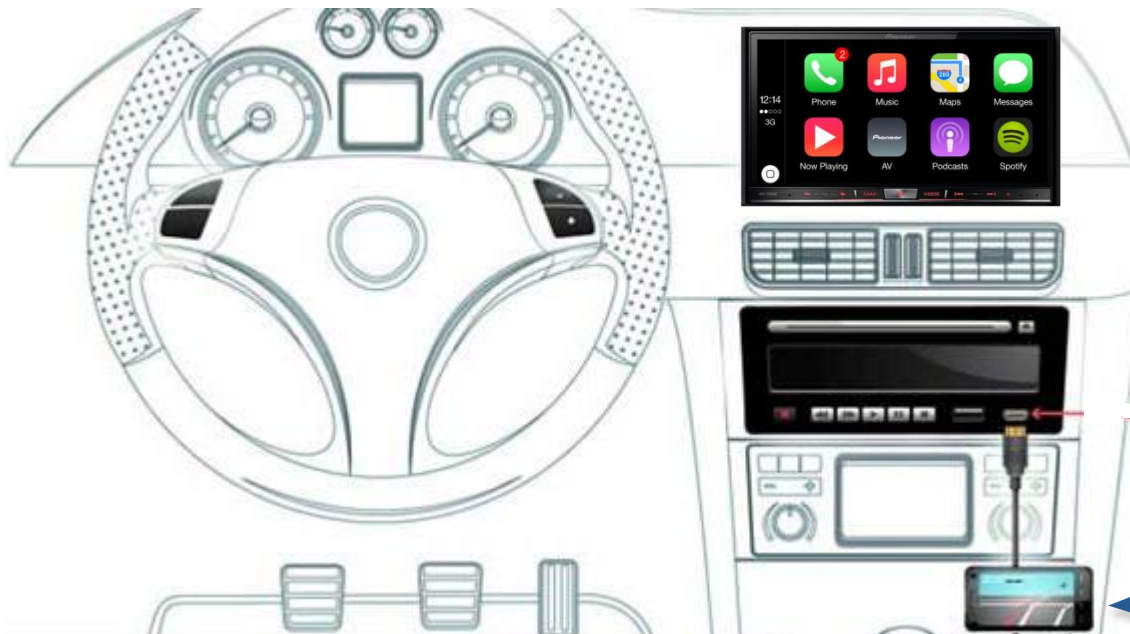


Smart Phone Connectivity

Some vehicles will have the ability to replicate your smartphone system onto an in-vehicle display. Which of the following systems, if any, have you heard of, and what is your interest in them?



Display Audio



Lower development cost for head unit



Value Added Apps can be added and upgraded on a timely manner from Smartphone



Security Issue with Connected Car

- Jeep Hacking
 - Remotely hacking unaltered passenger vehicle
 - Target: 2014 Jeep Cherokee
 - Hacking approach summary:
 - “Jailbreak” Harman’s Uconnect system through USB update mechanism
 - Found a bug in D-Bus service
 - Remotely access Uconnect system from Sprint 3G network
 - Updated firmware in Microcontroller





TY.KIM@WINDRIVER.COM

Thank You

