FROST & SULLIVAN

Global Connected Car Research

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Connected Car Programs at OEMs are going through a Major Strategy Change

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New Customer Experiences

Ability to push new retail experiences to customers relying on the IOT

Retail

New Services

Aftersales

Profit Generation

Ability to use connectivity to decrease recall rates and increase service revenues over lifecycle

Impacting Overall Safety

Ability to add connectivity to enhance the overall safety of the customer

Mobility

New Revenue Streams

Create new sustainable revenue streams using connectivity and personalized services

Safety

Trend 1– Meaningful Data Set is Expected to grow from 10MB to 5GB per Connected Car by 2018

As of 2013 less than 2 per cent of vehicle data was useful for monetization

Parking As a Service

Peer to Peer Marketplace

Integrated Traffic Management

Cooperative & Automated Driving

Usage Based Insurance

Integrated Multimodal Transport

Trend 2– High speed connectivity technologies like 5G can increase speed by 70% compared to LTE

ConnectedCAR

5G Characteristics

Speed: 1-10GB/s
Latency: 1-5ms
Bandwidth: 6-30GHZ
Coverage: 100%

- High Download Speed Close to 1–10Gbs/s
- Latency Period Close to 1–5ms
- Support 1,000X more Traffic Volume
- 100% Network Coverage

High to Fully Automated Driving

Over the Air Updates

Augmented and Virtual Reality

Trend 3– Aftermarket Startups are Creating True Automotive IOT Programs Impacting a Lot of Use Cases

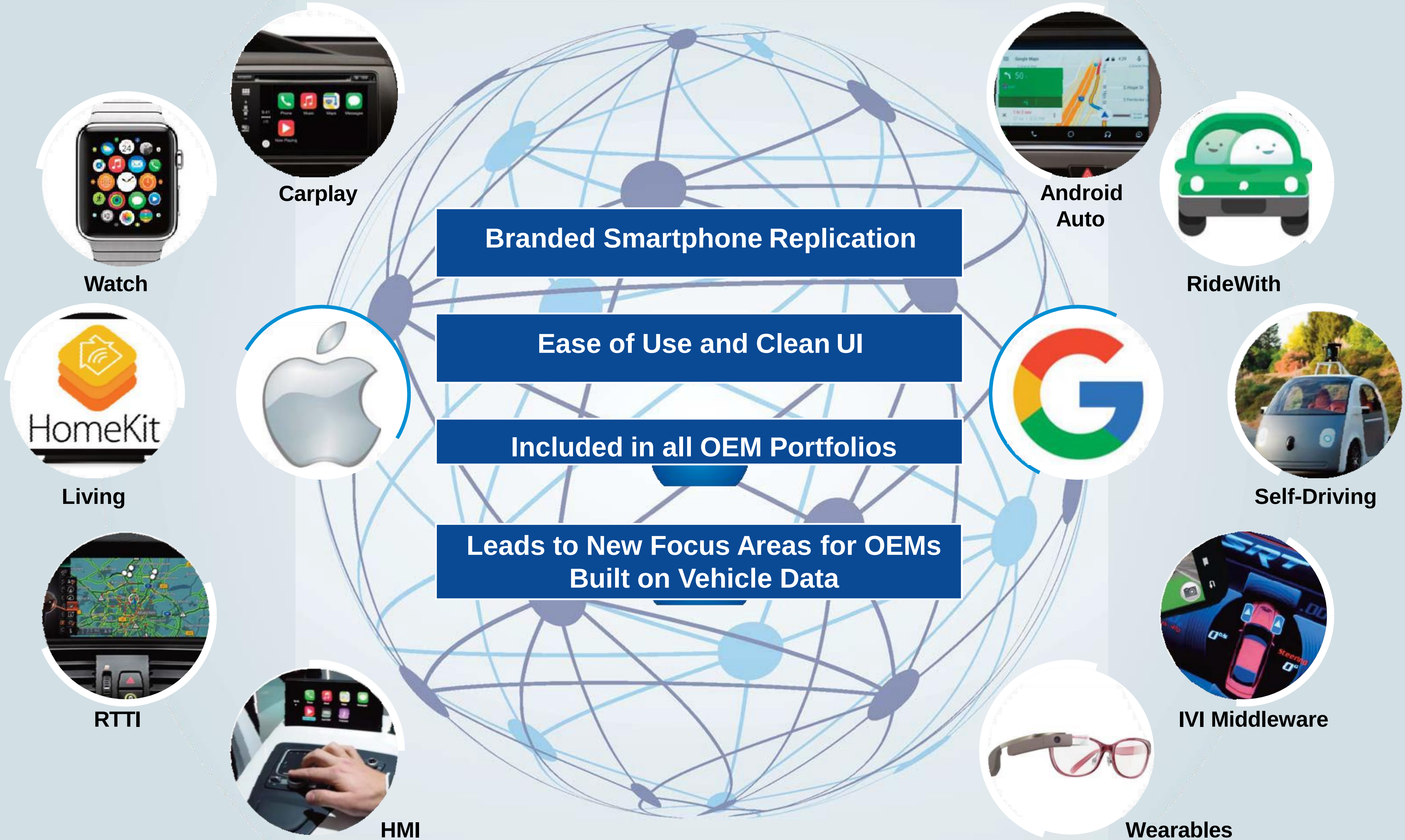
ConnectedCAR

metromile
Zubie
TOMTOM
openbay
wejo
AUTOMATIC
DELPHI
vodafone
Allianz
verizon vehicle

Over 20 Apps All Vehicle Data Based

- Breakdown assistance (Urgent.ly)
- Car locator apps
- Advanced diagnostic alert apps
- Auto insurance shopping
- Access to repair shops
- Jobs dispatching
- Expense creation apps
- Most of these are categorized into connected life, enterprise, fleet management, insurance, maintenance, productivity and safety/security

Trend 4– For Consumer Electronics Giants, Wireless Carriers and Technology Vendors the Connected Car is the next big Market



Trend 5– HMI design for infotainment is fast evolving into a holistic HMI experience across other key areas like automated driving

Feature Integration

- Collision Avoidance ADAS features uptake growing at a CAGR of 25%
- C & D Segments are showing Highest Growth
- 6.8 million L2/L3 automated vehicles by 2030
- Health, wellness integration in the near term
- How to support drivers to make sure features are useful?

Easy Discoverability

- Features hidden in difficult to use input controls and menu structures
- Haptic vs. voice vs. secondary modes and optimal output alerts/displays is an issue
- Tesla followed by Volvo have shown good user acceptance for large Portrait based central display
- Intuitive experience is a must for true USP purpose

Driver Workload Management

- Situational aware HMI mix and intelligence missing
- Information overload is a key concern today
- Bigger issue with higher levels of automation where han-dover needs to happen with minimal lag
- A key reason why many OEMS are refraining from L4
- Tier 1 suppliers are key actors in this trend

Holistic Experience

- Networked central, ICD and HUD is a concept many OEMs are showing – Cadillac demo using MELCO solution
- Key integration to address information flow needed as per situation
- Areas like OTA can be applied in this case easily from a visual standpoint
- Mix of Gestures, Handwriting and others are part of this

Trend 6– Telematics-based safety and security programs are evolving into embedded connected programs with impact on CRM and Aftersales

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OEM Feature Availability Benchmarking	Europe	North America	China	Brazil
Telematics Safety: Automatic Collision Notification (ACN), eCall, Roadside Assistance	Low	High	Low	Low
Stolen Vehicle Tracking	Medium	Medium	Low	Low
Remote Vehicle Slowdown	N/A	Medium	N/A	N/A
Telematics-based Insurance: Mileage-based, pay-how-you-drive (PHYD)-based Insurance	High	Low	N/A	N/A
Prognostics Services	N/A	Low	N/A	N/A
Recall Alerts	N/A	Low	N/A	N/A
Software Over-the-Air Updates	Low	Medium	N/A	N/A
Firmware Over-the-Air Updates	Low	Low	N/A	N/A
Maintenance Alerts	Low	Medium	N/A	N/A
Service Scheduling	Low	Medium	N/A	N/A
Vehicle Health Reports	Low	High	N/A	N/A
Geo-Fence Alerts	Low	Low	N/A	Low
Remote Function App	Low	High	Low	Low

N/A - Not Available - Low - Medium - High

Trend 7– Automakers like GM are continuing to push the boundaries on connected services by focusing on areas like Prognostics

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New OnStar Plans

2015

Feature Integration

Industry best usage statistics

- Answer more than 185,000 calls everyday
- More than 3-4 million vehicle health reports emailed monthly
- 155,000 remote door unlock requests
- 78,000 emergency responses per month
- 4000 automatic crash responses per month

PROTECTION

Automatic Crash Response Roadside Assistance 24/7 Virtual Advisor Prognostics

$19.99/Month

SECURITY

Protection + Stolen vehicle assistance Remote ignition block and remote vehicle slowdown $24.99/Month

GUIDANCE

Protection + Turn by Turn Navigation AtyourService booking service 30 Hands free calling mins

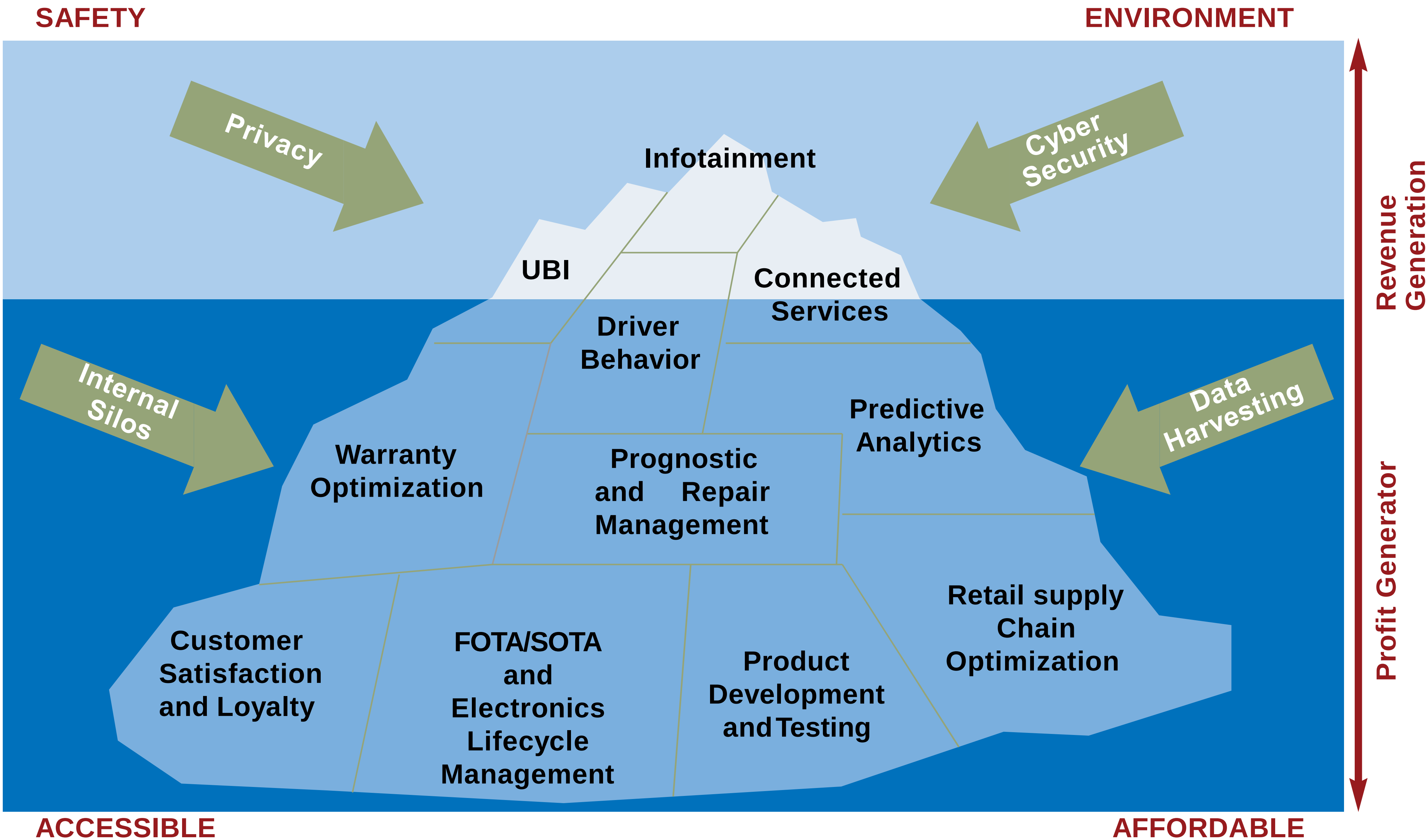
A 25% Net Margin Generator
OnStar is a $1.5 billion entity for GM with just 30% retention levels

Prognostics is the Next Bet
A first for the industry where GM is looking to use OnStar as the key aftersales link

Transactional Cuts are a Yes
Started providing concierge services using LTE with GM taking a cut

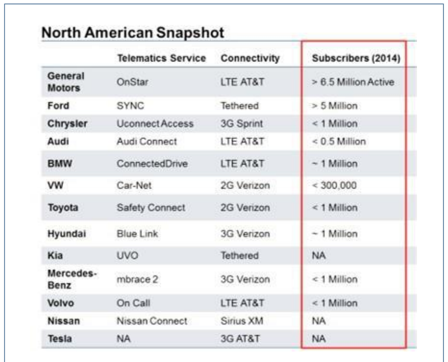
Internalizing IT – HP lost $2 Bn Post 2012 GM made the decision to heavily internalize IT

Ultimately connected car programs need to be profit generators and customer loyalty improvement programs



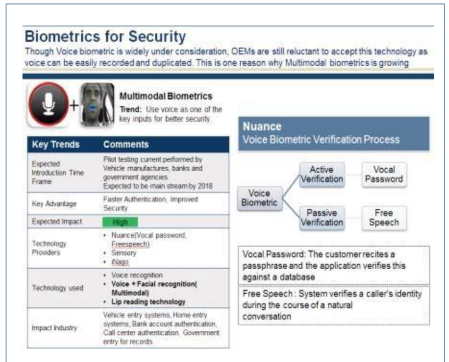
Frost & Sullivan Offer – Complete 360 analysis of the connected car market with a focus on medium to long term strategic options for OEMs

ConnectedCAR

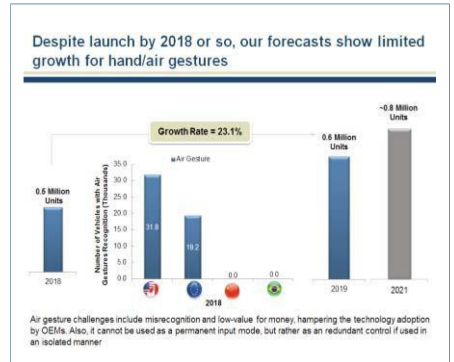

North American Snapshot

	Telematics Service	Connectivity	Subscribers (2014)
General Motors	OnStar	LTE AT&T	> 6.5 Million Active
Ford	SYNC	Tethered	> 5 Million
Chrysler	Uconnect Access	3G Sprint	< 1 Million
Audi	Audi Connect	LTE AT&T	< 0.5 Million
BMW	ConnectedDrive	LTE AT&T	~ 1 Million
VW	Car-Net	2G Verizon	< 300,000
Toyota	Safety Connect	2G Verizon	< 1 Million
Hyundai	Blue Link	3G Verizon	~ 1 Million
Kia	UVO	Tethered	NA
Mercedes-Benz	mbrace 2	3G Verizon	< 1 Million
Volvo	On Call	LTE AT&T	< 1 Million
Nissan	Nissan Connect	Sirius XM	NA
Tesla	NA	3G AT&T	NA

Benchmarking of OEM Activities

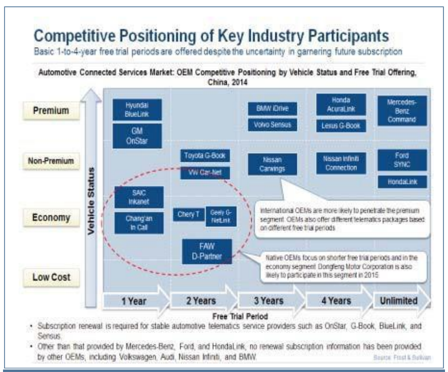


New Technology Analysis

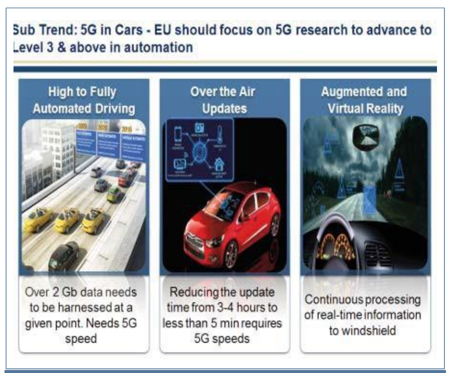


Global Market Size and Forecasts

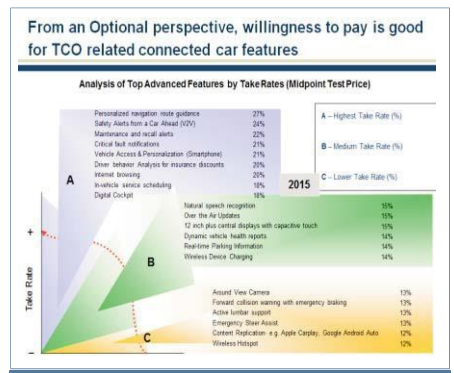
New Business Opportunities Assessment



Regionally Relevant Research



Impact of Regulations on New Solutions



Voice of Customer Feedback

Cross Industry Analysis

Our Content Fits into the Needs of All Key Stakeholders in the Connected Car Ecosystem

1

Vehicle Manufacturers

Actionable intelligence on competitor activities and business models, voice of customer feedback for planning and vendor/partner profiling

2

Tier 1 Suppliers

Technology market potential analysis, OEM short to medium to long term feature plan, Market shares of competing suppliers, tier 2 vendor analysis

3

Service & Content Providers

Industry Ecosystem Analysis, Business Models Analysis for Service packages, OEM Strategies and Interests

4

Technology Vendors, Wireless Carriers & Tech Vendors

All of the Above

Subscription clients get access to much more than just the research reports

ConnectedCAR

KEY AREAS

Connected Car Subscription

- Dedicated Customer Support Executive and Account Manager
- Invitations to all global online Analyst Briefings
- Personalized user portal
- Free access to GIL Community Newsletter (Quarterly)
- Ability to Influence Future Research Titles
- Access to Consulting Hours
- Complimentary Invitation to F&S Urban Mobility Event (London)
- Access to Best Practices Research
- Discounted Pricing on Consulting Assignments
- 3-4 Complimentary Private Briefings
- Peer To Peer' Network Access
- Unlimited Access to Analysts
- Monthly Connected Car Bulletin Briefing

Existing Frost & Sullivan Clients in the Connected Car Market Globally

CONNECTED CAR & HMI – PROPOSED 2016 TITLES

Research Title	Regional Scope
2016 Connected Car and HMI Market Outlook	EU & NA
Profiles of Non Automotive Disruptors in the Connected Car Market – Apple, Google, Uber and Other Key Players	NA
Connected Car Aftermarket Impact on Insurance & Aftersales	Europe
Future of the Intelligent Transport Systems Market	NA
Role of Software Vendors in the Automotive HMI and UX Market	EU & NA
Market and Technology Analysis of Over the Air Updates	EU & NA
Connected ADAS and the Role of HD Maps in Autonomous Vehicles	EU & NA
Automotive App Stores – Comparison of OEM Efforts Vs. Apple and Google Efforts	EU & NA
Role of Software Vendors in the Automotive HMI and UX Market	EU & NA
Profiles of US, EU and ASIAN OEM's in the Connected Car Market	Global
Recap of V2X Market - DSRC Vs. LTE Trends and Applications in North America and EU	EU & NA
Impact of Connected Cars on the Future of Retailing	EU & NA
2025 Connected Car Outlook	Global
Analysis of Consumers Unmet Needs, Awareness Levels and Satisfaction of Connected Car Features by OEM Brands in US and Europe	Consumer Research US Focused
2015 Brazil Voice-of-Customer Study	Consumer Research Brazil Focused

CONNECTED CAR & HMI – 2015 TITLES COMPLETED

Research Title	Regional Scope
Competitive Analysis and Benchmarking of Key Tier 1 Suppliers in the Global Connected Car Market	Global
2015 Outlook of the Global Connected Car Market	Global
Strategic Analysis of the Chinese Connected Car Market	Europe and NA
Strategic Analysis of the Japanese Connected Car Market	Europe and NA
Executive Analysis of Health, Wellness and Wellbeing In the Global Automotive Industry	Europe and NA
Augmented Reality In Cars in Europe and North America	Europe and NA
Handwriting Recognition in Cars	Europe and NA
Rise of Virtual Cockpit in Cars	Europe and NA
Automotive Gesture Recognition Market in Europe and North America	Europe and NA
HTML 5 Vs. Qt in the Car – Use Cases and Impact Analysis	Europe and NA

CONNECTED CAR & HMI - 2014
COMPLETED RESEARCH

Planned Research Title	Regional Scope
Strategic Update of European Usage Based Insurance Market for Passenger Cars and Trucks	EU
Strategic Outlook on MirrorLink & Tethered Smartphone Solutions in North America and Europe	EU & NA
2014 Outlook for the Global Telematics and Infotainment Market	Global
Impact Assessment of Mobile Ads in the North American Automotive Infotainment Market	NA
Strategic Outlook of Vehicle Relationship Management Systems in Europe and North America	EU & NA
European and Russian Infotainment Voice of Customer Study – Infotainment and Telematics Features and Willingness to Pay	EU & Russia
Strategic Analysis of Select LATAM Regions Telematics and Connected Services Market	LATAM
Real-Time Traffic Information Apps Study for NA and Europe	EU & NA

CONNECTED CAR RESEARCH
EXISTING RESEARCH (2010 – 2013)

Research Title	Regional Scope
Strategic Outlook of Automotive Ethernet Technology in Europe and North America	Europe & North America
Strategic Analysis of the European Market for V2V and V2I Communication Systems	Europe
Opportunity Analysis of Telematics in the North American Automotive Aftermarket	North America
Strategic Update of the North American Usage-based Insurance Market	North America
Strategic Analysis of the Impact of Big Data on the European and North American Automotive Industry	Europe & North America
Future of Vehicle Parking Management Systems in North America and Europe	Europe & North America
Strategic Outlook of Global Telematics and Infotainment Market in 2013	Global
Key Trends and Forecasts for the Chinese Automotive Navigation and Telematics Services Market	China
Key Trends and Forecasts of Navigation Systems and Telematics Services in Western and Eastern European Markets including Russia	Europe
Key Trends and Forecasts of Navigation Systems and Telematics Services in North and Latin American Markets	North And Latin America
Strategic Analysis of European and North American Automotive Human Machine Interface Market - Part 2 Display and Instrument Clusters	Europe & North America
Global OEM Benchmarking Study on Connected Telematics and Infotainment Offerings and Strategies	China, Europe & North America
Connectivity, App Stores and Cloud-based Delivery Platforms - Future of Connected Infotainment and Telematics Market	Europe & North America
Strategic Analysis of European and North American Automotive Human Machine Interface Market - Part 1 Steering Wheel Controls, Voice Interfaces and Multifunctional Switches	Europe & North America
Strategic Analysis of the Impact of Smartphones and Apps on the European and North American Infotainment Market	Europe & North America
Strategic Analysis of North American Embedded-Connected Hybrid Telematics Market	North America

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