Linux You Can Drive My Car

Embedded Linux Conference 2017

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Community Manager, AGL , The Linux Foundation

LINUX FOUNDATION

AUTOMOTIVE GRADE LINUX

What is AGL?

- Non-profit
- Open source Linux-based collaborative project
- Hosted at Linux Foundation
- Focused on rapid innovation of vehicle software

Automotive Grade Linux

Collaborating to build the car of the future through rapid innovation

http://AutomotiveLinux.org

Goals of AGL

- Build a single software platform for the entire industry
- Develop 70-80% of the starting point for a production project
- Reduce fragmentation by combining the best of open source
- Create an ecosystem of developers, suppliers, expertise all using a single platform

AGL Charter and Scope

AGL is the only organization planning to address all of the software in the vehicle

Infotainment

Instrument Cluster

Heads-Up-Display

Telematics / Connected Car

Advanced Driver Assistance Systems

Functional Safety

Autonomous Driving

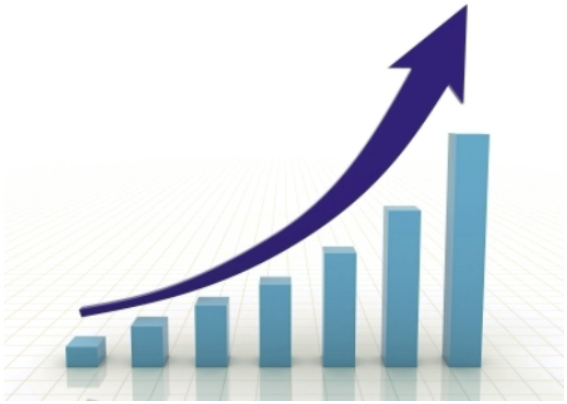
AGL Growth

AGL now has 90+ members!

10 OEMs are members of AGL

Over 60% growth in 2016

680+ developers on AGL mailing list



Total of 10 OEMs supporting AGL!

AGL Members - Total of 90+ companies!

Platinum

DENSO

mazda

Panasonic

RENESAS

SUZUKI

TOYOTA

Gold

HONDA
The Power of Dreams

NTT DATA
NTT DATA MSE Corporation

Silver

AISIN AW CO.,LTD.

Continental

Mercedes-Benz

GRIMNES

FUJITSU TEN

irdeto

MITSUBISHI ELECTRIC

NISSAN

Pioneer

QUALCOMM

WIND

Bronze

Advanced Driver Information Technology

Advanced Telematic Systems

ALPS

ARM

MIRACLE

MITSUBISHI MOTORS

KOMPAC

MOVIMENTO

audiokinetic

Autoliv

bright box

中国移动 China Mobile

NEC

NVIDIA

NXP

OBIGO

cinemo

CodeThink

COLLABORA

Elektrobit

OPENSYNERGY

ORACLE

OSSYSTEMS

PocketSoft

ENEA

ETRI
Electronics and Telecommunications Research Institute

Eureka, Inc.

Ford

RADIO & SOUND

REALVNC

sasken

SAMSUNG

FORGEROCK

FUJITSU

GlobalLogic
Leaders in Software R&D Services

HARMAN

sdtech

SiriusXM

SONY

STAR LAB

HI CORP.

HITACHI
Inspire the Next

HYUNDAI MOBIS

igalia

SUBARU

Suntec

SYMBIO

SYNOPSYS

intel

JAGUAR

LAND ROVER

JVCKENWOOD
creates excitement & peace of mind

Konsulko Group

TELENAV

Texas Instruments

Qt
The Qt Company

TOSHIBA

Linaro

LINKMOTION

mcloudware

ELECTRONICS

TUXERA

Ubiquitous

VeriSilicon

MEDIATEK

Mentor Automotive

MICROCHIP

micware

Virtual Open Systems

Witekio
EMBEDDING SUCCESS

WITZ

Xevo

AUTOMOTIVE GRADE LINUX

AGL is CODE FIRST

AGL is a "Code First" organization!

Specifications lead to fragmentation!

Top 25 Git Committers in 2016

Commits	Name	Company
533	Jose Bollo	IoT.BZH
166	NuoHan Qiao	Fujitsu Ten
146	Jan-Simon Moeller	Linux Foundation
102	Stephane Desneux	IoT.BZH
92	Jens Bocklage	Mentor Graphics
86	Tasuku Suzuki	Qt Company
85	Manuel Bachmann	IoT.BZH
70	Yannick Gicquel	IoT.BZH
64	Ran Cao	Fujitsu Ten
57	Tadao Tanikawa	Panasonic
55	Fulup Ar Foll	IoT.BZH
42	Leon Anavi	Konsulko

Commits	Name	Company
40	Anton Gerasimov	Advanced Telematics
35	Yanhua GU	Fujitsu Ten
22	Christian Gromm	Microchip
21	Ronan	IoT.BZH
20	SriMaldia	Alps
18	Naoto Yamaguchi	AisinAW
15	Karthik Ramanan	TI
13	Scott Murray	Konsulko
11	Kotaro Hashimoto	Mitsubishi Electric
9	Matt Porter	Konsulko
8	Dominig Ar Foll	Intel
8	Yuta Doi	Witz
8	Jian Zhang	Fujitsu Ten

1791 Total Commits
45 Committers
24 Companies

- 01 Jan 2016 – 31 Dec 2016
- Commits to master

Commits by Company in 2016

Company	Commits
IoT.bzh	872
Fujitsu-Ten	273
Linux Foundation	147
Mentor Graphics	92
Qt Company	86
Konsulko	68
Panasonic	57
Advanced Telematics Systems	42
Microchip	22
ALPS	20
AisinAW	18
TI	15

Company	Commits
Witz	14
Renesas	13
Mitsubishi Electric	11
Intel	10
Samsung	6
Collabora	5
Toyota	5
ADIT	3
Cogent Embedded	3
Hitachi	2
Igalia	2
Radio Sound	2

1791 Total Commits
45 Committers
24 Companies

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Thanks for all the fish…

- AGL Releases:

  AA – Agile Albacore – Jan 2016

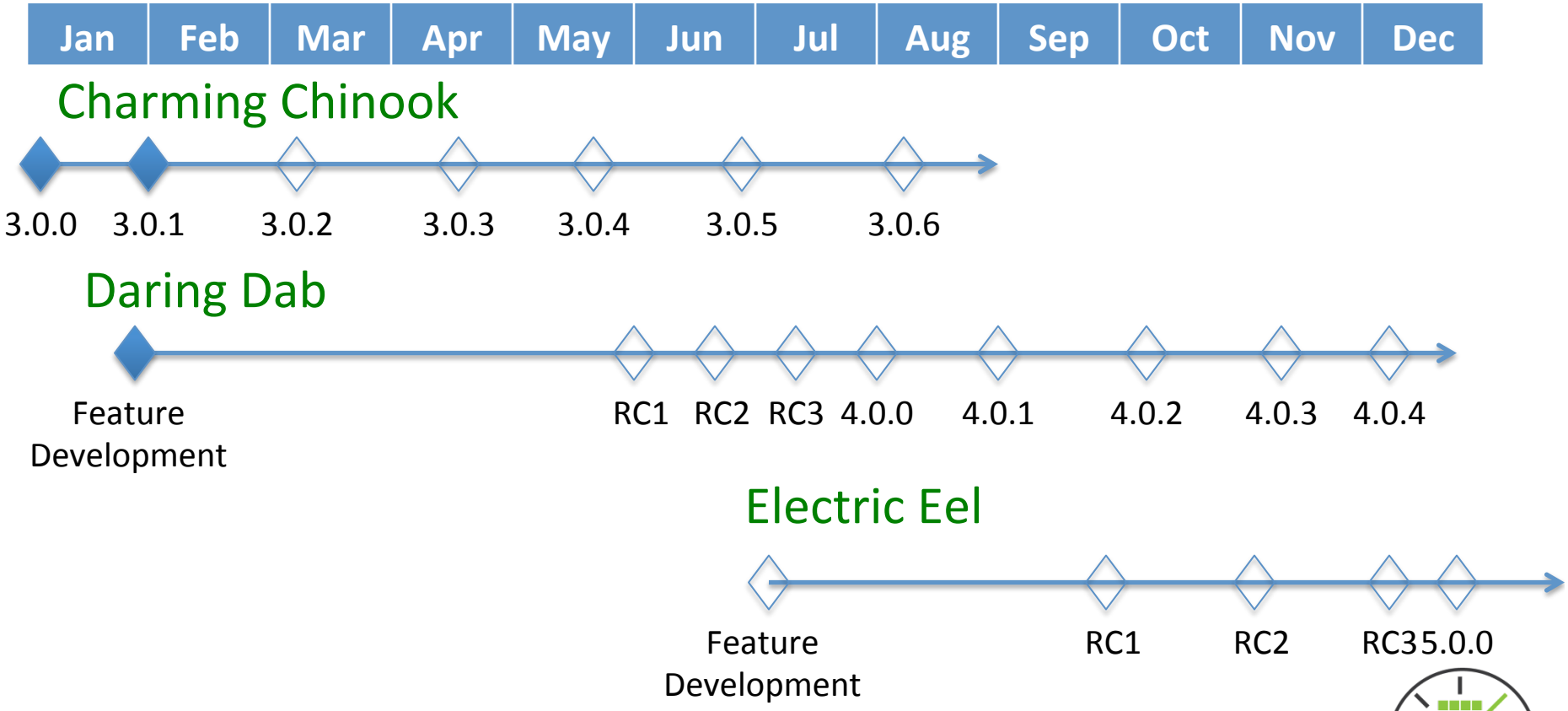
  BB – Brilliant Blowfish – July 2016

  CC – Charming Chinook – Dec 2016

  DD – Daring Dab – July 2017

  EE – Electric Eel – Dec 2017

2017 AGL Schedule



CHARMING CHINOOK AND CES 2017

Charming Chinook

- Released January 6
- Updated to Yocto 2.1 (krogoth)
- AGL App Framework improvements
  - App packaging, installation and widget installation
  - Use of systemd for app control
  - Template for App FW Service Binders (APIs) available
- SDK for AGL App Developers
- Reference AGL Apps for Home Screen, Media Player, Settings, AM/FM Tuner, HVAC, and more

Charming Chinook

- First patch update (3.0.1) released on Jan 30
- Chinook branch in git
- Release notes, binary downloads, source code and more at

  https://wiki.automotivelinux.org/agl-distro/release-notes
- Next patch update planned for March 8

AGL Documentation

- New documentation site rolled out.

  http://docs.automotivelinux.org/

- MD with web publishing for all AGL documentation
- Use git/ gerrit for version control and reviews

SDK for App Developers

- Docker image to eliminate host dependency issues
- Available for reference boards with published images that include graphics drivers
- Enables rapid AGL application development Support for Qt (HTML5 planned!)
- Documentation
- No Yocto knowledge is needed or assumed for SDK users

Chinook Board Support

- Reference BSPs – Fully supported by manufacturer, CI, etc.
  - ✓ Renesas R-Car 2 - Porter board
  - ✓ Intel - Minnowboard Turbot
  - ✓ QEMU
- Community BSP – Best effort by AGL community
  - ✓ Raspberry Pi 2/3
  - ✓ NXP – i.MX6 – SABRE
  - ✓ TI - Jacinto 6 - Vayu board
  - ✓ QCOM – Dragonboard 610-c

CES2017 At a Glance

- **3** announcements: Suzuki, UCB 3.0 and Daimler
- **12** member demos in the AGL Suite
- **1000+** attendees at the Demo Showcase
- **15+** media, analysts and influencers at the AGL media dinner
- **11** media interviews
- **539** global media clips

CES2017 - AGL Demo Suite

Participating Members:

- Advanced Telematics Systems
- Aisin AW
- Denso
- Elektrobit
- ForgeRock
- Intel
- Microchip
- NTT Data MSE
- Panasonic
- Qualcomm
- Renesas
- Texas Instruments

AGL Demo Video (Draft): https://vimeo.com/198163241/8aba459409

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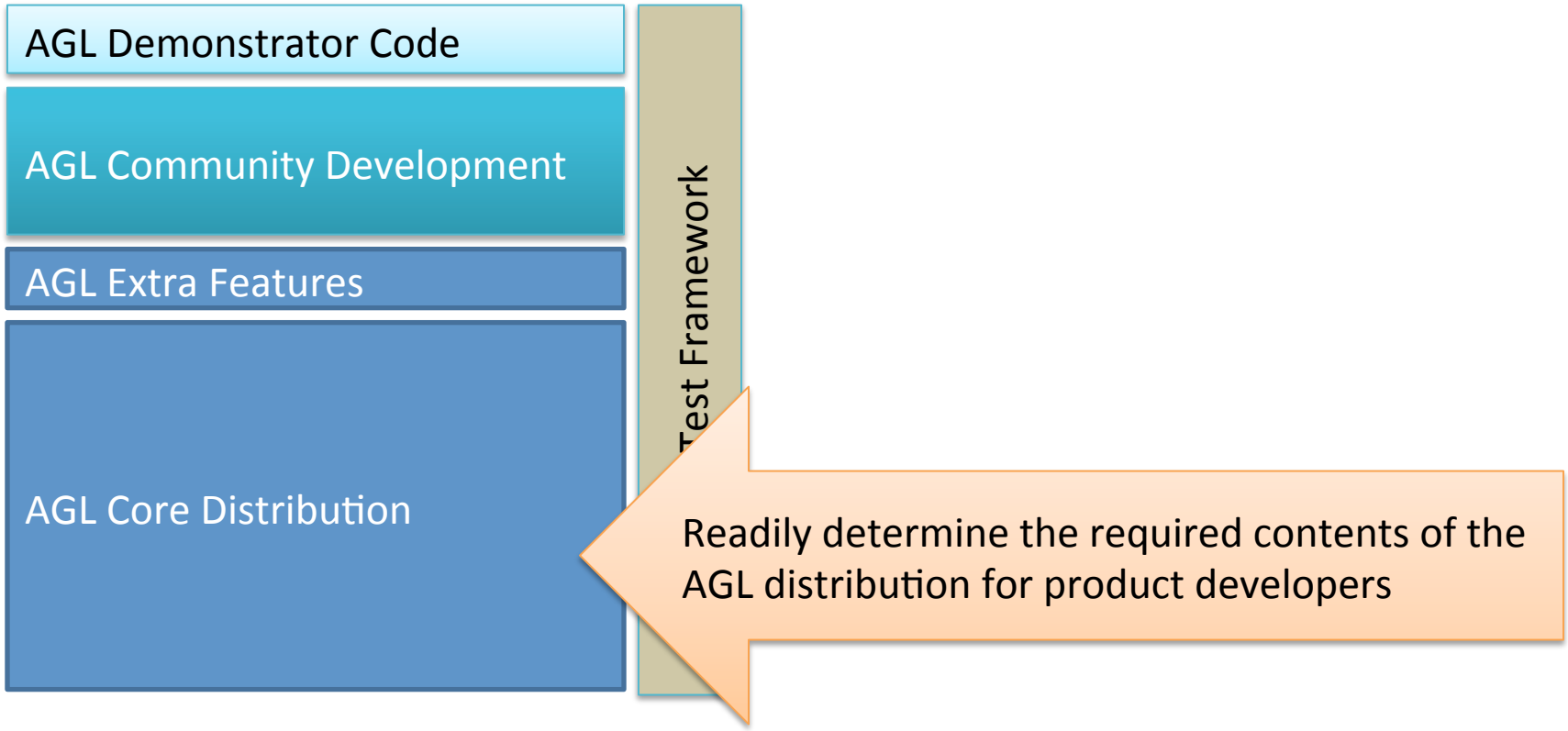
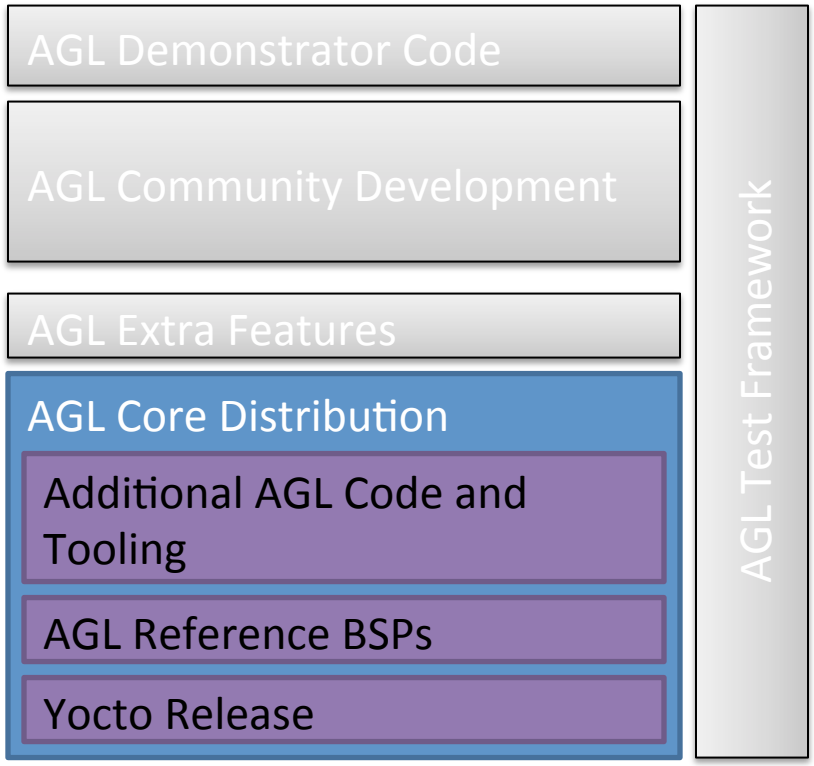
GETTING INVOLVED - CODE STRUCTURE

Software Configuration Requirements

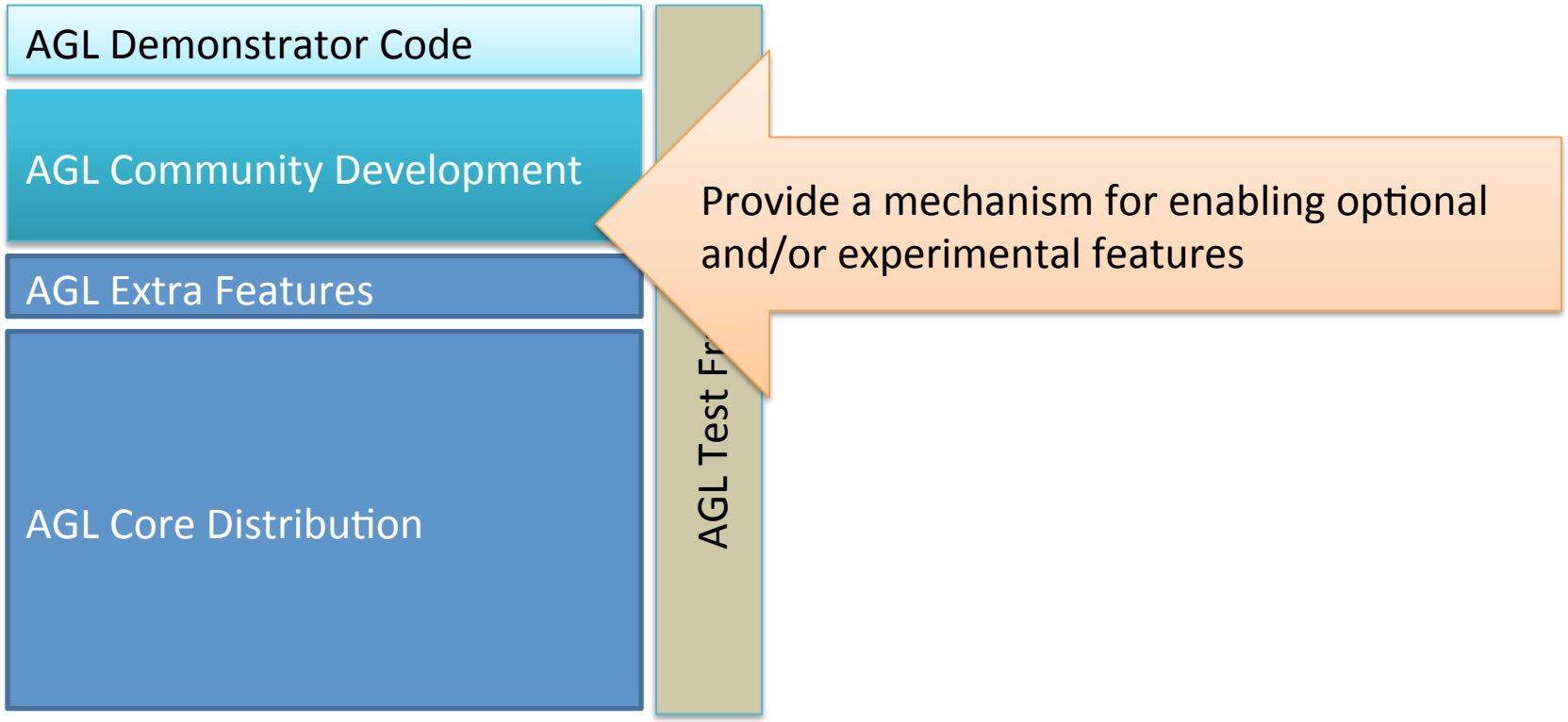


AGL Core Distribution

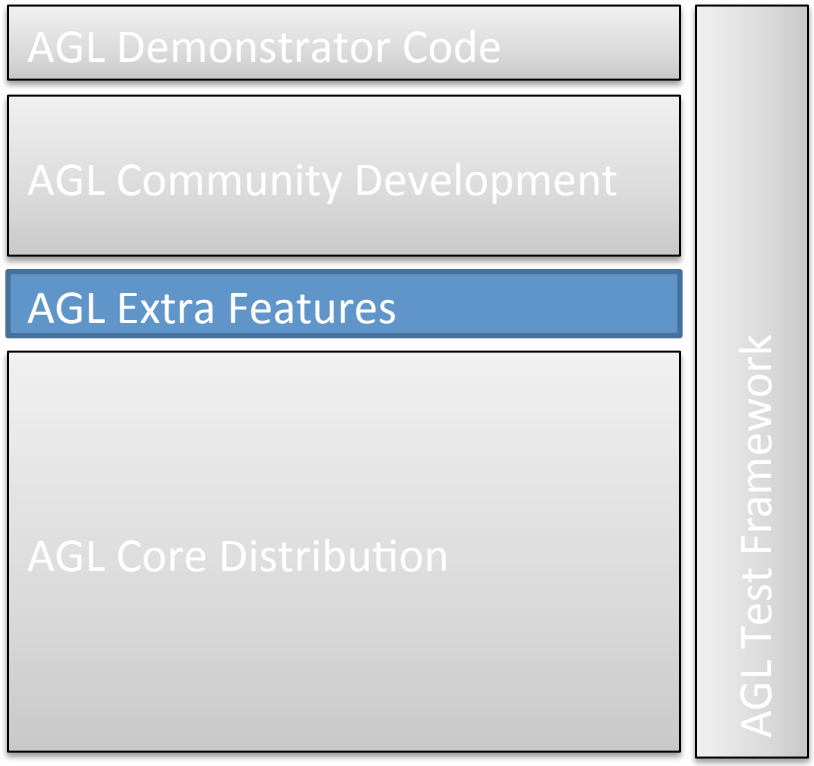


- Stable Yocto release
- Reference BSPs fully supported by the board manufacturer or chip vendor
- Documentation and tooling for building and deploying reference BSPs
- Tooling to allow selection of optional features in the core build
- Test results provided using AGL Test Framework
- Fully supported with updates for at least 6 months
- Defined by Yocto layer – meta-agl

Software Configuration Requirements

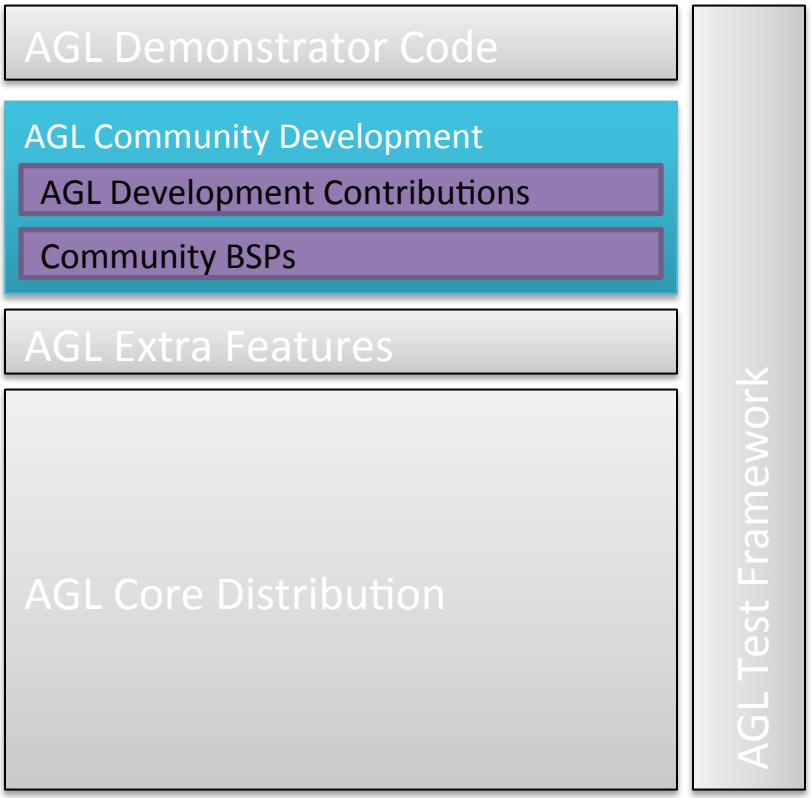


AGL Extra Features



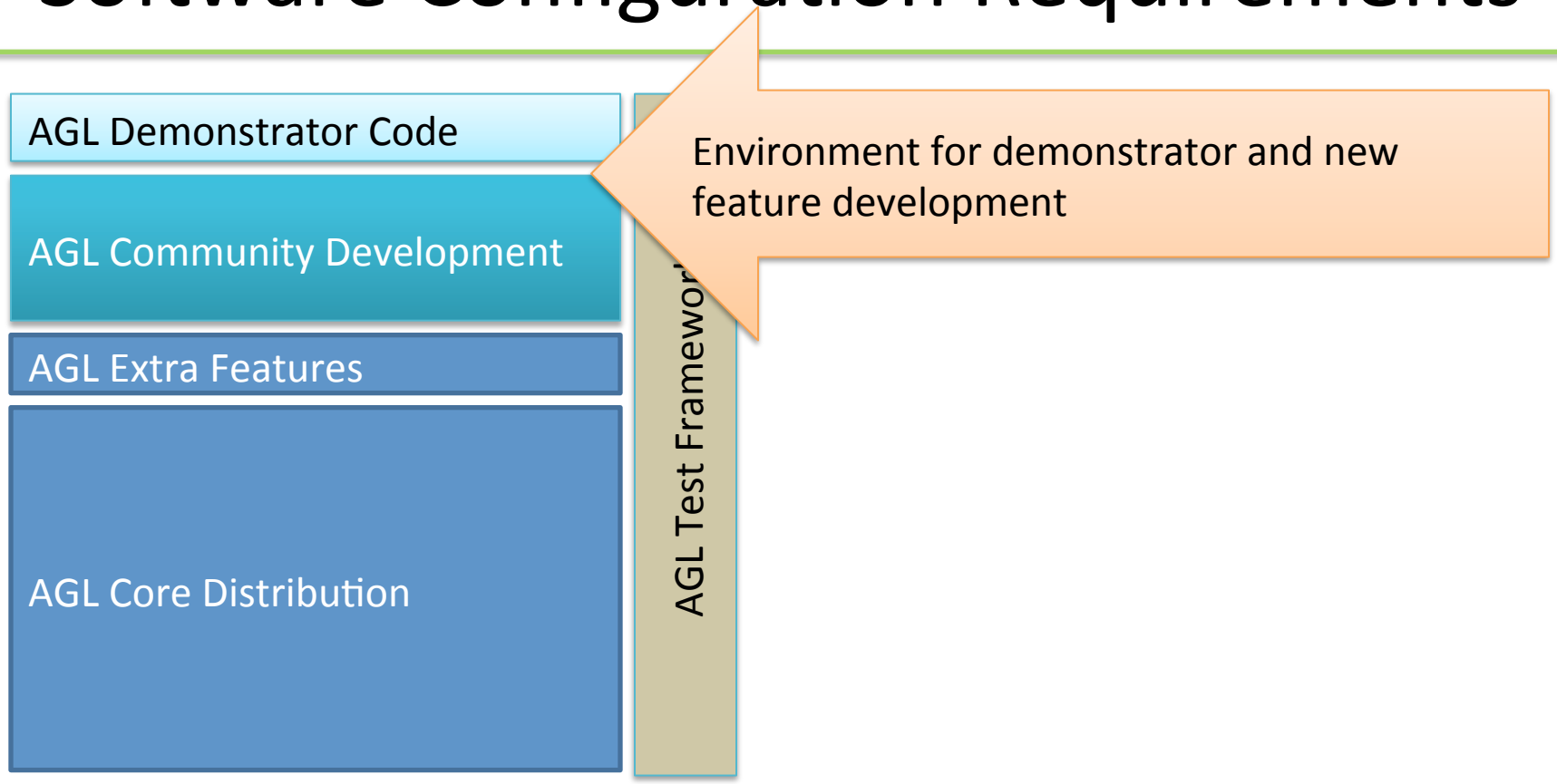
- Builds on AGL Core Distribution
- Features are fully tested and supported as part of AGL release
- AGL environment set up provides extra features that may be enabled by device creators
- Device profiles (e.g., Telematics, ADAS) will be provided in AGL Extra Features
- Yocto layer – meta-agl-extra

AGL Community Development

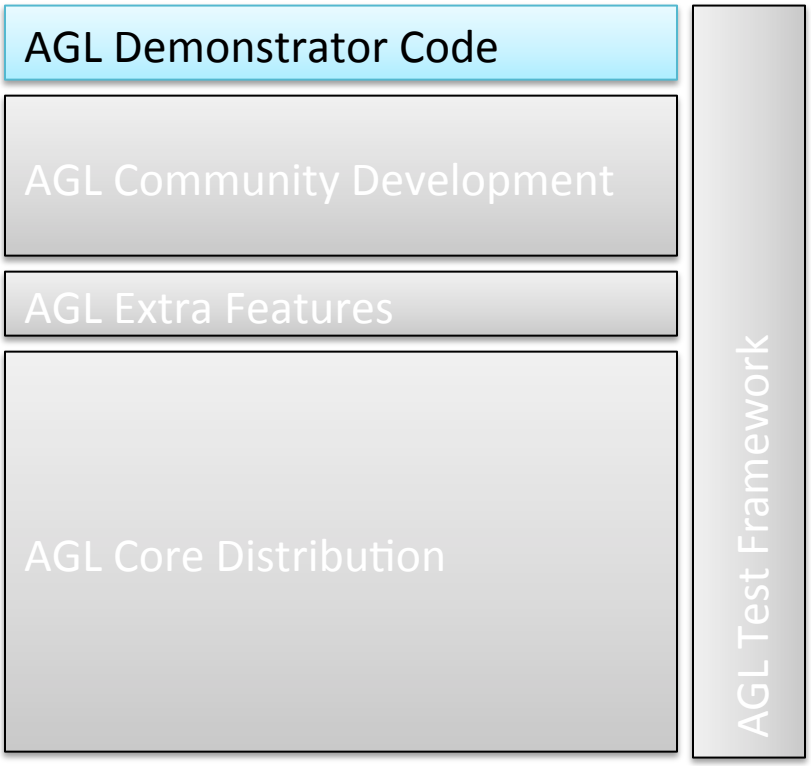


- Place for developing code that may eventually make it into AGL Core or Extra Features
- Snap shot builds for experimental features to facilitate collaboration
- Community BSPs without official support
- Snap shot builds may be provided for Community BSPs
- No formal QA – basically whatever the community can provide
- Defined by Yocto layer – meta-agl-devel

Software Configuration Requirements

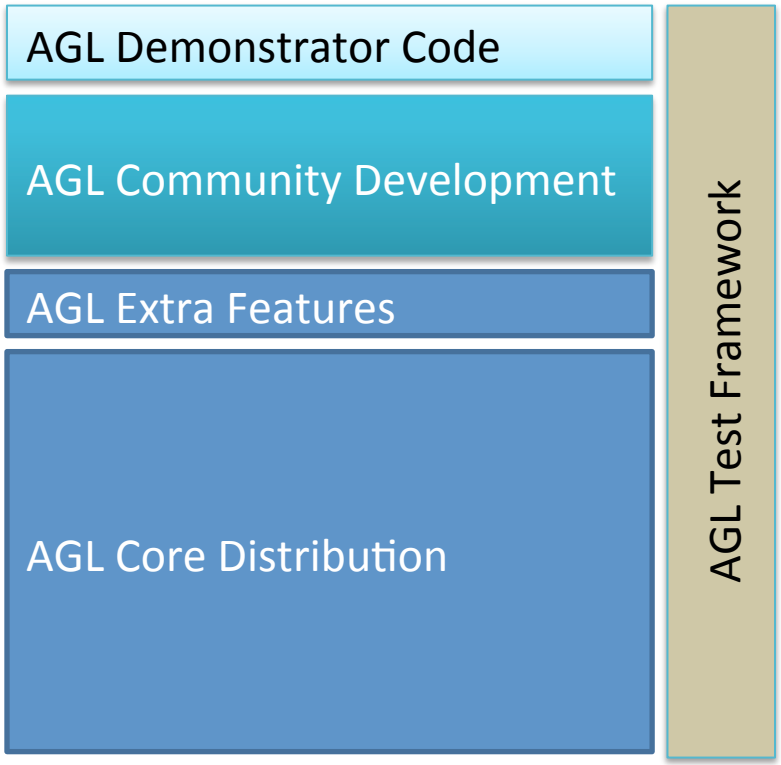


AGL Demonstrator Code



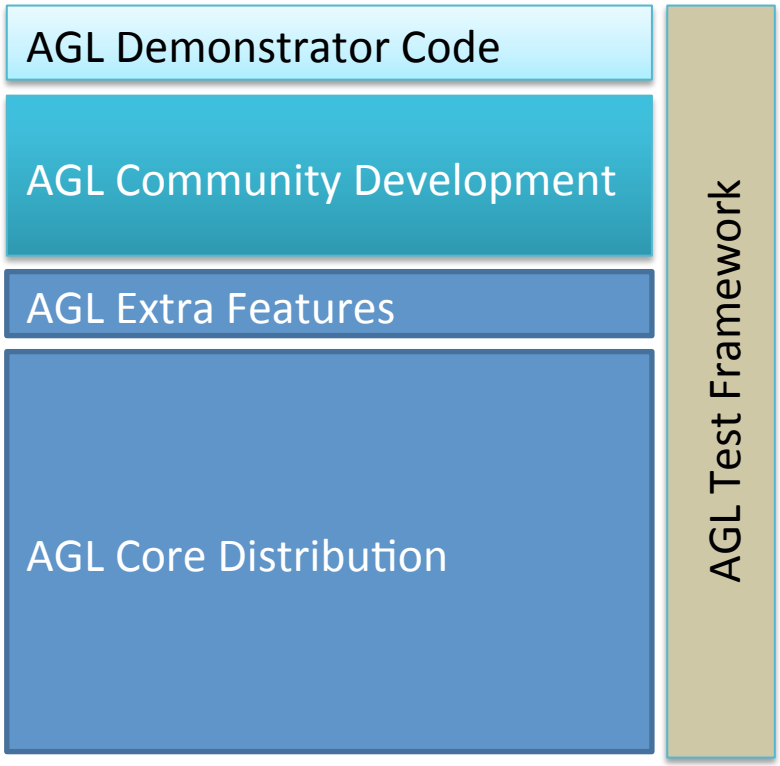
- Code developed to demonstrate specific features and/or releases of AGL
- CES 2016
- Automotive Linux Summit 2016
- Intended for “one shot” development
- Provided “as-is”
- Yocto layer – meta-agl-demo

Release Management



- Twice per year release of AGL Distribution includes
  - AGL Core Distribution and Extra Features
  - All code and tooling with test results
  - Full test results for reference BSPs
  - As-Is demo code, Community Developed features, and BSPs
- Support biannual releases with code fixes for six months
- Long term support (2+ years) for selected releases
- Daily snapshot builds for specific configurations
- Pre-release candidates to allow developer collaboration and coordinated testing

AGL Yocto Layers



meta-agl-demo

meta-agl-devel
- meta-agl-sota
- meta-<BSP>

meta-agl-extra
- meta-iot-appfw
- meta-qt5

meta-agl
- meta-agl
- meta-agl-bsp
- meta-ivi-common
- meta-agl-security

- meta-poky
- meta-oe
- meta-<BSP>

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Get The Code

- Pre-built binaries and source tar balls available
  - https://www.automotivelinux.org/software/download
- Latest Source Code and Build Instructions
  - https://wiki.automotivelinux.org/agl-distro/source-code

Build Options

- Once you have the repos set up use
  $ source meta-agl/scripts/aglsetup.sh –h
- To determine available boards and build options
- Example – Build QEMU AGL Demo

  $ source meta-agl/scripts/aglsetup.sh -m qemux86-64 agl-demo agl-netboot agl-appfw-smack

  $ bitbake agl-demo-platform

GETTING INVOLVED – EXPERT GROUPS

Expert Groups

- Six Current EGs
  - App Framework and Security
  - Connectivity
  - UI and Graphics
  - CI and Automated Test (CIAT)
  - Navigation
  - Virtualization
- EGs focus on requirements and architecture
  - Kernel, Common Libs and OS are subsystem teams

App Framework and Security EG

- *Application lifecycle (install, run, remove, applications)*
- *SDK and application developer experience both in security and APIs*
- *Security framework, 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

App Framework Tasks

- Upcoming Improvements to App Framework
- Conversion to systemd completed in CC
- Complete cgroups implementation
- Namespace (Will be included in Daring Dab)
- Resource management using cgroups (memory, CPU usage, CPU affinity, network bandwidth)

App Framework Tasks

- Identity and user management via Bluetooth/NFC presense
- Key management for app installation and the manifest that gives the rights within cynara policy checker
- First boot app installation mechanism
- Building apps in CI using SDK and providing snapshot builds.
- Consistent templates and documentation for creation of apps and widgets
- Documentation of how to convert legacy apps to AGL Apps using Qt5 or HTML5 backend.
- Consent management for managing resources and applications. Examples include payments, enabling LBS.

UI and Graphics EG

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

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

Graphics and UI Tasks

- Wayland update to 1.11 from 1.9
- Refactor Home Screen including splitting out Window Manager
  - Updated Window Manager for better secondary display support
  - Pop-up support
  - Focus Management of out of focus applications
  - Latest Proposal

Graphics and UI Tasks

- Internode display protocol
  - Control IC display output from navi running on IVI system
- Theming and skinning
- Improved PulseAudio and Audio management configuration and policies
- Replacement of QtMultimedia for media management?
- Speech services API and integration into reference apps
- Support for Chromium browser engine

Connectivity EG

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

CIAT Task List

- Upstream our fork of Fuego from JTA
- Create system to publish and evaluate test results
- Add new reference boards to Lava and Jenkins
- Ensure CI system builds and checks for optional features when testing patches
- Static code analysis tools

Navigation EG

- Navigation API
- Location Based Services API
- Reference Navigation and POI apps
- Speech recognition integration

https://wiki.automotivelinux.org/eg-navi

Virtualization EG

- Hypervisor/ LXC
- Looking at Xen, Jailhouse, and others
- Newly formed expert group – kick-off meeting was held January 27
- Roadmap for 2017 in progress
- Several BoFs held prior to EG formation

https://wiki.automotivelinux.org/eg-virt

DARING DAB

Daring Dab

- Current master branch in git
- Update to Yocto 2.2 (morty)
- App Framework Improvements
- Secure signaling and notifications
- Smart Device Link
- App FW Service Binders
  - Navigation API
  - Speech Services API
  - Browser Engine API
  - CAN signaling

Upcoming Board Support

- Planned for Daring Dab Release
- Renesas R-Car 3
- Qualcomm SnapDragon 820
- BeagleBone?

…and Beyond

- AGL Reference Apps available in both Qt5 and HTML5 versions
- All APIs available as App FW Service Binders
- IC, Telematics and other profiles
- Complete set of documentation
- Expand binder API capability to RTOS for interoperability

2017 F2F Workshops

- Feb 8 -10 – AGL AMM - Tokyo
- Apr 4 – 5 – Microchip - Karlsruhe, Germany
- May 31 – ALS Tokyo Japan
- July 25 – 26 (proposed) – TBD
- October - Fall AMM - Germany
- Nov 15-16 – CES Integration Session – Japan TBA
- Dec 13-14 – CES Integration Session - Japan TBA

Q & A

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Q & A

- This is the segment where
  - You ask intelligent, well thought out questions
  - I ramble pointlessly and unintelligently
- And/Or
  - You ask “dumb” questions
  - I respond with concise, insightful, and well-reasoned answers

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THANK YOU

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