Bosch multi domain strategy for IVI-systems based on GENIVI
Genivi All Member Meeting, April 17-19, 2018, Munich
Andree Zahir, SVP at Robert Bosch Car Multimedia GmbH
Agenda

1. Company overview Bosch Car Multimedia GmbH

2. Business & technical challenges

3. Solution strategy based on open technology
RB Multi Domain Strategy
Car Multimedia – Overview

Total Bosch sales (2017): € 78 billion
Total Bosch Mobility Solutions Sales (2017): € 48 billion
Total Car Multimedia sales in 2017: € 2.6 billion

400,500 Bosch associates worldwide, thereof >7,000 CM

Multiple products & services in following business units:

- **Connected Information Solutions 1**
  connected navigation & infotainment systems, information displays, connectivity units, coach entertainment

- **Connected Information Solutions 2**
  analog and digital instrument clusters, head-up displays

- Manufacturing Services
  contract manufacturing

- Bosch Softec
  embedded and cloud based SW solutions for connected services

- ADIT
  joint venture with Denso for the development of IVI (SW) platform

Customers include all major global automotive manufacturers
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Car Multimedia – Linux/GENIVI relation

- Active charter member of Genivi Alliance, board member since 2012
- Genivi systems in market since 2012, in total more than 20 million units delivered
- Well established SW partner network, part of the GENIVI community
- Integration of many 3rd Party components in to our SW-Stack for different customer projects
- Working in global, large scale IVI projects:
  Up to one complex project ensemble covering 6 vehicle brands with more than 400 SOPs, approx. 500 variants and levels
- Meanwhile 100% of Bosch Head Units and Connectivity Units based on Linux

Linux has become the de-facto standard in the IVI market, differentiation rather in SW-layers above
### RB Multi Domain Strategy

**IVI related OSS – excerpt of Bosch driven contributions**

<table>
<thead>
<tr>
<th>Genivi</th>
<th>Apertis</th>
<th>IoT Backend solutions</th>
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</table>
| - Wayland-IVI Extension  
  >90% of contributions by ADIT in 2017  
- Diagnostic Log and Trace  
  ADIT is maintainer of DLT  
- Audio Manager  
  >60,000 changes by ADIT in 2017  
- Audio Manager Plugins  
  100% of contributions by ADIT in 2017 |
| - Add-on Software  
  a set of services to orchestrate execution and interaction of add-on software processes  
- Sensor & Actuator access  
  a framework for more than CAN data  
- Inter-Domain Communication  
  gateway to deeper embedded area  
- Integrated collaborative B&I infrastructure  
  streamlined deployment of recurring updates |
| - Hawkbit  
  a back-end framework for rolling out software updates to edge devices  
- Leshan  
  an OMA LightWeight M2M Device Management solution  
- Ditto  
  turn physical devices into web services and orchestrate them |
| and more to  
  - Kernel.org  
  - Apertis.org |
| and more to  
  - Gnome  
  - Debian  
  - Upstream OSS Projects |
| and more to Eclipse Foundation |
GoKid Announcement

- **mySPIN** is Bosch’s smartphone integration platform to bring app content and services in a safe and secure way to the vehicles screen.
- As of today, >50 app partners around the globe have integrated the mySPIN.SDK (triggers “Car Mode” and allows whitelisting).
- **GoKid** is a comprehensive carpool solution app for schools, teams and active families, helping parents carpool with families they know and trust – and the latest partner in the mySPIN App Network!

Example how GENIVI technology enables new technologies and new biz models.
Business & technical challenges
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General trends and challenges

- Complexity growths
  - Functional scope
  - Internally distributed composed functions
  - Externally connected functions & protocols
  - Update rate and granularity

- Capabilities need to rise
  - Technical resources & tools
  - Organizational structure & processes
  - Collaboration Models & ecosystems
  - Business Models

- Aspiring system structure driving quality attributes
  - Security (maintained over lifetime)
    - holistic, layered, secure by design & least privilege principle
  - Flexibility (within consistent structure)
    - deployment across product-lines and integration-level
    - scalability and customization of technologies
  - Manageability
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Capabilities creates opportunities

MOORE’S LAW
Computing Power
New technologies continue to increase computing power

NIELSEN’S LAW
Network
Tactile internet, latency, reliability, availability, security

CONNECTED WORLD
Estimated 20 bn. connected devices until 2020

CUSTOMER
Customer
New services and business models

Business models and configurations evolve with moving state-of-the-art
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Clear trend towards major upheaval of EE architectures

Centralization (into computation nodes) & system boundary expansion (into the cloud)
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Instrumentation and Infotainment systems are merging

- Support of **holistic vehicle HMI concept**
  - Displaying everything that needs to be displayed
  - Granting function safety for critical elements in primary view-field
  - Multimodality including haptic feedback for more safety and comfort

- Solution for **economical vehicle lines**
  - Scalable technology portfolio with flexibility for specialization

- Integration framework for **securely connected services**
  - Down to Connectivity Units acting as gateway to critical networks
  - Also for deeply embedded functions, like automated driving use cases

Infotainment products constitute the interface to the user and to external services
Changing business / collaboration models

- Different business models for infotainment system development get applied, going beyond the classical model (Tier1 develops mainly the complete system)

- Advantages of these new and often more complex business models
  - Increasing technical complexity of the systems is addressed by system de-composition
  - OEMs can assume responsibility on system or sub-system level, e.g. from HMI to system integration
  - OEMs are enabled to define and implement their software roadmaps independent of Tier1 suppliers

- Conclusions
  - The classical “OEM/Tier1 only” business model will be more and more replaced by other models with different responsibilities and more stakeholders
  - Successfully mastering these new business models will be a key to success for OEMs and Tier1s in future

Engaging in development communities like GENIVI supports to master complex project setups
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Security & Privacy as major architectural driver

Affect
- Personal injury and death
- Damage to other property
- Compliance to legal regulation
- Consumer confidence

Privacy
- Enforcement of well-defined privacy policies
- Transparent and user friendly

Security
- Measures for all IoT elements, i.e. assets, network, backend
- Application- and component-specific defense-in-depth strategy
- State-of-the-art technology

Security is a key success factor for connected services and a system architecture driving aspect
Bosch Car Multimedia strategy based on GENIVI and OSS technology
General platform building blocks

- Platform spans across all areas: in-vehicle but as also cloud and personal devices
  - Features are handled holistically and broken down into composed sub-functions being deployed to the respective environment
  - In-vehicle platform is based on several domains and used across all product-lines
  - Products and segments are derived from a consistent basis
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Car Multimedia domain architecture

Security Paradigms
- Strict legal compliance (state-of-the-art measures, data protection)
- Strict isolation of critical components / infrastructure
- Defense-in-depth approach
- Consequent application of least-privilege-principle
- Up-to-date security by fast fixes (i.e. days) in CE domain, updates in automotive domain acc. to automotive procedures

Car multimedia’s implementation of the GENIVI domain interaction strategy
Our view: No one 'alone’ can master the challenge
Proprietary platforms for software integration nodes lose relevance

- Follow upstream-first principle
  - IVI-SW Development must be fully aligned with OSS components, frameworks and toolchains
  - Enablement of an ECO system

- The infrastructure of IVI-Software (Architecture, Toolchain, Processes) should not contain any proprietary technologies
  - Proprietary cross cutting processes, methods and tools should be harmonized
    - The processes and the tools for software build & integration shall be flexibly adaptable to the OEM needs
    - Related proprietary tooling's must be transferred into mainstream OSS solution
  - Proprietary frameworks and central functions must be replaced completely
    - Own approaches must be contributed to corresponding OSS projects

Go upstream for collaboration and join the GENIVI and OSS contributor community
Key Success factors to master the challenge

- Align solution (Interfaces, Protocols, Tools) with adjacent environments (µP-, OS- und HV-Combinations)
  - Genivi, Adaptive Autosar, Android, W3C
  - Deployment variants, inter-domain connection, resource and device sharing

- Refined with any desired software solution and related 3rd party SW-partner
  - From the pool of partners of a particular OEM and integrated into their products
  - Across the complete value chain
    (commercial technology supplier, OSS consultancy service provider, OSS software distributor, contract developer, etc)

- Share commonality across OEM specific products
  - Integrated into diverse environments and configurations at different OEMs
  - and thus via the OEM also into competitor products

GENIVI is the platform to drive this mission
Q&A

Thank you! Any questions?