

MeeGo IVI

In-Vehicle Infotainment for Connected Mobility

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Rudolf Streif
Director of Embedded Solutions
The Linux Foundation
rudolf.streif@linuxfoundation.org



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Introduction

- What is In-vehicle Infotainment?
- History
- Current IVI Systems
- Integration of Technology and Services
- Challenges

Technology

- IVI System Overview
- What does MeeGo need to provide for an IVI platform?

MeeGo IVI

- Working Group and Project Team
- Who is MeeGo IVI collaborating with?
- Community Participation
- MeeGo IVI Roadmap



Introduction

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Introduction - In-vehicle Infotainment

Infotainment

- ♦ Infotainment is "Information-based media content or programming that also includes entertainment content in an effort to enhance popularity with audiences and consumers." (Demers, David: Dictionary of Mass Communication and Media Research)
- ♦ Infotainment *noun*: (in television) the reporting of news and facts in an entertaining and humorous way rather than providing real information (Cambridge Online Dictionary, <http://dictionary.cambridge.org>)
- ♦ A television program with a mixture of news and entertainment features, such as interviews, commentaries, and reviews. Also called *docutainment*. (www.answers.com)
- ♦ Refers to all the information and entertainment services delivered to the home, which are essentially telephone, TV and Internet access. (encyclopedia2.thefreedictionary.com)
- ♦ A television program that presents information (as news) in a manner intended to be entertaining. (www.merriam-webster.com)

In-vehicle Infotainment (IVI)

- ♦ A combination of technologies, applications, services and content for, but not limited to, automobiles which satisfy a broad variety of consumer needs including entertainment, communication, navigation, safety, maintenance, and commerce.

Introduction - A Short History of IVI



First Analog Mobile Phone Call



8-Track Tape Player



First Navigation System Electro Gyroator



First Car GPS



First Commercial Car Radio (Galvin)



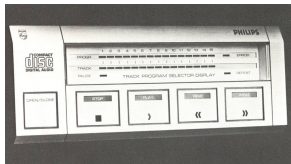
First Car Radio With Station Presets



First Fully Transistorized Car Radio



Analog Car Phone



Car CD Player Prototype



Terminal Mode



In-car Internet



First Car Radio



First FM Car Radio



In-car Turntable



Compact Cassette



Mobile Phone



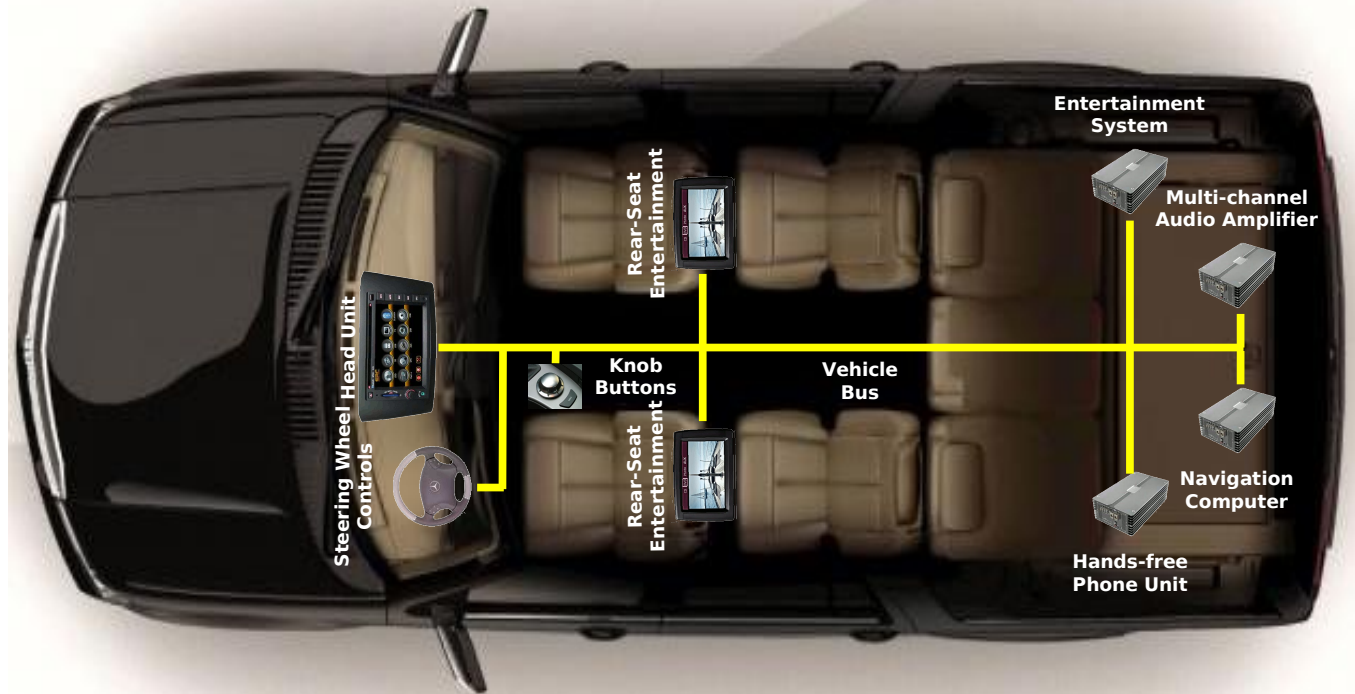
In-car Internet Radio



1922 1930 1946 1952 1953 1955 1963 1966 1970 1979 1981 1982 1984 1995 2008 2009 2010

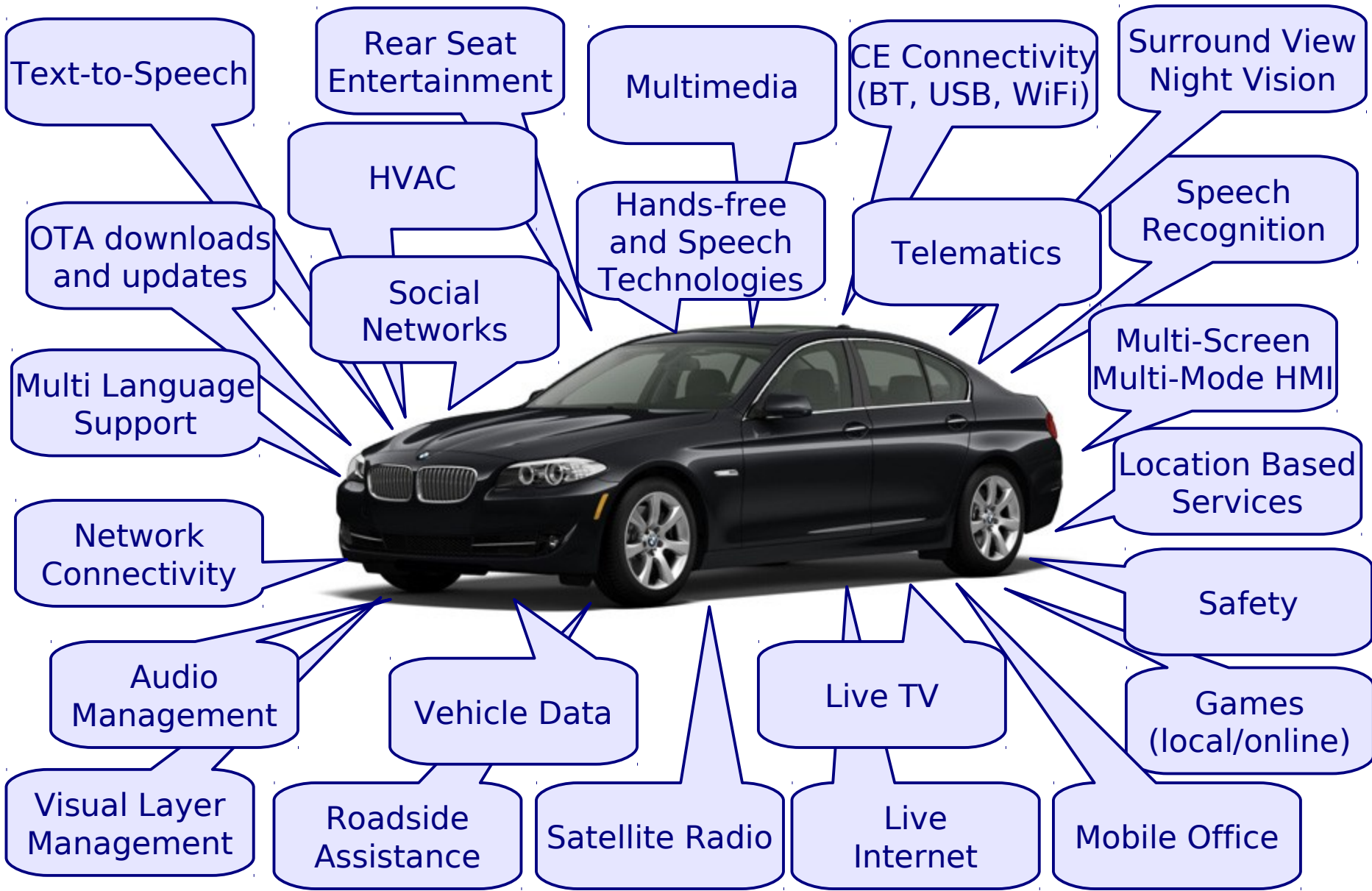
Sources: www.radiomuseum.org, www.caranddriver.com, various Internet sites

Introduction - Modularized and Distributed Architecture



- Sources and Sinks are not necessarily integrated within the same physical unit e.g. Navigation Computer and Head Unit can be separate.
- Multiple Sources can deliver data to and accept controls from a sink e.g. Navigation Computer and Climate Control deliver data and accept input from the Head Unit.
- A Source can deliver data and accept controls from multiple sources e.g. video from DVD player can be delivered to multiple Rear-Seat Entertainment units.
- Different Sinks can show and control different content.
- Similar to distributed home entertainment.

Introduction - Integrated Technologies and Services



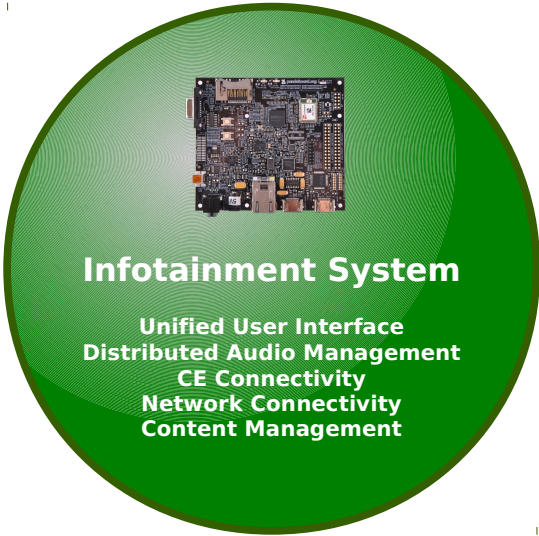
Choice of vehicle is personal only. It applies to any make.

Smartphones are eclipsing IVI Systems providing more functionality at a lower price.

- Smartphones offer navigation with down-loadable maps, location-based services and more.
- Smartphones provide multi-media services allowing users to consume stored and live content.
- Smartphones allow users to customize the user experience by setting wallpapers, arranging menus, adjusting visible and audible notifications and more.
- Smartphones provide a software platform that can be extended with 3rd party applications.
- Smartphones provide over-the-air software updates.
- Smartphones function as mobile offices providing access to e-mail, documents etc.
- Smartphones synchronize address books and personal databases with desktop computers and other devices.
- Smartphones offer entertainment with games etc.
- Smartphones integrate social networks.
- ...

IVI Systems need to leverage CE technologies.

However, a vehicle's life cycle is planned for 10 years or more.



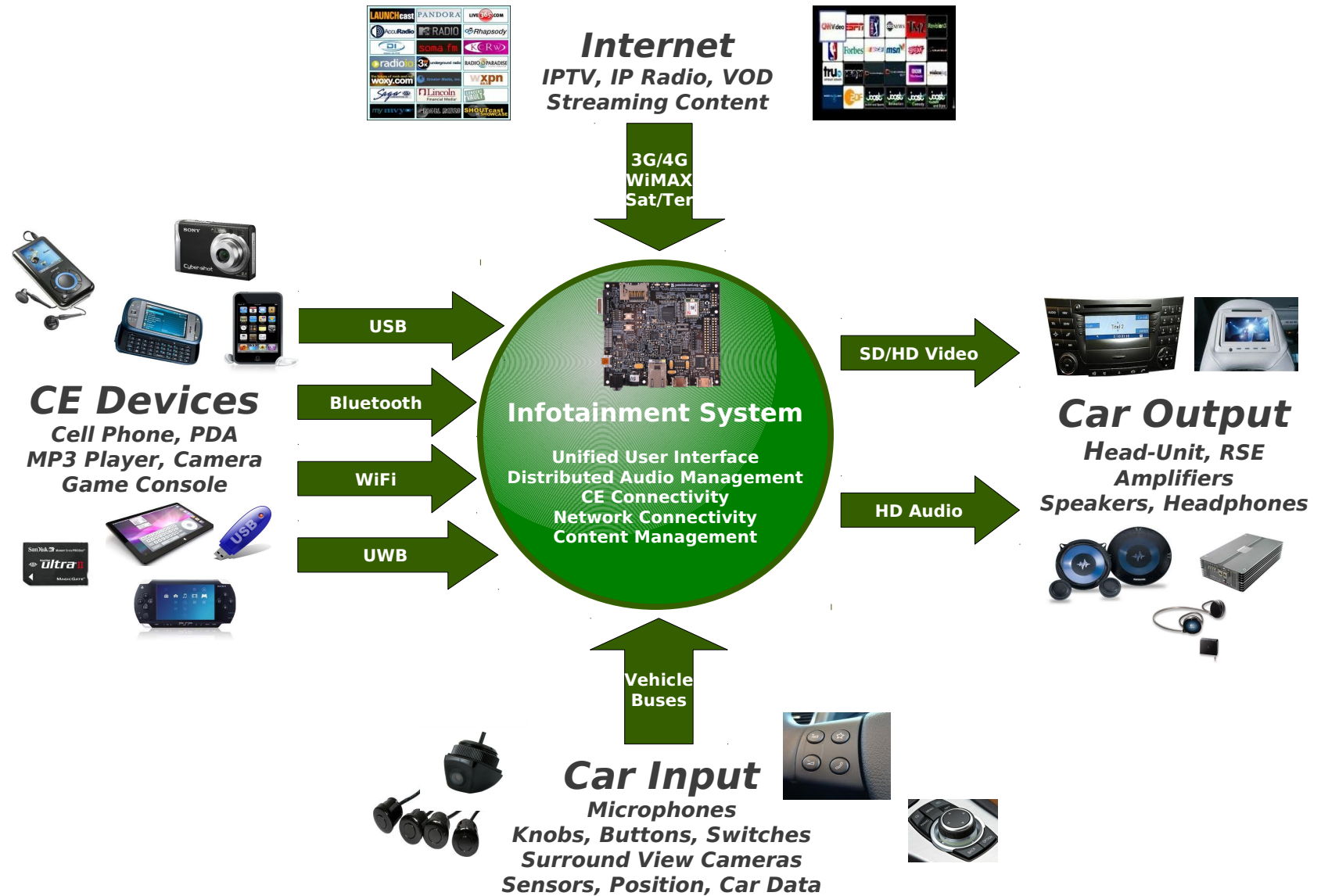
Infotainment System

**Unified User Interface
Distributed Audio Management
CE Connectivity
Network Connectivity
Content Management**

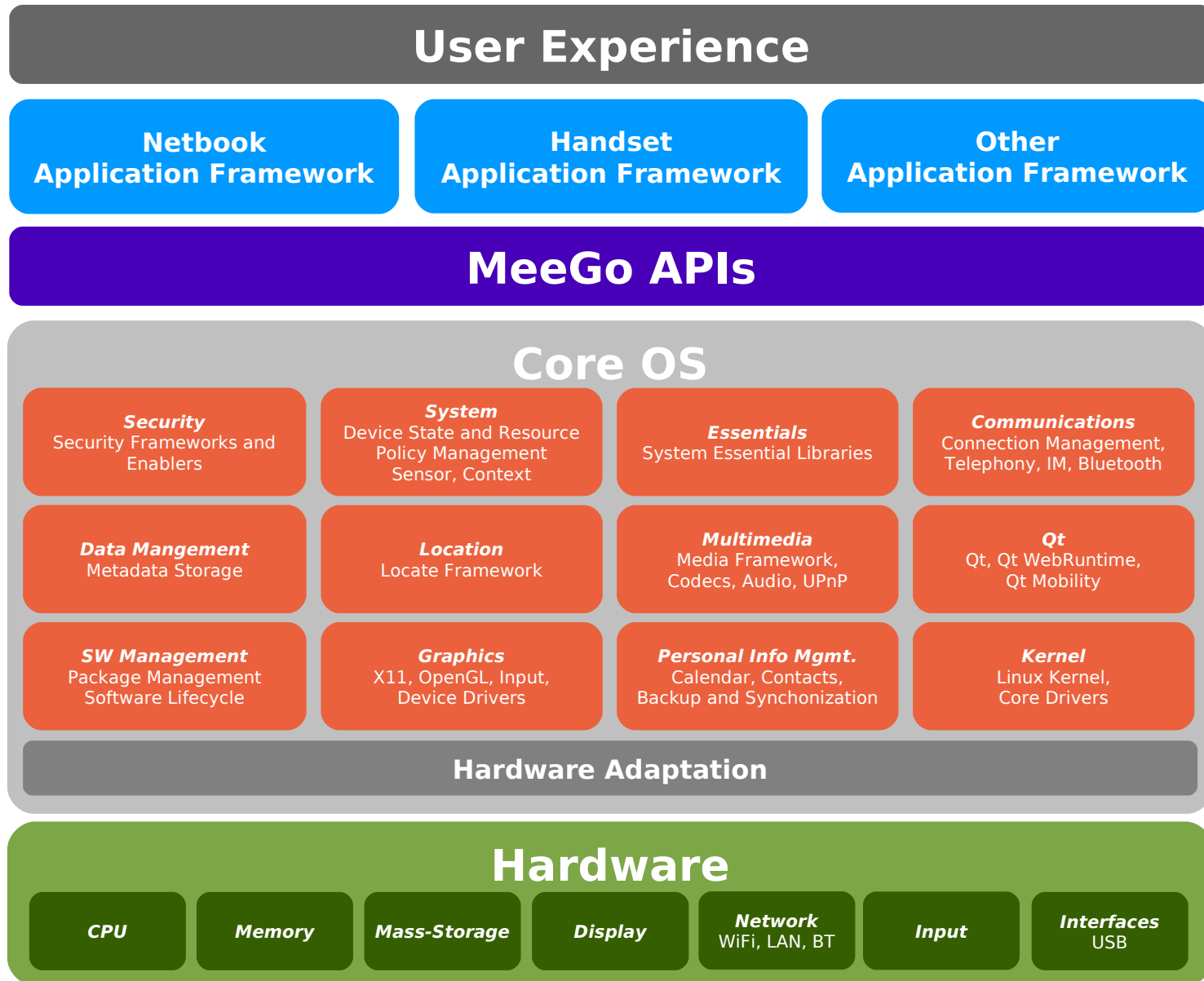
Technology

MeeGo

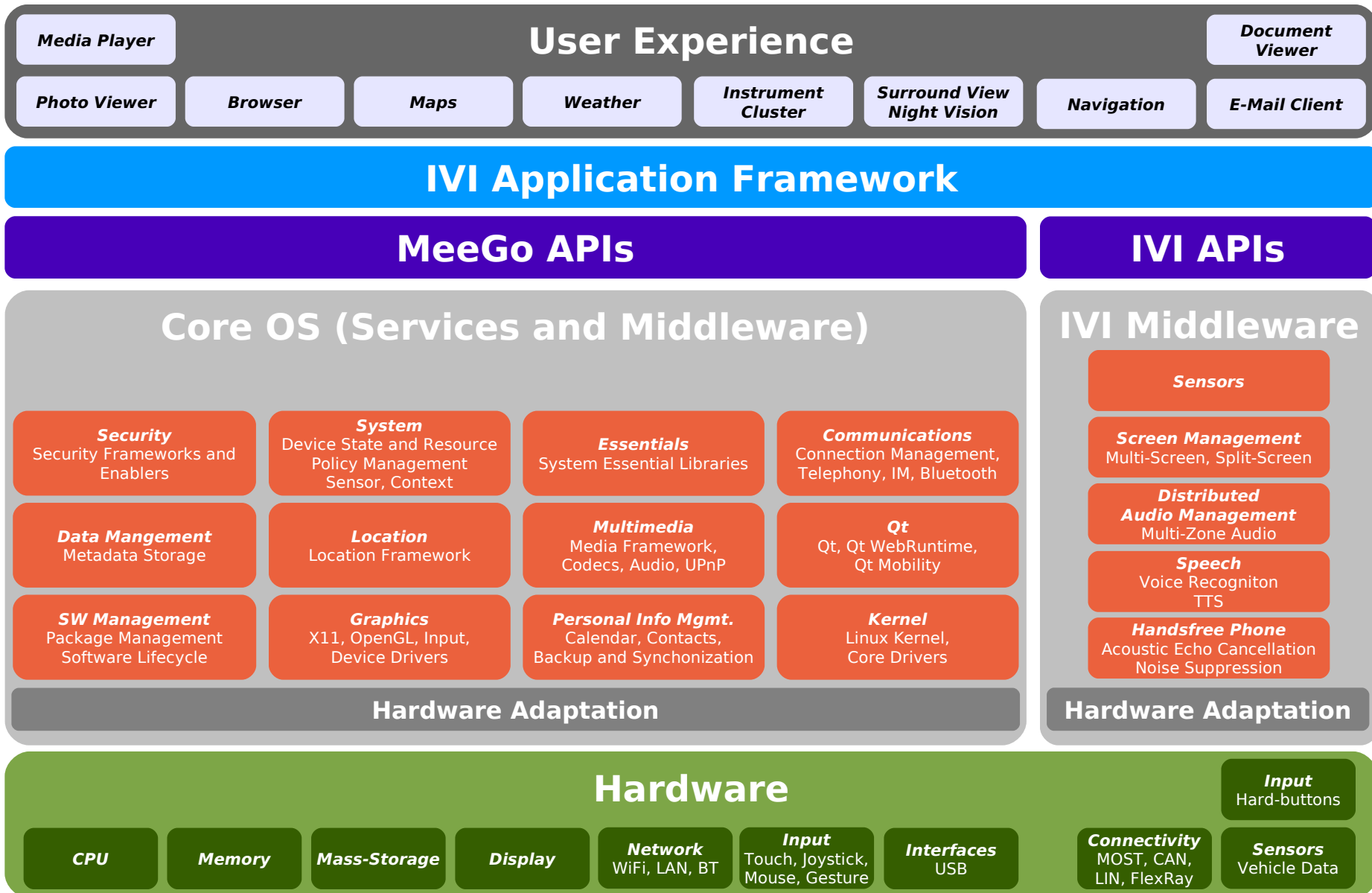
Technology - IVI System Overview



Technology - MeeGo HW/SW Stack



Technology - MeeGo IVI HW/SW Stack



Technology - What is needed in MeeGo for IVI?

MeeGo needs to add features and functionality to become a viable IVI solution.

Vehicle Buses

- Controller Area Network (CAN)
- Media Oriented Systems Transport (MOST)
- FlexRay
- Local Interconnect Network (LIN)

Human Machine Interface (HMI)

- Multi-zone Video
- Split Screen
- Layered HMI
- Video Policies (priorities)

Audio Management

- Multi-zone Audio
- Audio Routing and Ramping
- Audio Policies (priorities)

Hands-free Phone/Control

- Voice Recognition
- Text-to-Speech
- Acoustic Echo Cancellation
- Noise Suppression

User Input

- Button, Knobs, Joysticks, Touch, Gestures

Software Updates

- Over-the-Air Updates with Binary Delta
- Secure, failsafe, surviving power cycles

Fast Boot

- Kernel Boot < 250ms
- Device Activation < 50ms from Ignition
- Early Audio < 2s; Early Video < 2s
- Secure boot loader

Network Connectivity

CE Device Connectivity

- iPod/iPad, iPhone, Zune, MP3 Players, USB Drives, Android, Blackberry, MeeGo, etc.

IVI Application Framework

- Standardized access to vehicle data e.g. fuel level, temperature, rain sensor, etc.
- Control API

Technology - Vehicle Buses

Controller Area Network (CAN)

- Multi-master broadcast serial bus; up to 1 MBit/s
- Initiated 1983 by Bosch; Released 1986 by SAE
- Used to connect ECUs and for OBD
- Specification: ISO 11898-1..5, ISO 11991-1

Media Oriented Systems Transport (MOST)

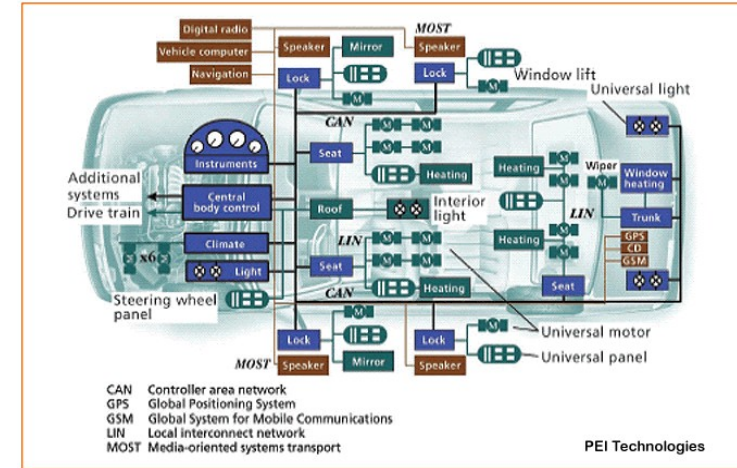
- Multimedia and infotainment network in vehicles
- Synchronous network; packets carry streaming, packet and control data
- 7 Layer OSI; up to 150 Mbit/s (3rd generation)
- www.mostcorporation.com

FlexRay

- High-reliability serial bus; up to 20 Mbit/s
- Time-/event-triggered behavior; redundancy; fault-tolerance; deterministic
- www.flexray.com

Local Interconnect Network (LIN)

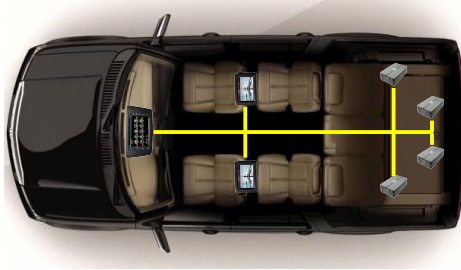
- Low cost sensor/actuator network; typically sub network of CAN
- Master/slave with 1 master and up to 16 slaves; up to 19.2 kBit/s
- www.lin-subbus.de



Technology - IVI HMI

Multi-zone Video

- Video from the same source distributed to multiple screens.



Layered HMI

- Video from different sources overlaid on a screen.



Split Screen

- Video from different sources displayed side-by-side.
- Video from different sources visible from different angles.



Policies

- Policies define what content gets displayed in what context on the screen.
- Minimize distraction for the driver.
- Bring critical information to the immediate attention of the driver.



Technology - IVI Audio Management

Multi-zone Audio

- For example 2 front and 2 rear zones plus one master zone.

Audio Routing

- Route audio to the correct zone dependent on the media source selected for that zone.
- Route audio for driver information systems e.g. parking aid etc. to the right zones.

Audio Ramping

- Ramp down one audio source in favor of a second for a particular zone e.g. lower music in the driver's zone for incoming phone call or navigation turn-by-turn instructions.

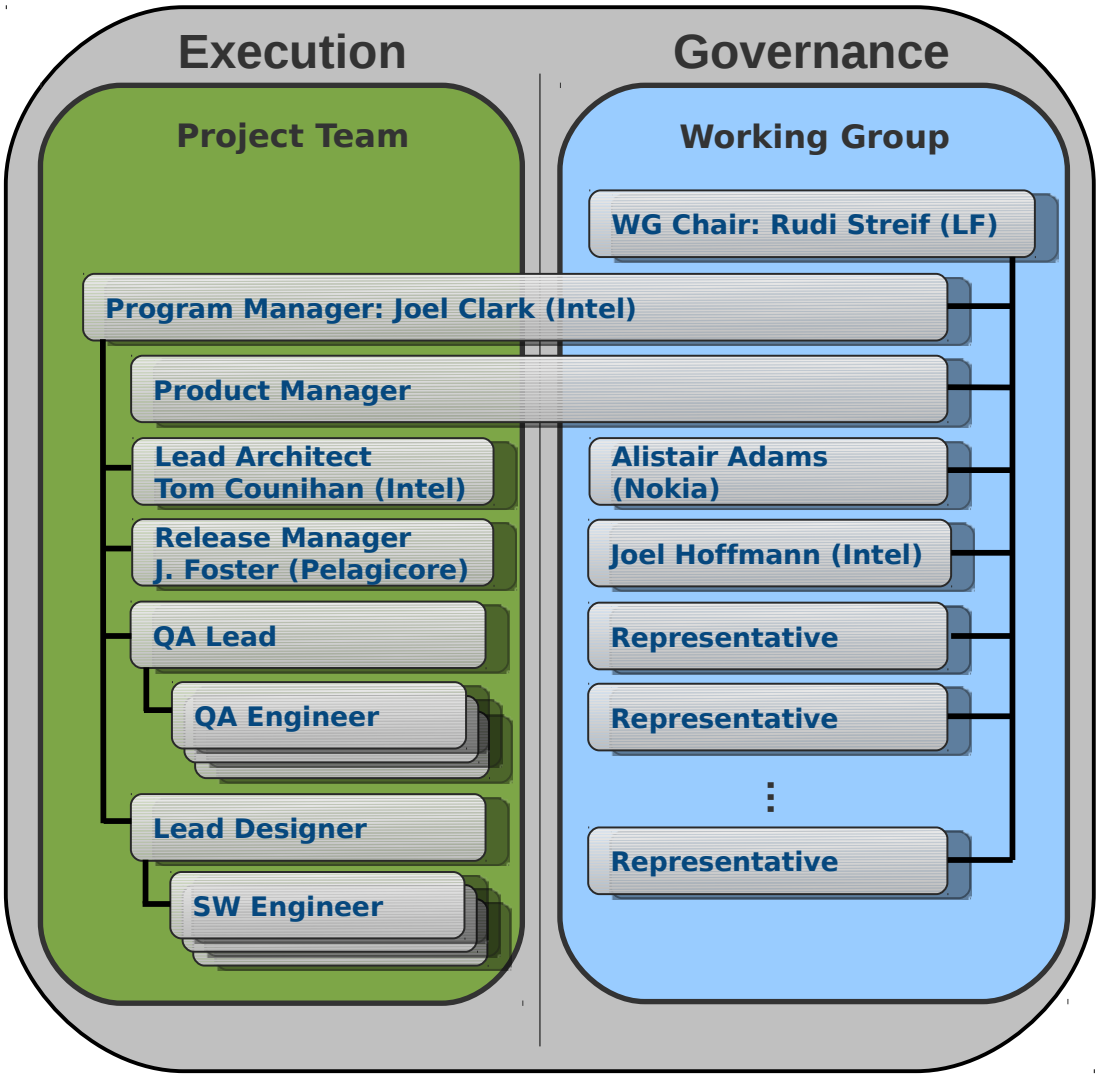




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MeeGo IVI - Working Group and Project Team Cooperation



Working Group

- Seeks alignment with companies and organizations in the automotive industry.
- Collects, organizes and prioritizes market requirements.
- Defines the roadmap.
- Identifies gaps and develops requirements documents that detail the need for capabilities.
- Does *not* manage the project.

Project Team

- Executes the roadmap and manages the project..
- Develops technical solutions.
- Implements solutions and delivers the product.

MeeGo IVI - Who is MeeGo IVI collaborating with?

Automotive Industry Companies and Organizations

- Consortia such as GENIVI
- Car Makers (OEM)
- Automotive Suppliers

Hardware and Software Companies

- Semiconductor Companies
- Operating System Vendors
- Independent Software Vendors / Integrators

The Community

- Individual Software Developers
- Community Initiatives such as mp3car.com

Familiarize yourself with the MeeGo project

- Visit <http://www.meego.com>, <http://www.meego.com/about>, <http://meego.com/devices/in-vehicle>, <http://wiki.meego.com/In-vehicle> provides a lot of useful information on the project, its governance, contribution guidelines, etc.

Identify and assign

- A representative from your organization that will participate in the WG.
- Engineering resources from your organization to the Project Team of the MeeGo vertical that is of interest to your organization.

Contact the IVI WG Chair

- to help you integrate with the WG and PT
- to provide you with information about regular meetings, ongoing activities, etc.

MeeGo IVI - Roadmap Features 1

Terminal Mode (8704)

- MeeGo 1.2 shall provide Terminal Mode client capabilities to enable a connected smartphone to replicate its display to the IVI, to receive events from the IVI controlling application user experience, to allow for remote launch and termination of smartphone applications, and to route audio stream from and to the IVI.

Multi Screen Support (7668)

- For IVI, multiscreen support is required to facilitate both Driver and front/rear seat passengers. Each screen 'zone' needs to be have seperate control (touch).

Tethered Device Indexing (7669)

- In an IVI context, we expect a multitude of potential tethering scenarios. In terms of context presentation, we need to present information as fast as possible. This feature focuses on tethered devices - the nuance here is these devices need to be recognized quickly and can be removed without warning.

Multi-Zone Audio (7670)

- Zones represent physical areas in a vehicle occupied by passengers and the driver. A simple zone set would represent 2 front zones and 2 rear zones, plus one master zone. The zone concept is presented to facilitate tailored interaction with IVI depending on the zone.

MeeGo IVI - Roadmap Features 2

Distributed Audio Management (7671)

- The system needs to be able to handle policy control decision in a distributed scenario – i.e external amplifier servicing multiple channels and needing to ramp down one in preference to a second.

Network Gateway (7672)

- In the scenario where a phone is tethered to the system providing DUN support to the head unit - this feature proposes to extend the service to passengers. The system shall support an ad-hoc network for secondary devices to route IP traffic through the supporting DUN connected handset.

Phonebook Synchronization with CE Device (7674)

- Enhance Buteo with server side synchronization capability. This is needed for a tethered BT device to sync the phonebook to the system.

Media Synchronization with Home Device (7675)

- IVI system enters home WiFi spot. Facilitate the synchronization of media files from home PC to Vehicle.

Power Management (7680)

- For EV cars, running out of power, this feature presents a framework for terminating non-critical applications to facilitate extending vehicle range.

MeeGo IVI - Roadmap Features 3

Multi-User Support (7677)

- Whereas typically a handset/netbook/slate is associated with 1 user, from an IVI perspective we need to cater for multiple users and partition their personal data. A vehicle can have a number of different drivers which persist personal PIM/Settings data. A vehicle will have a number of rear-seat passengers who will wish to persist personal PIM/Settings data. Multiple users may interact with the system simultaneously.

Fastboot (7678)

- Kernel boot in less than 250ms. Instant device activation in less than 50ms. Early video and audio in less than 2s.

Persistence Management (7679)

- From an IVI perspective, we need to consider the requirement that flash usage will have a longer life span expectancy than for example a typical handset.

System Health Monitor (7681)

- Essentially monitoring of stalled applications and processes, for example, bouncing an infrastructure component and ensuring the associated UI process is considered.

Inertia-based Application Control (7682)

- From a driver safety perspective, certain application should not be allowed to function when a car is in motion. This feature is to provide a framework to detect when such a state is reached and control disabling applications that are deemed not appropriate for operation when in motion..

Speech Recognition

- Build in support to IVI UX to have a fully controlled speech UX, driving application selection and subsequently application behavior.



IVI is not just for cars!

**Thank You!
Questions?**

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Backup Slides

MeeGo