Why the Automotive Industry Needs Open Innovation

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Ken-ichi Murata:

• is a project general manager in Toyota.
• was a computer scientist at Sony Computer Science Labs. Inc.
• was a software platform architect at Sony Corp. for CE devices (STB, DTV, Robot, …).
• was the senior architect and the project lead of the Cell Operating System while engaging in the Playstation 3 project.
• joined Toyota in 2008, and since 2010, acting as the chief engineer of the next generation in-vehicle Multi-media / Telematics Units.
at ALS 2011 (at Yokohama Japan), I talked …

A vehicle is becoming a Mobile Information Device

note: you can find the video at YouTube

http://www.youtube.com/watch?v=BMIVyY2EpLA (or keyword: “Toyota Smart Center gazoo”)
at ALS 2011 (at Yokohama Japan), I talked …

■ Challenges:

1. introducing leading-edge Information Technologies (ex.)
   • context aware speech recognition
   • modeling and analyzing user’s behavior
   • huge data computation at cloud
   • ...

2. automotive specific requirements to ICT (ex.)
   • more safe manner (driver distraction)
   • reliability
   • long term support
Barriers

1. Lack of expertise
   • Necessary to use ICT, but we don’t have much experience…

2. Complex distributed systems
   • Systems are not closed within a vehicle, need a cloud technology

3. Rapid evolution
   • ICT is rapidly evolving, hard to catch up

4. Huge software
   • IVI source code > 10M LOC

We cannot develop everything by ourselves any more…
at ALS 2011 (at Yokohama Japan), I talked about…

So, I said:

A common Open Platform is required in the industry!

Need help from ICT developers!

But, …

Why?
How?
Why Open Platform?

We need someone’s help (2 options)

1. ask ICT Giants
   - Well support
   - Slow / narrow innovation
   - Higher cost

2. ask ICT developers on a Common Open platform
   - Fast / wide innovation
   - Can widely share the cost

But, Just using a common open platform is NOT enough for getting an excellent open innovation

…… Maybe OK
How an Open Platform has been used in other industry?

Telecom industry

- Increase software usability
- Latest evolved technologies as quick as possible
- Reduce cost of maintaining the platform software
- Put telecom requirements
- Portability: (avoid vendor lock)

Open innovation in the OS
How an Open Platform has been used in other industry?

CE (Consumer Electronics) industry

- Reduce cost of application software development
- Rapid innovation on middleware software
- Sharing development cost of platform software
- CE requirements: (fast boot, real-time robustness, …)
- Use latest hardware for performance

Open innovation both in the OS and the middleware
How an Open Platform has been used in other industry?

Mobile Phone industry

- Reduce cost of application software development
- Rapid innovation on applications
- Sharing development cost of huge platform software
- Smart phone requirements

Open innovation in the OS, middleware and application

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How about for the automotive industry?

Automotive industry (IVI)

Automotive Requirements:
- Fast Boot
- Reliability for power supply fluctuation
- Easy to make/test variety of system configuration
- Multi-modal application support by kernel

- Reduce cost of application software development
- Rapid innovation on applications
- Sharing development cost of huge platform software

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Approaches to make it really happen:

To achieve the common platform efficiently:

- Discuss about the requirements only
- Discuss about the requirements, and then create common reference source code
  … Better
Approaches to make it really happen:

To create the common reference code efficiently:

- Write code for each unique device

- Write code on a common reference hardware (ex. PC/AT architecture in PC)
  ... Better
Merits for each sector:

- **Car OEMs**
  - can incorporate latest technologies easily into their products
  - can create ecosystem for distributed applications (for IVI and Smartphone integration)
  - can share the cost of developing the platform

- **IVI suppliers**
  - can incorporate latest technologies easily into their systems
  - can create ecosystem of developing software
  - can develop product software quickly

- **ISVs**
  - can promote their technologies and solutions easily into customer’s products

- **Contents providers**
  - can provide their contents and services easily and consistently into variety of customer’s products
Next steps:

• Join “Automotive Grade Linux WG”

• Develop “Automotive Grade Linux”
  • As a common reference implementation of the platform

Toyota is ready for this movement