AGL Requirements Specification V2.0

AGL All-Member Meeting @ DRESDEN
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TOYOTA MOTOR CORPORATION
Who is Oiwa?

- Software engineer, expert in in-vehicle infotainment.
- Have been developing software for in-vehicle infotainment system such as apps, services since 1994.
- In charge of HMI-Framework development.
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Background
Background

Merits of “Code First“ approach

• Unification by source code
  Elimination of producing functional bugs caused by different understanding of requirements on documents.

• Rapid development of function

• Collateral of behavior identity
Issues
Issue #1

Increase of the gap with the source code

- Daily evolution of source code
- More than 3 years since it was released

Derived implementation are different

Requirements of “Homescreen”
- Layout
- System UI Parts
- Application Management
- Application Switch

Implementation to other components

Code of “Homescreen”
- System UI Parts
- Application Switch

Code of “Window Manager”
- Layout

Code of “AppFramework”
- Application Management

- It is hard to judge what is actually implemented, because requirements do not cover components architecture.
The granularity of the requirements described in the specification and the granularity of implementations are different.

Requirements for “Navigation Service”
- Navigation Engine

Code of “Navigation Service”
- Map-view
- Route
- Guidance
- Location input
- Map-matched position

Undefined requirements are implemented

Requirements for “Speech Service”
- To record and interpret voice commands
- To convert text to synthesized speech

Code of “Speech Service” (assumed)
- Speech recognition
- Text to Speech
- Noise reduction (future)
- Echo cancellation (future)
- To set up a call
Issue #2

- There is no implementation criteria.
  - Unclear scope or importance of implementation
  - Currently coded by developer’s own understanding & intention

- Implementation may not enough for production

Requirements for “Sound Manager”
- Routing Sound Streams
- Mixing Level Control
- Sound Effect
- Reduced Dependency of Hardware

The lack of implementation for “Mixing Level Control”

Sounds are overlapped and outputted

- For application development of real products, AGL UCB implementation is not yet enough.
Issue #2 - Detailed examples

“Sound Manager” (In the above example)
Lack of implementation of
“Mixing Level Control” feature
⇒ Sound outputs are overlapped

“Application Manager”
Lack of implementation of
“Get the state of an app” feature
⇒ difficult to change apps in timely manner

“Network Service”
Need to be conscious of each communication device
⇒ difficult to send and receive messages at the requested timing

“Input Manager”
Not implemented yet
⇒ Judgment from the operation devices becoming complicated

“Web Runtime”
Not separated from Applications
⇒ Consume a lot of resource in each application
Proposal for activity
Countermeasure

① Rewrite requirements specification
② Define criteria in the specification

Why countermeasure①?  
・It is hard to judge what is implemented.  
⇒ It is necessary to match what is described in the specification and what is implemented in the code.

Why countermeasure②?  
・For application development of real products, AGL UCB implementation is not yet enough.  
⇒ It is necessary to have a clear criteria of implementation which development of application can rely on.
Proposal #1 Rewrite specification

Content quality improvement
1. Collection of functional requirements from OEM
2. Feedback from developers
3. Linkage with the source code and the test code

Readability
4. Unification of the wording & expressions

Maintainability
5. Maintenance periodically
6. Release periodically

OEM Functional requirements from real production

AGL Requirements Specification v2.0

Each Expert Group And Developer
- Functional requirements
- Linkage information

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## Content quality improvement

- **Improvement point of description based on the collected Use cases**

<table>
<thead>
<tr>
<th>Use cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>・Understandability</td>
</tr>
<tr>
<td>Visualize for easy understanding</td>
</tr>
</tbody>
</table>

## Requirements

- **Functionally**
  - Review functional requirements again by OEMs and developers

- **Efficiency**
  - Performance requirements in terms of time constraints and resource consumptions

- **Adaptability**
  - Requirements for hardware dependencies

## Linkage information

- **Operability**
  - Information that makes it easy to grasp the implementation and test
Readability

➢ Improvement for unification of wording & expression

Example

Category

Use cases

Requirements

Requirement (ID/Title/Description)

... ...

Requirement (ID/Title/Description)

Linkage informations
Maintainability

➤ Improvement for the maintenance and release periodically

**EG Name**

“Requirements Specification Expert Group” (RS-EG)

**Charter(proposal)**

- The Expert Group is responsible for defining and maintaining requirements as specifications targeted for implementation in the AGL UCB.

- The contents of the requirements specifications should include:
  1. Guidelines for deciding design policy for developers
  2. Priorities and criteria of developing AGL UCB which OEMs can judge whether their in-vehicle software meet the specifications or not.

**Expected Members**

It is expected that the team consists of AGL OEM members at least.
Proposal #2 Definition of Criteria

• The order of the implementation for each requirement

A view of the order of the implementation (Example)
• for components
  • Benefits
  • System assumed (e.g. single ECU, multiple ECUs)
  • Target board (e.g. reference hardware model)
  • Target grade of vehicle
  • Type of system in a vehicle
    (e.g. Infotainment, Instrument Cluster, Telematics/Connectivity, etc.)
• for requirements within a component
  • Importance for in-vehicle
  • Difficulty
  • Frequency of usage
  etc.
Proposal #2 Definition of Criteria

- the priority of implementation of components
  - the case of application development (Example)

**Priority 1 : Components related to HMI**

<table>
<thead>
<tr>
<th>Native App Framework</th>
<th>Application Manager</th>
<th>Sound Manager</th>
<th>Policy Manager</th>
<th>Web API</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native App Runtime</td>
<td>Window Manager</td>
<td>Input Manager</td>
<td>Speech Services</td>
<td>Web Runtime</td>
</tr>
<tr>
<td>Window System</td>
<td>Graphics</td>
<td>Audio Services</td>
<td>Vehicle Bus</td>
<td></td>
</tr>
</tbody>
</table>

**Priority 2 : Basic service for IVI**

<table>
<thead>
<tr>
<th>Bluetooth</th>
<th>Telephony</th>
<th>Tuner Services</th>
<th>Multimedia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Services</td>
<td>Camera</td>
<td>Smartphone Link</td>
<td>Navigation Services</td>
</tr>
</tbody>
</table>

**Priority 3 : Error handling service**

<table>
<thead>
<tr>
<th>Resource Management</th>
<th>Error Management</th>
<th>Health Monitoring</th>
<th>Diagnostics</th>
</tr>
</thead>
</table>
Proposal #2 Definition of Criteria

- the priority of implementation of features
  - the case within each component (Example)

Priority 1: High usage frequency
- Routing Sound Streams
- Mixing Level Control

Priority 2: Mid usage frequency
- Sound Effect

Priority 3: Mid usage frequency
- Reduced Dependency of Hardware
Schedule Plan
Schedule Plan

△UCB6.0

- Collection of functional requirements from OEM
- Feedback from developers
- Linkage with the source codes
- Linkage with the test cord to confirm requirements

★draft ★release

- The order of the implementation
- Unification of the mention expression
- Review & Correction

△UCB7.0

- Feedback of difference information
- The order of the implementation (difference)
- Review & Correction
Conclusion
Conclusion

- **① Rewrite requirements specification**
  Evolve and maintain the document as open activity

- **② Define criteria of implementation**
  The index of the development promotion by the addition of the priority information

By our proposal, we hope that AGL will become more active and OEM will promote product development using AGL.
Introducing GPL related activity
Introducing GPL related activity

- GPLv2’s termination clause
  - No opportunity to cure
  - Automatic termination  → Only a single mistake makes us never to use the OSS

- GPLCC (GPL Cooperation Commitment)
  - Introduces a cure opportunity for GPLv2 and LGPLv2
  - On July, TOYOTA joined the GPLCC
Introducing GPL related activity
Adopt the GPL Cooperation Commitment

1. **No Agreement.** There are no agreements or other documents to sign.

2. **No Fees.** There are no fees or payments required to participate.

3. **Post the Commitment.** Post the GPL Cooperation Commitment on your company’s web page.

Thank you once again for taking the time to join today’s presentation.

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