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OSGi Applications for the Next Generation of Automotive and Vehicle Infrastructure Systems



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Overview

- Emerging Trends in Automotive Infotainment
- Key Issues for the Car Industry
- OSGi Solutions
- Barriers and Resolutions
- Conclusions



Cars, CE and the Road...A Collision Course

Road Infrastructure Trends

- Infrastructure based safety systems
- Roadside communications
- US Vehicle Infrastructure Integration Program (VII)
- EU GST program

Key Issues:

- Device Integration
- Interoperability
- Upgradability/Features
- Regionalization
- Longevity/Lifecycle

The Next
5 Years

Car System Trends

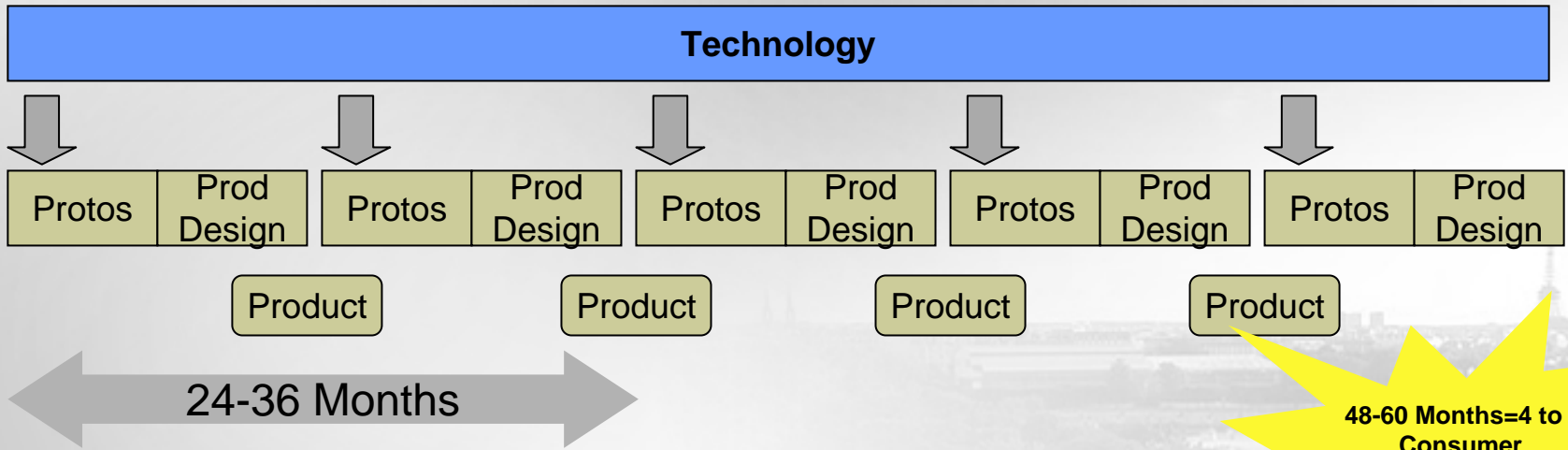
- Graphical User Interfaces
- High capability Computing
- Wireless Communications

Portable CE Trends

- More functions per device
- High data rate short range wireless connectivity
- Geometric increase in data storage capacity



CE and Automotive Life Cycles

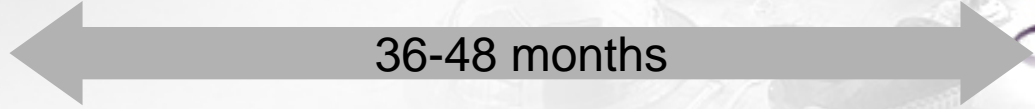
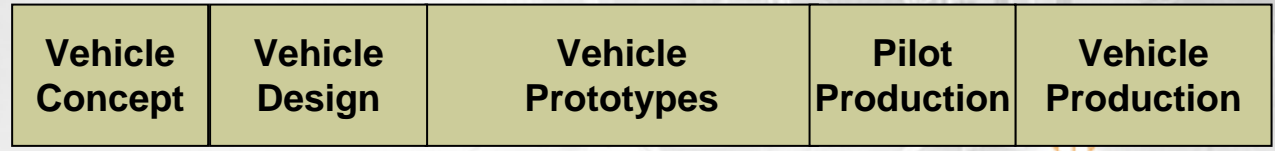


48-60 Months=4 to 5 Consumer Product Cycles!!



Electronic Components

Vehicle



Car-CE Device Integration

- Seamless CE Device integration in the car is critical...But...
 - CE technology changes many times over car life
 - Limited uniformity among devices makes integration a consumer nightmare
- Very risky to install interfaces for one type/make of device
 - Obsolete before the car launches!
- Very difficult to make single interface that supports many device types/makes
 - e.g. Bluetooth interoperability issues are causing many car makers to question approach (more consumer problems than benefits)



Automotive Features and Upgrades

- Optional features provide profitable upgrade market for makers and dealers...But...
 - Factory provisioning is risky, and dealers often end up discounting features to sell car (US issue)
 - Complex systems usually have problems, and fixing them is difficult after car is sold
- Car industry faces difficult choices
 - Forgo technology to avoid risk
 - Risk consumer dissatisfaction because technology features are out of date, don't work properly, etc

Infrastructure Integration

- Integration of vehicle with roadside infrastructure is next important wave
 - US Vehicle Infrastructure Integration Program
 - EC GST Program
 - Both programs promise to enable new level of safety and roadway management systems
- But, Implementation is challenging
 - Difficult to require software uniformity across large independent regions with different problems to solve
 - Early systems will be obsolete quickly
 - Loss of safety benefits
 - Loss of consumer confidence, satisfaction



OSGi Provides Elegant Solutions for the Next Generation of Car Systems

CE Device Integration

Provide core feature bundles with car
- Hands free phone, music player, etc)
Provision custom device interfaces after sale
-Adapt user's CE devices to Car systems
Fixes Interoperability issues AND creates new dealer market for software

Infrastructure Integration

Provide core application bundles with car
-Safety applications
-Mobility applications (e.g. probe data)

Provision new functionality from roadside
-Updates to existing software
-New features and interfaces
-Software to adapt car to regional apps

Feature Implementation

Provision software car features at sale
-Huge profit margin, low risk
Provide consumers with new features after sale
-Opens new market for OEMs and dealers
-May be able to sell and install online for even higher profit margins

Lifecycle Management

Provide upgrades and bug fixes over life of car
- OSGi service paradigm provides much more controllable software architecture
- Motivates increased dealer service over full life of car
-Allows car to keep pace with technology

Barriers and Next Steps

- In the car industry, OSGi is misunderstood by many, and feared by some
 - Assumes more advanced software environments than many car makers understand - comes across as geek fantasy
 - Terrible fear of allowing third party software into car
- Need to develop simple easily understood examples of benefits
 - Best opportunities are probably VII and GST
 - Other opportunity might be “software defined” universal Bluetooth hands free system where phone specific interfaces are provided into general hands free system
- Need to develop and implement ways to certify and validate services
 - Probably on a car maker by car maker basis



Conclusions

- OSGi promises to revolutionize the car
 - General purpose computing and user interface environment
 - Software based features
 - Improved match between car and fast moving CE world
 - Ability to dynamically adapt car to varied regional infrastructure systems

