



Open Source in Every Car with Automotive Grade Linux

2016 Automotive Linux Summit

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Community Manager, [AGL](#), [The Linx Foundation](#)

Ours Goals Today

- Educate you on what AGL is all about
- How to access source code and documentation
- Generate interest in developer community to participate in AGL



Introduction to Automotive Grade Linux

Or “AGL is changing the way automotive manufacturers build and manage software”

“If Linux is in the car, we want it all to be based on AGL, no matter what the function.”

**Dan Cauchy, Linux Foundation,
Automotive Linux Summit 2015**

***AGL is the only organization that plans to address IVI,
instrument cluster, telematics, HUD, control systems, ADAS.***

Automotive Grade Linux

Collaborating to build the car of the future through rapid innovation

[*http://AutomotiveLinux.org*](http://AutomotiveLinux.org)

Automotive Grade Linux

*Collaborating to build the car of the future through **rapid innovation***

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Charter: AGL is “Code First”

- AGL is a Linux Foundation Open Collaborative Project
- Leverage Linux and Open Source technologies
- Build standardized platform(s) and app framework for the entire industry and for all functions in the vehicle
- Develop ~80% of the starting point for a production project
- AGL is a “Code First” organization
- Work with upstream projects
- Educate the industry in open source collaboration and best practices

AGL is changing the industry

- We are creating a new software development methodology for automotive using open source
- We are changing the way automotive manufacturers build, manage, and treat software
- We are building an AGL ecosystem and supply chain, all using the same code base
- AGL will change:
 - The way consumers interact with the vehicle
 - The way vehicles interact with other vehicles
 - The way vehicles interact with the cloud

AGL Governance

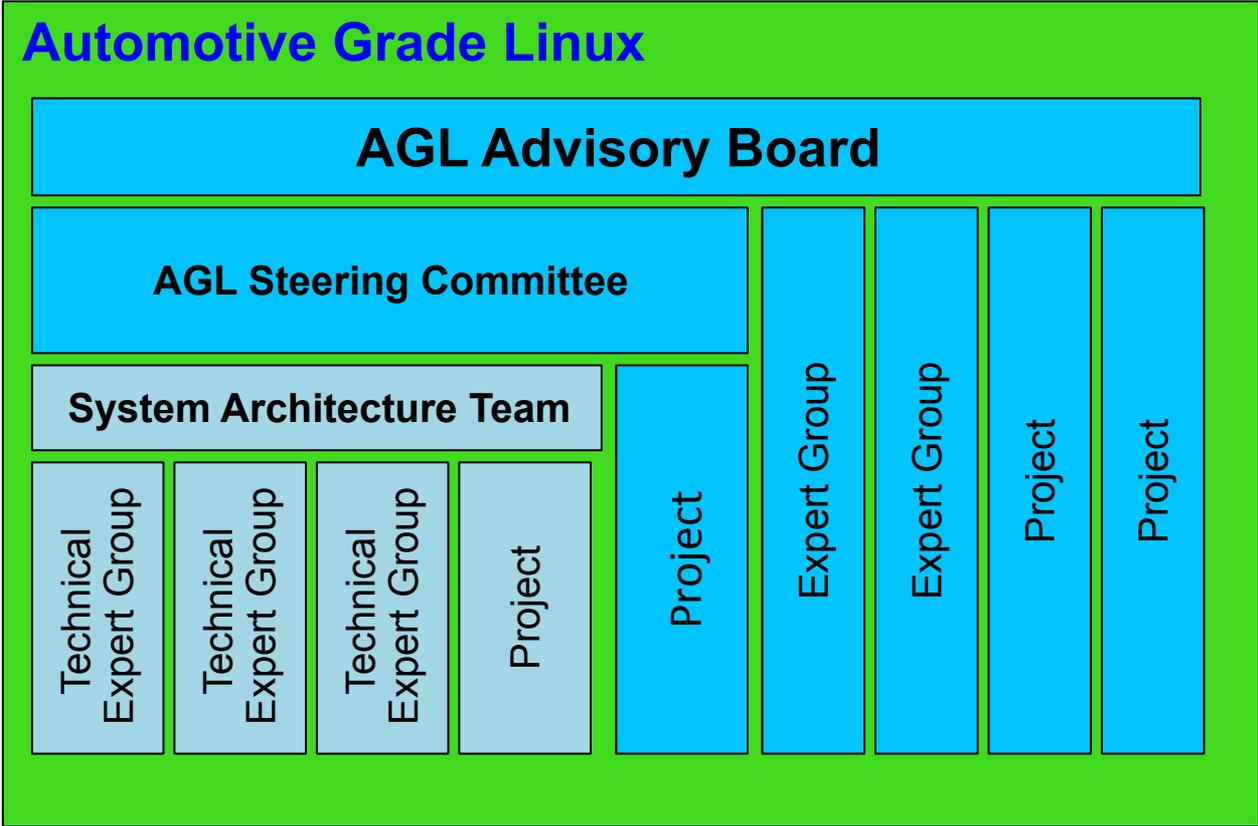
Advisory Board responsible for overall direction, budget

Steering Committee runs AGL day-to-day

System Architecture Team Oversees Technical aspects of the project

Expert Groups can run one or more projects

Projects may be directly managed by SAT



AGL is changing the future of driving



AGL has 8 major OEM supporters

AGL Members - Total of 76 companies!

Platinum Members



Gold Members

The Power of Dreams

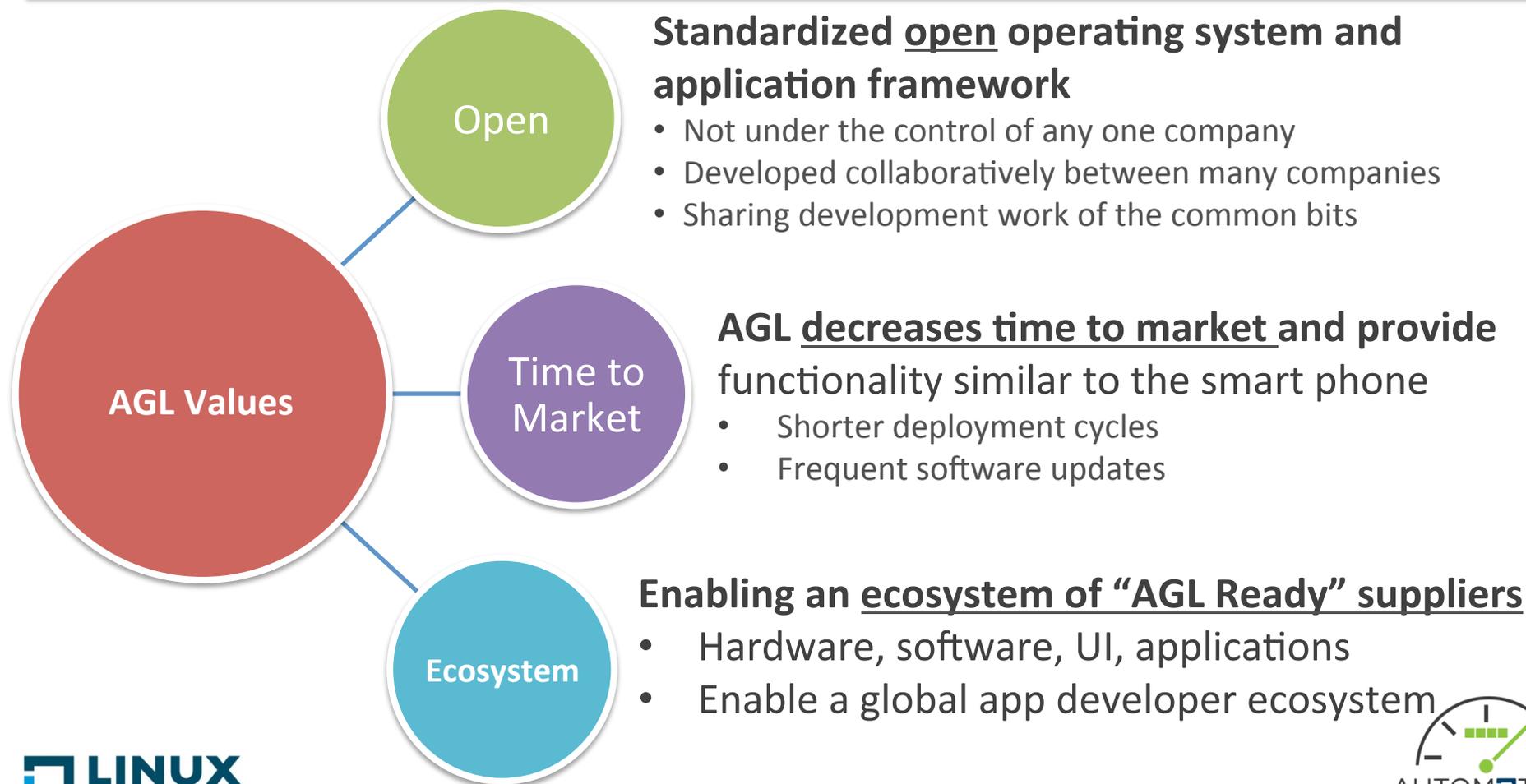
NTT DATA MSE Corporation

Silver Members



Bronze Members

Open, Time to Market, Ecosystem



AGL vs GENIVI - Code First vs BYOP

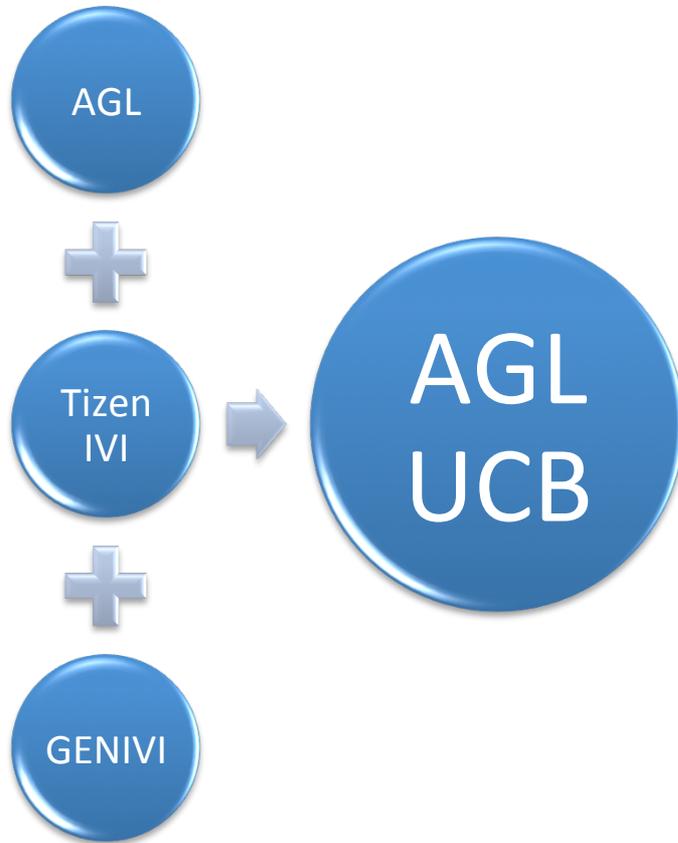
- We are different, but we are not enemies
- AGL is “Code First”
 - Building a complete distro, middleware, app framework
 - OEMs and suppliers use the same software base as starting point for production programs
 - We are organized and run like a standard open source project
- GENIVI is “Bring Your Own Platform”
 - Multiple suppliers can be compliant to GENIVI Specification
 - Different starting points
 - More options in the marketplace, but less interoperability and reuse
- AGL and GENIVI are collaborating on software components where appropriate
- AGL is addressing all functions in the vehicle, not just IVI



AGL Roadmap

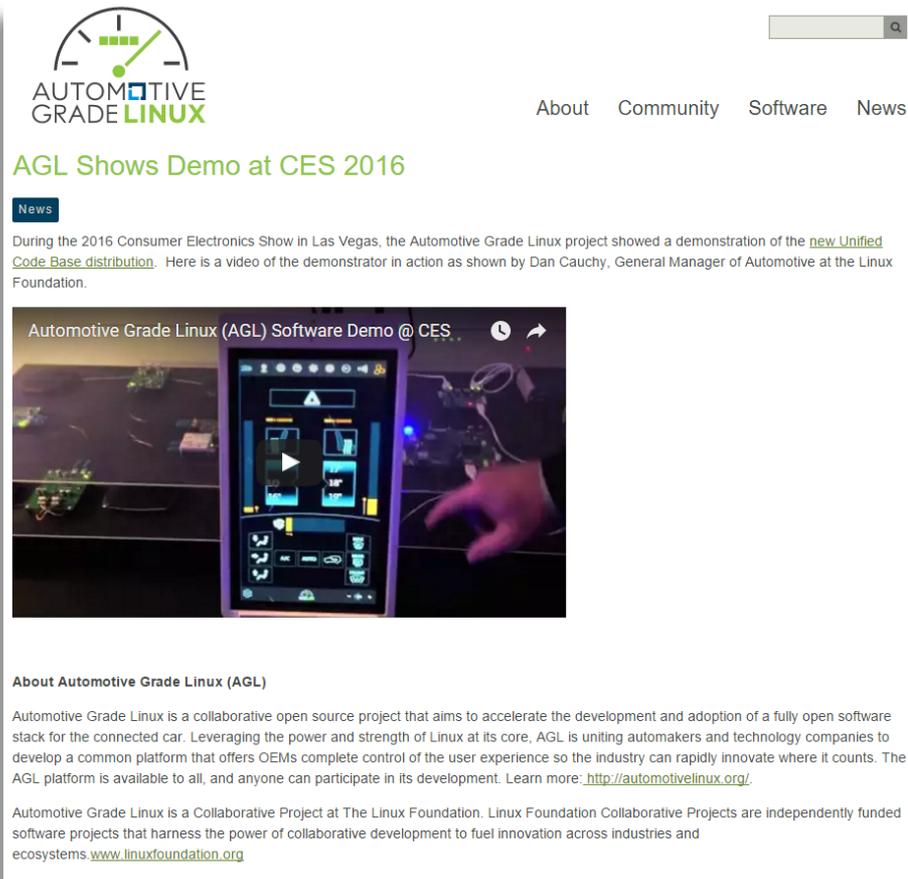
Or “One platform to rule them all”

AGL Distro “Unified Code Base”



- *First Release announced at CES Las Vegas in January*
- *Unifying the best of AGL, Tizen IVI and GENIVI into a single code base for the entire industry!*
- *Reduce fragmentation, focus on innovation and new features!*
- *Yocto/Poky based with AGL specific layers*

CES AGL Demo Video



The screenshot shows the Automotive Grade Linux website. At the top left is the logo, which consists of a speedometer icon with a needle pointing to the right, and the text "AUTOMOTIVE GRADE LINUX" below it. To the right of the logo is a search bar and a navigation menu with links for "About", "Community", "Software", and "News". Below the navigation menu is a news article titled "AGL Shows Demo at CES 2016". The article has a "News" tag and a short paragraph of text. Below the text is a video player with a play button and a hand cursor. The video title is "Automotive Grade Linux (AGL) Software Demo @ CES". Below the video player is a section titled "About Automotive Grade Linux (AGL)" with a paragraph of text and a link to the website.

AUTOMOTIVE GRADE LINUX

About Community Software News

AGL Shows Demo at CES 2016

News

During the 2016 Consumer Electronics Show in Las Vegas, the Automotive Grade Linux project showed a demonstration of the [new Unified Code Base distribution](#). Here is a video of the demonstrator in action as shown by Dan Cauchy, General Manager of Automotive at the Linux Foundation.

Automotive Grade Linux (AGL) Software Demo @ CES

About Automotive Grade Linux (AGL)

Automotive Grade Linux is a collaborative open source project that aims to accelerate the development and adoption of a fully open software stack for the connected car. Leveraging the power and strength of Linux at its core, AGL is uniting automakers and technology companies to develop a common platform that offers OEMs complete control of the user experience so the industry can rapidly innovate where it counts. The AGL platform is available to all, and anyone can participate in its development. Learn more: <http://automotivelinux.org/>.

Automotive Grade Linux is a Collaborative Project at The Linux Foundation. Linux Foundation Collaborative Projects are independently funded software projects that harness the power of collaborative development to fuel innovation across industries and ecosystems www.linuxfoundation.org

- We posted a video of the CES AGL UCB Demo online:
 - <https://www.automotivelinux.org/news/news/2016/01/agl-shows-demo-ces-2016>
- ALS Video Coming Soon!

ALS AGL Demo

- Visit our booth to see AGL portability

Thanks for all the fish...

- AGL Releases:

AA – Agile Albacore – Jan 2016



BB – Brilliant Blowfish – July 2016



CC – Charming Chinook – Jan 2017



DD – Daring Dab – July 2017

Brilliant Blowfish



- Released July 15, 2016
- Upgrade to Yocto 2.0
- Additional BSPs
- IVI Audio Manager
- IVI Layer Manager
- Automated Test Improvements

Brilliant Blowfish



- Reference BSPs – Fully supported by manufacturer, CI, etc.
 - ✓ Renesas R-Car 2 - Porter board – **Full ALS demo**
 - ✓ QEMU – demo code available – not shown at ALS
- Community BSP – Best effort by AGL with minimal support
 - ✧ NXP – i.MX6 – SABRE – **ALS demo available**
 - ✓ NXP - i.MX6x – Wandboard – issues with graphics drivers
 - ✓ Intel - Minnowboard Max - demo code available – not shown at ALS
 - ✓ TI - Jacinto 6 - Vayu board – **ALS demo available**
 - ✧ QCOM – Dragonboard 610-c – no demo available
 - ✧ Raspberry PI – no demo available

Brilliant Blowfish



- ✧ Application Framework available in AGL Extras
- ✧ Incomplete – does not meet all requirements but a great start
- ✧ Allows collaboration by larger number of developers
- Gather requirements from all AGL OEMs before next AMM (Sep 7)

Brilliant Blowfish



- Automotive Linux Summit Demo Features
- CES 2016 Features +
- Demonstrate multiple audio streams (switching and mixing)
- Hardware accelerated video
- Navigation app improvements
- AM/FM tuner application

Charming Chinook



- Target January 7, 2017
- Yocto 2.1
- SDK available
- Reference AGL Apps
- AGL Compositor
- AGL Home Screen Reference App in Qt and HTML5
- Device Profiles for Telematics, IC, ADAS
- IP Network Manager with WiFi and LTE
- Smart Device Link (defer to DD or later)
- Linux Security Module (SMACK was added in BB as part of App FW)

Charming Chinook



- Carry over from BB
- Finish IVI Layer Manager
- AGL Audio Manager Plug-ins
- AGL Security Spec
- Requirements Spec 2.0

Charming Chinook



- CES 2017 Demo Features
- Multi-screen Home Screen using AGL App Framework and Compositor
- ADAS profile with multiple camera inputs displayed on single and multiple displays

Charming Chinook



- Software Development Kit
- Available for reference boards with published images that include graphics drivers
- Enables rapid AGL application development (download SDK and write “Hello World” in less than 1 hour)
- Support for Qt and HTML5
- IDE with debugging supported (optional for CC)
- Documentation

Charming Chinook



- CES 2017 Demo Features
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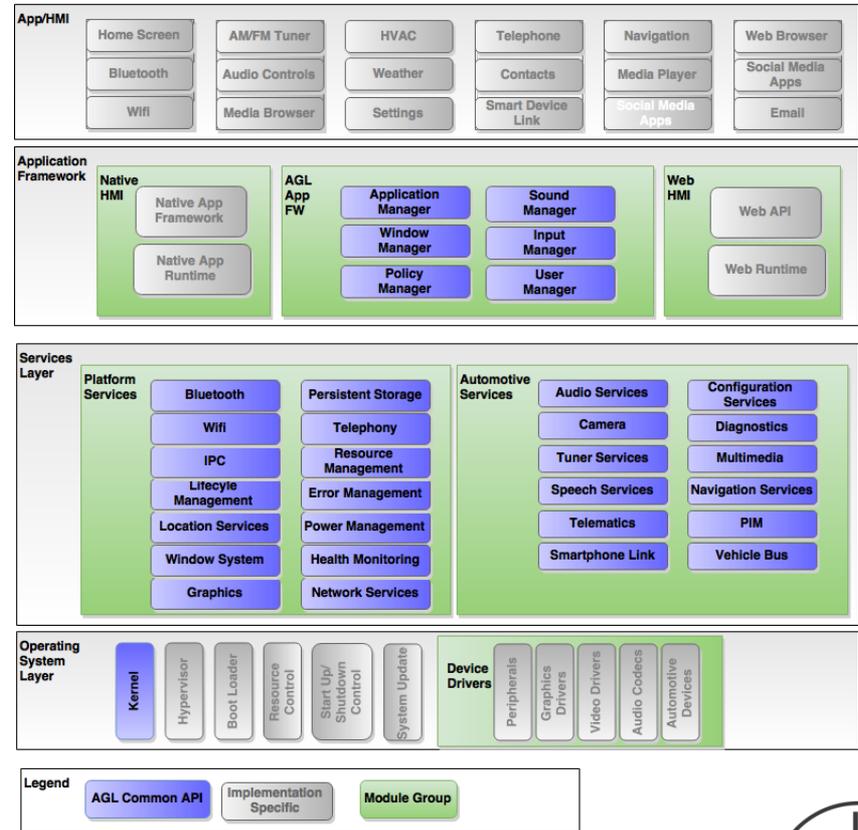


Getting Involved with AGL

Or "I came, I saw, I coded"

AGL Portability

- *AGL Services API* in the Services Layer and *AGL App Framework* are exposed to App Developers
- Native and Web runtimes are adapted using the *AGL App Framework* and *AGL Services API*



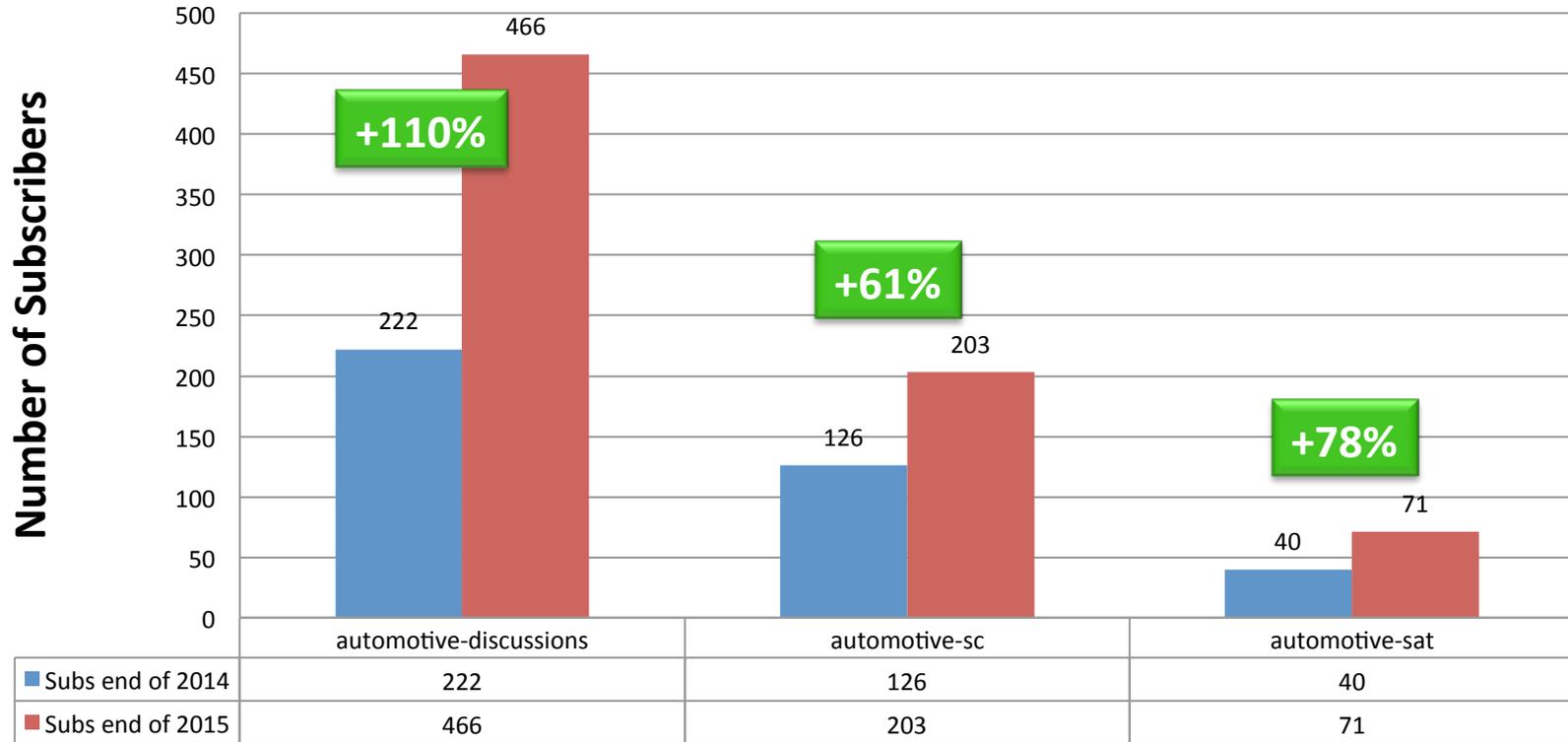
Security

Getting Involved

- AGL Wiki
 - <https://wiki.automotivelinux.org/>
- Single sign-on for AGL sites including Jira, git, gerrit, DOORS NG, and the AGL Wiki
 - Register at <https://dev.automotivelinux.org/>
- Mail list for technical discussions
 - <https://lists.linuxfoundation.org/mailman/listinfo/automotive-discussions>
- IRC for technical discussions
 - #automotive on freenode.net

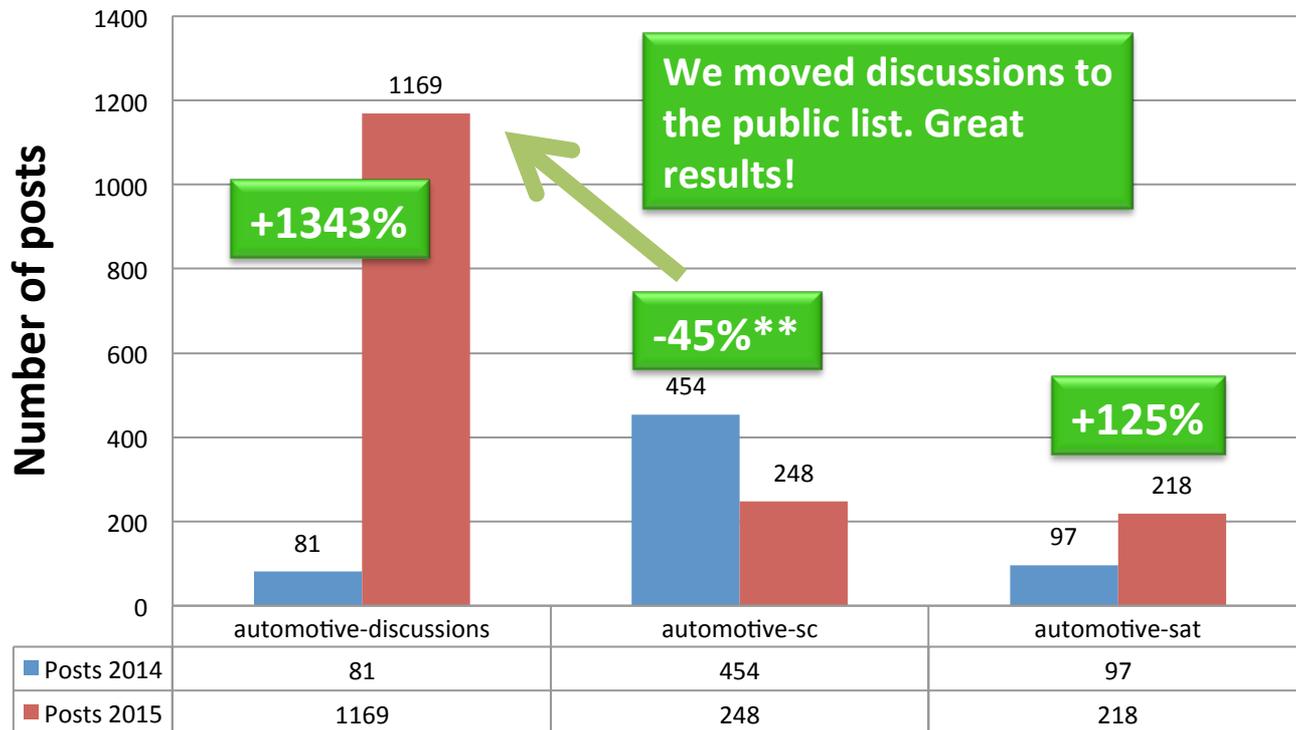
AGL mailing list subscriber growth

AGL Mailing List Subscriber Growth – 2014 vs 2015



AGL mailing list traffic growth

AGL Mailing List Traffic – 2014 vs 2015



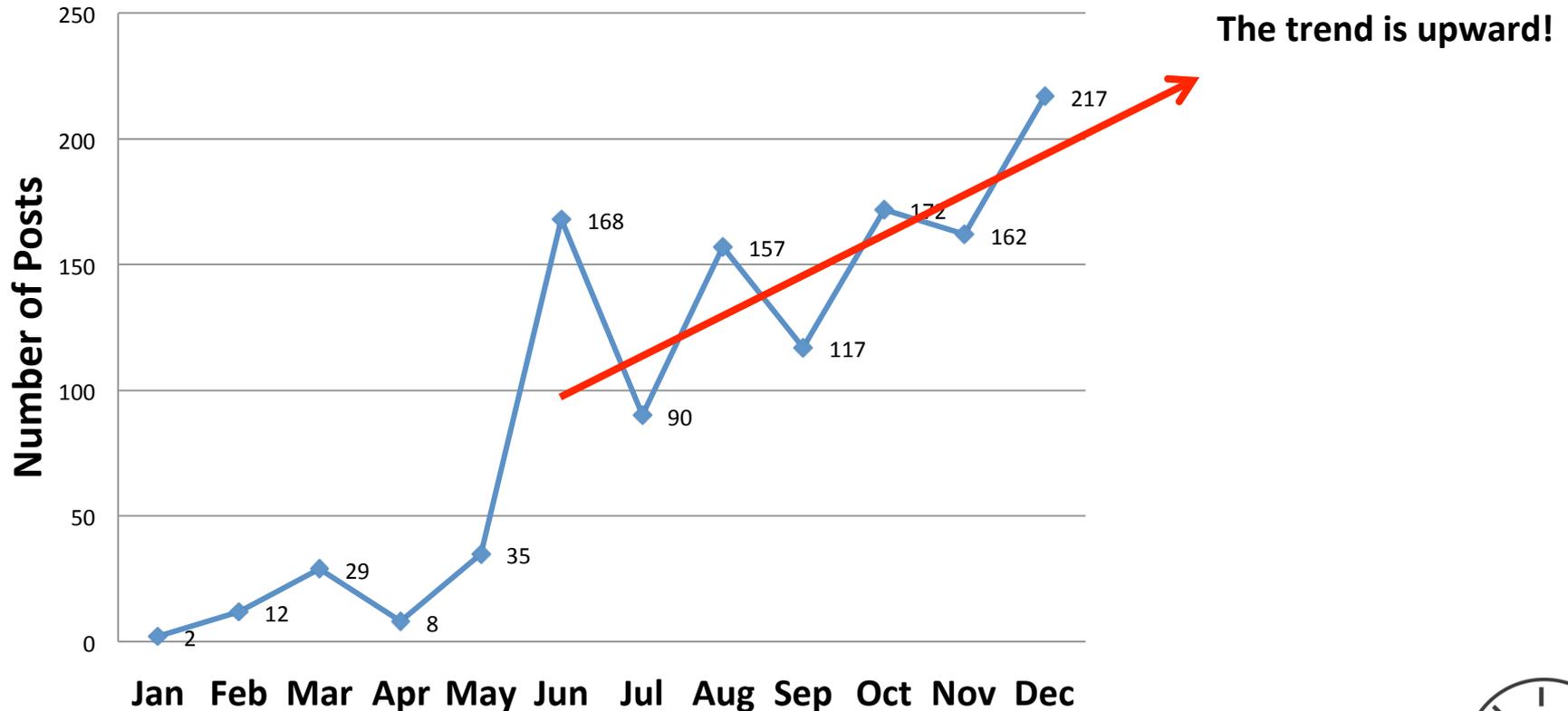
** No surprise: we made a conscious decision to move technical discussions to the public “automotive-discussions” – open is always better!

Total 1635 vs 632 posts, overall **159% growth** in traffic year-over-year.

Average 3 posts per day in 2015 versus 1.7 in 2014.

AGL mailing list traffic growth

Automotive-Discussion - Posts per Month 2015



Getting Involved

- Most subsystems in need of developers and maintainers particularly user space
- Application developers needed
- Weekly developer calls on Tuesdays at 13:00 UTC
 - Info at <https://wiki.automotivelinux.org/dev-call-info>
- Check Jira for open issues and tasks that need to be done
 - <https://jira.automotivelinux.org/>

Contribution Process

- Code development process is documented
 - <https://wiki.automotivelinux.org/agl-distro/contributing>
- Process continues to evolve as we mature

Git and Gerrit

- AGL uses git for version control and gerrit for code reviews
- Code and patch submissions are via gerrit and use the gerrit review and merge process
- These can be found at
 - <https://gerrit.automotivelinux.org>
 - <https://git.automotivelinux.org>

Git and Gerrit

- The AGL gerrit setup is divided into three main repository groups
 - AGL - contains the recipes for building the AGL distribution
 - src - contains source code repositories where AGL is the upstream. This code is officially part of the AGL distribution
 - staging - contains source code repositories where AGL developers can work on new features or components that can eventually be included in the AGL distribution
- Complete descriptions and links to gerrit can be found at <https://wiki.automotivelinux.org/agl-distro/contributing>

Continuous Integration

- Using Jenkins for Continuous Integration
- JTA (Jenkins Test Automation) being integrated into process
- Successful build in Jenkins gives +1 to new code in Gerrit
- JTA will be added as part of the +1 criteria as we go forward



AGL Expert Groups

Or “You don’t have to be an expert to work in an Expert Group”

Team Overview

- System Architecture Team and Expert Groups working on new feature requirements and architecture
- Component teams own software not specifically assigned to an EG
 - Common Libraries and OS
 - Kernel and Device Drivers
- Each team has a dedicated wiki page
 - Link to roadmap and project backlog from wiki

App Framework and Security EG

- *Application lifecycle (install, run, remove, applications)*
- *SDK and application developer experience both in security and APIs*
- *Security framework (SELinux, SMACK, AppArmor, etc.), policies, and strategy for the distribution*
- Network and vehicle firewalls in conjunction with the Connectivity EG
- Software Update and secure update
- Diagnostic log and trace
- Secure boot

<https://wiki.automotivelinux.org/eg-app-fw>

UI and Graphics EG

- *AGL Compositor, Layer Manager, and GPU interface*
- *Multimedia video manager (including multi-display and display sharing) and audio manager, and media manager/player.*
- Browser Engine
- Speech Recognition
- Navigation

<https://wiki.automotivelinux.org/eg-ui-graphics>

Connectivity EG

- *Vehicle Connectivity (CAN, MOST, LIN, AMB)*
- *Network and vehicle firewalls*
- Cloud Connectivity (Iotivity)
- Connected Car
- Bluetooth, Wifi, NFC
- Smart Device Link (SDL)
- Remote Vehicle Interactions (RVI)

<https://wiki.automotivelinux.org/eg-connectivity>

CI and Automated Test EG

- *Build and smoke test of Gerrit submissions on all hardware*
- *Daily snapshot build and testing*
- *Device tests on real hardware*
- *Test environments such as JTA and Lava*
- Test suites such as LTP
- UI testing (OpenQA)

<https://wiki.automotivelinux.org/eg-ciat>



Q&A

Or “Ask us (almost) anything.”



THANK YOU