Why AGL should collaborate with the community and how?  
Aiming long-term reusable common asset for automotive industry

Hisao Munakata

Linux Foundation, Automotive Grade Linux

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How we deal with the issue

Real life is not simple like PDCA

Case study 1
Case study 2

How we treat with the issues in real life
How we deal with the issue
Why AVOIDANCE does not work for long-term solution
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PDCA is theoretical process management procedure, but..
In real life, **EXECUTION** consumes most of the time
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While EXECUTION, various ISSUES hit you and require SOLUTION

Plan → Issue → Solution → Goal

Start

Issue

Solution

Goal

Check

Action

Disconnection to the next cycle

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Why AGL need to collaborate with the community and how?

Real life is not simple like PDCA
Case study 1
Case study 2
How we treat with the issues in real life

Today I focus on this **ISSUES** and **SOLUTION**

Plan — Issue — Solution — Goal

Action — Check

Why AGL should collaborate with the community and how?
Case 1: Stuck at the train station in the snow morning

**ISSUES**
- You want to reach office by train as usual
- As forecast predicted, slight snowfalls
- Then you notice **commute train comes only every 30 min. rather than regular 5 min.**
Case 1: Stuck at the train station in the snow morning

**ISSUES**
- You want to reach office by train as usual
- As forecast predicted, slight snowfalls
- Then you notice commute train comes only every 30 min. rather than regular 5 min.

**SOLUTION**
- stack at the station
- go back to the home
- seek for the alternative train route
- use taxi or walk to the office
Case 2: 24bit/192k hi-resolution audio playback on WindowsPC

**ISSUES**

- You want to play 24bit/192k hi-reso contents
- You purchase 32bit/384k support USB-DAC
- Then you notice WindowsOS does not contain required USB Audio Class 2.0 feature

**CASE STUDY 1**

You want to play 24bit/192k hi-reso contents

- You purchase 32bit/384k support USB-DAC
- Then you notice WindowsOS does not contain required USB Audio Class 2.0 feature

**SOLUTION**

- Return purchased USB-DAC
- Seek for the proprietary driver
- Replace with a Windows-compatible USB-DAC
- Use as USB Audio Class 1.0 compatible DAC

**CASE STUDY 2**

**How we deal with the issue**

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Real life is not simple like PDCA

Case study 1

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**USB Audio Class 2.0 compatible DAC**

- M2TECH HiFace DAC
- Up to 32bit / 384k support
- Asynchronous 2.0 Audio Class USB
Case 2: 24bit/192k hi-resolution audio playback on WindowsPC

ISSUES
- You want to play 24bit/192k hi-reso contents
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SOLUTION
- return purchased USB-DAC
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- replace to Windows compatible USB DAC
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Available **SOLUTION** options for the **ISSUE**

- How we deal with the issue
  - Why AVOIDANCE does not work for long-term solution
  - Why AGL need to collaborate with the community and how?
- Real life is not simple like PDCA
- Case study 1
- Case study 2
- How we treat with the issues in real life

**Stuck**
Available SOLUTION options for the ISSUE

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- How we treat with the issues in real life

Give up

Hisao Munakata
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Available SOLUTION options for the ISSUE

Disregard
Available **SOLUTION** options for the **ISSUE**

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**Avoidance**
Available SOLUTION options for the ISSUE

Solve root cause
Available **SOLUTION** options for the **ISSUE**

- Stuck
- Give up
- Disregard
- Avoidance
- Solve root cause
### Categorization of Case1/2 SOLUTION

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### Why AVOIDANCE does not work for long-term solution

Real life is not simple like PDCA

### Conclusion

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Categorization of Case1/2 SOLUTION

- **Case1 (snow train)**
  - Reaction pattern:
    - Stack at the station: ![Reaction Pattern](image1.png)
    - Back to the home: ![Reaction Pattern](image2.png)
    - Seek alternative train route use taxi, or walk: ![Reaction Pattern](image3.png)

- **Case2 (USB DAC)**
  - Reaction pattern:
    - Give up to use USB DAC
    - Return to the shop
    - Use as low spec DAC
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**Avoidance might be the best possible option you can choose for case1/2**
Why AVOIDANCE does not work for long-term solution
Avoidance approach works only for **one time solution**

As original issue remains, you may hit exact same problem in the future
How we deal with the issue

Why AVOIDANCE does not work for long-term solution
Why AGL need to collaborate with the community and how?

Avoidance works only for one time solution

case 3: Linux audio device support (ALSA SoC framework)

Avoidance approach works only for **one time solution**

As original issue remains, you may hit exact same problem in the future

Case 1 was a human disaster, not a simple natural disaster

- Train crash accident occurred on a snow day (2014-2-15)
- Train break system did not work properly due to the snow
- Train operator wanted to avoid the similar accident
- Then, intentionally added excessive operation interval

Tokyu train snow slip & crash accident
How we deal with the issue

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Avoidance works only for one time solution

Case 3: Linux audio device support (ALSA SoC framework)

Avoidance structure: pull other one’s issue to own place, then fix

An issue located outside your territory

There exist internal dependency

If you apply the AVOIDANCE fix to boundary problem, it easily breaks existing internal dependency

Your territory

Other one's territory

You can fix own problem

Other one's territory

Other one's territory
Once goal achieved, you really do not care for the root cause fix

In general, you have no (or very limited) access to the root cause

- Proprietary system (no source code access, closed system)
- Operated as large scale infrastructure (transportation, electricity, gas,...)
- Restricted by the regulation
- A natural disaster

- Black-boxed technology (closed source)
- No access to the stakeholder
- Legal regulation
How we deal with the issue

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Case 3: Linux audio device support (ALSA SoC framework)

Avoidance for OSS easily create fragmentation (negative aspect)

- Black-boxed technology (closed source)
- No access to the stakeholder
- Legal regulation

You have access to the OSS source code

- You can access to the source code.
- You are allowed to modify the code as you like
- GPL require source code disclose, but not well shared in industry
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case 3: Linux audio device support (ALSA SoC framework)

conclusion

GPL allow code modification, redistribution as you like, however..

The Open Source Definition (Annotated)

3. Derived Works
The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

https://opensource.org/osd-annotated
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Case 3: Add new sound device configuration to your Linux BSP

**ISSUE**

- You develop Linux BSP
- Plan to use AK4642 codec
- Then, noticed *sound-card config needed for ALSA-SoC*
Case 3: Add new sound device configuration to your Linux BSP

ISSUE

- You develop a Linux BSP
- Plan to use AK4642 codec
- Then, noticed sound-card config needed for ALSA-SoC

SOLUTION

Follow ALSA/ALSA-SoC
Write "simple-card" config
AK4642 starts working
Submit file to the upstream

Why AGL should collaborate with the community and how?
Case 3: Add new sound device configuration to your Linux BSP

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Case 3: Linux audio device support (ALSA SoC framework)

Case 3 assessment: Appropriate OSS utilization and contribution

1. Issue and requirement analysis
2. Study existing OSS (ALSA / ALSA-SOC)
3. Follow OSS design guide (device binding)
4. Add own definition to existing OSS

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case 3: Linux audio device support (ALSA SoC framework)

Case 3 assessment: Appropriate OSS utilization and contribution

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Positive (your achievement)

- Follow standards (ALSA, ALSA-SoC)
- Own issue fixed (AK4642 works)
- Submit code to the upstream
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Positive (your achievement):
- Follow standards (ALSA, ALSA-SoC)
- Own issue fixed (AK4642 works)
- Submit code to the upstream

Potentially negative (for the community):
- Single purpose (not sharable) code
- Cause similar config code flooding
- Increase code complexity (diffusion)

Your code submission to the community might cause further confusion
How we deal with the issue  
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Avoidance works only for one time solution  

Case 3: Linux audio device support (ALSA SoC framework)

Reality: simple-card patch raised big argument in the community

Feedback from the ALSA community
- Seek for the best practice
- Add reasonable device abstraction
- Write sharable code
- Do not flood the config definition
- Care for long-term maintenance
- If needed request core code enhance

We strived to develop reusable, common ALSA SoC binding framework

ALSA upstream ML discussion
- over 1 year's discussion (2012.12 to 2013.12)
- Originally we raised 5 patches, it becomes 54 when merged
- 276 message exchange
- 8 developpers involved

http://thread.gmane.org/gmane.linux.alsa.devel/104057
Community expect **more than patch submission, but coordination**

- **Issue and requirement analysis**
- **Study existing OSS (ALSA / ALSA-SOC)**
- **Follow OSS design guide (device binding)**
- **Add own definition to existing OSS**

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Study existing OSS (ALSA / ALSA-SOC)
Study existing OSS (ALSA / ALSA-SOC)
Share issue & solution idea
Discuss the best practice to solve the issue
Develop together common code
Apply & keep it maintain

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Current AGL status
CI: continues integration
essential fix

Not let the AGL to **detached from the OSS mainstream momentum**

**Challenge**

- Collect automotive **domain specific demands**
- Investigate existing **OSS code** before start writing own code (AVOIDANCE approach)
- Find and establish a good relation with existing reference OSS project
- Collaborate with existing project and enhance code
- Commit long-term maintenance for domain specific code
- Create software **CEO-system** to encourage people to write an application code

**If detached from OSS eco-system, AGL may lose its momentum**

- No collaboration (patch adoption)
- With the community & submission only

- ALSA
- Pulse audio
- Gstreamer
- V4L2
- Walyand
- Community development activity
- SMACK
- AMB

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OSS development methodology = continuous integration (CI)

Current AGL status
CI: continues integration
essential fix

Keep periodic 75 days release interval
(Feature or performance does not affect)

Version 4.4

You can predict what is coming in next release

Version 4.5

Transparency

As you can predict mod, long-term release plan, you can concentrate essential issue fix.

Version 4.6

To keep master code clean and functional, not fully reviewed or validated code force carries over to the next “predicted” release.
Aiming to develop **3S (Sustainable, Sharable and Safe) asset**

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- Current AGL status
  - CI: continues integration
  - essential fix

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**OSS CI enables long-term reusable / sustainable asset creation**

The completion of one project is not a final goal. You need to consider the next one soon.
5C effort enables long-term reusable asset creation

5C effort for long-term sustainable solution

1. Connection
2. Communication
3. Collaboration
4. Coordination
5. Contenuous

5C effort proof in many existing OSS project
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- An avoidance approach is a common way of development as well as everyday life. However, it works only for a short-term solution.

- The big advantage of OSS (Open Source Software) adoption is 3S (Sustainable, Sharable and Safe) solution. It requires 5C (Connection, Communication, Collaboration, coordination and continuous) effort.

- AGL need to care for 5C effort before start writing own code (is Avoidance). Without such effort, AGL will detach from OSS community and lose momentums. We need to recognize community connection is key success factor of AGL success.