



Introduction to AGL Architecture and Roadmap

Automotive Linux Summit

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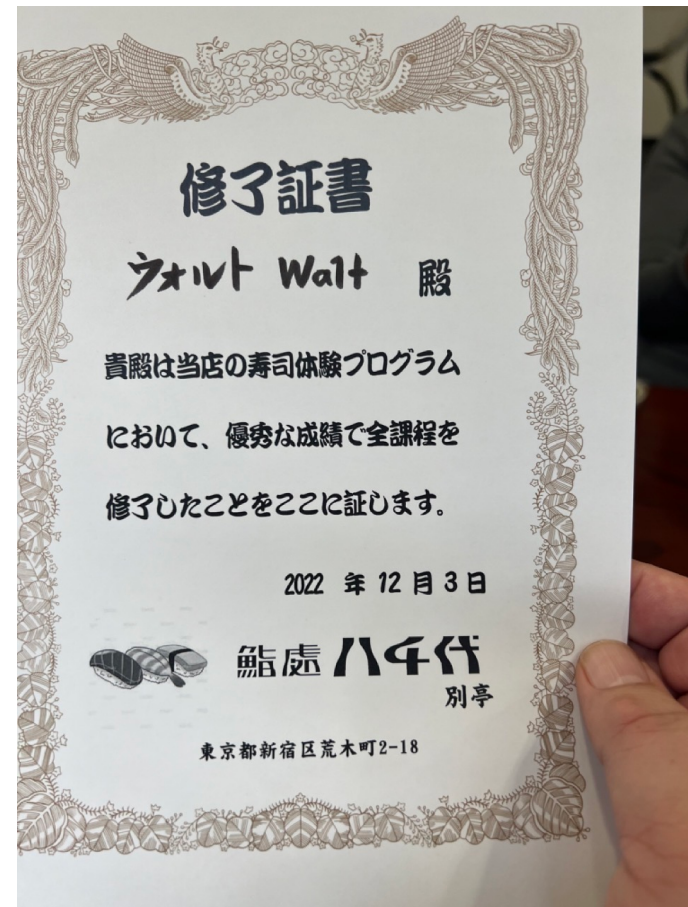
AGL Community Manager

Who is This Guy?

- Linux Foundation employee (8 years)
- AGL Development and Community Manager
- Previously at MontaVista and Mentor Graphics
- Continental AG
- Motorola Mobile Devices
- Motorola Telematics Communications Group



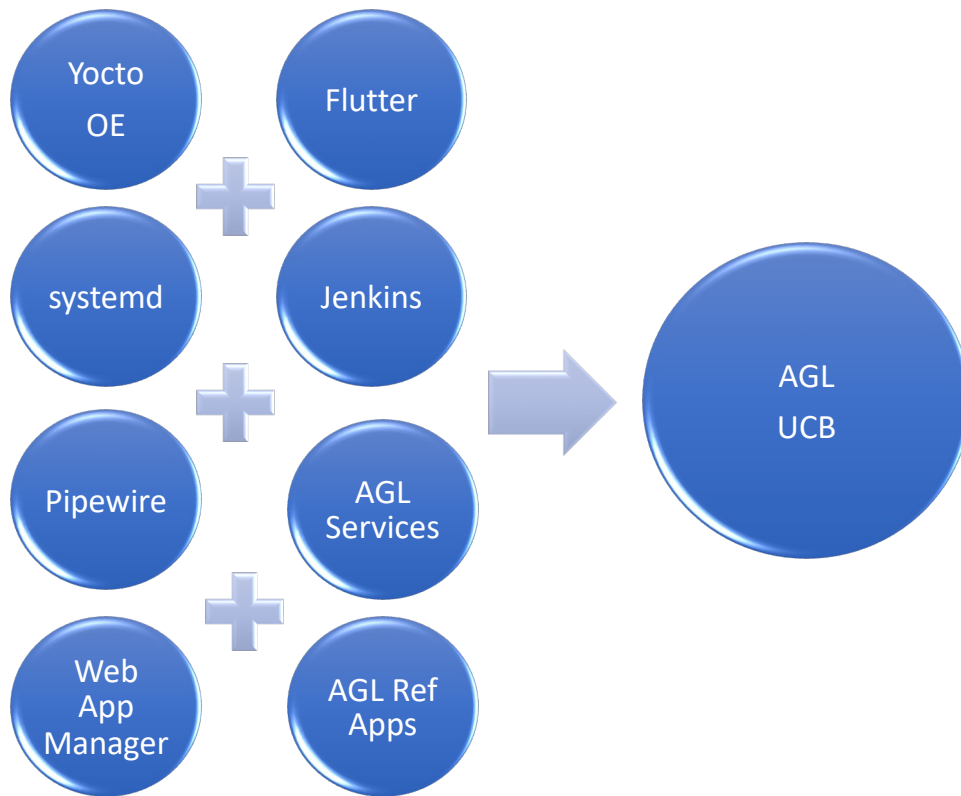
Apprentice Sushi Master



Intro

- This is intended to be a brief intro to the AGL Architecture with links to other resources
- For a general AGL introduction view
<https://www.youtube.com/watch?v=bzAar7PwWOk>
- Jan-Simon Möller and I will be available for "office hours" at 4:20 pm
- AGL Sponsor booth
- AGL Developer BoF session tomorrow at 5:40 pm

AGL Distro “Unified Code Base”



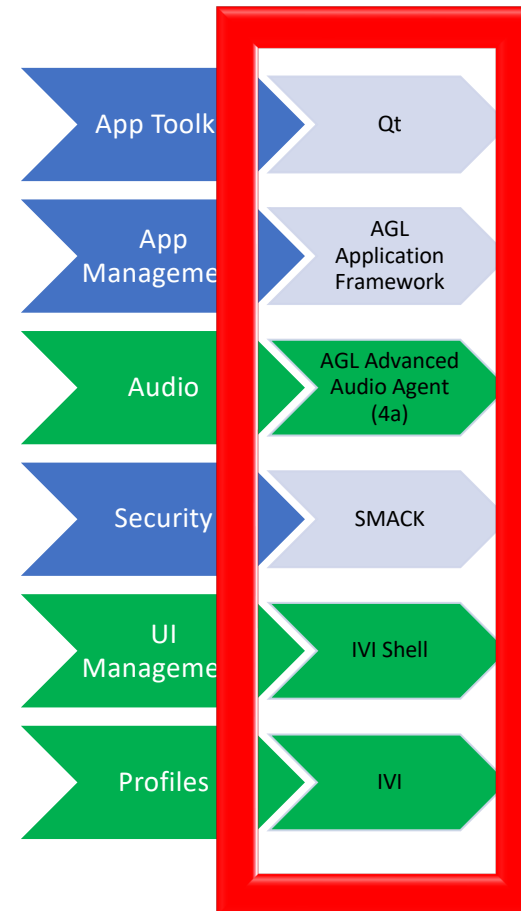
- *Fourteen major releases!*
- *Unifying the best of Open Source into a single code base for the entire industry!*
- *Reduce fragmentation, focus on innovation and new features!*
- *Production ready! Now in Toyota and Subaru vehicles!*

Code First/ Upstream First

- AGL has invested in automotive software components not available anywhere else
- Continually evaluating open source technologies to find best in class for automotive use cases
- AGL has invested (provided developers and upstreamed code) in open source projects such as Pipewire, Yocto, Lava, and others.

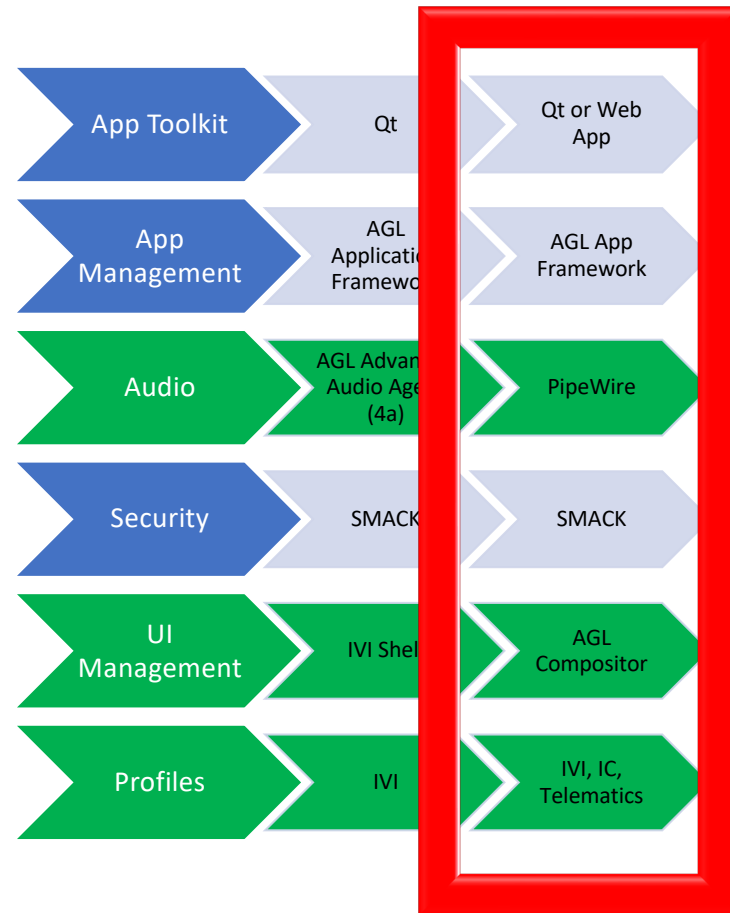
AGL Transformation (Pre-Lamprey)

- Initial releases of AGL UCB included carry-over and improvement of Tizen IVI components

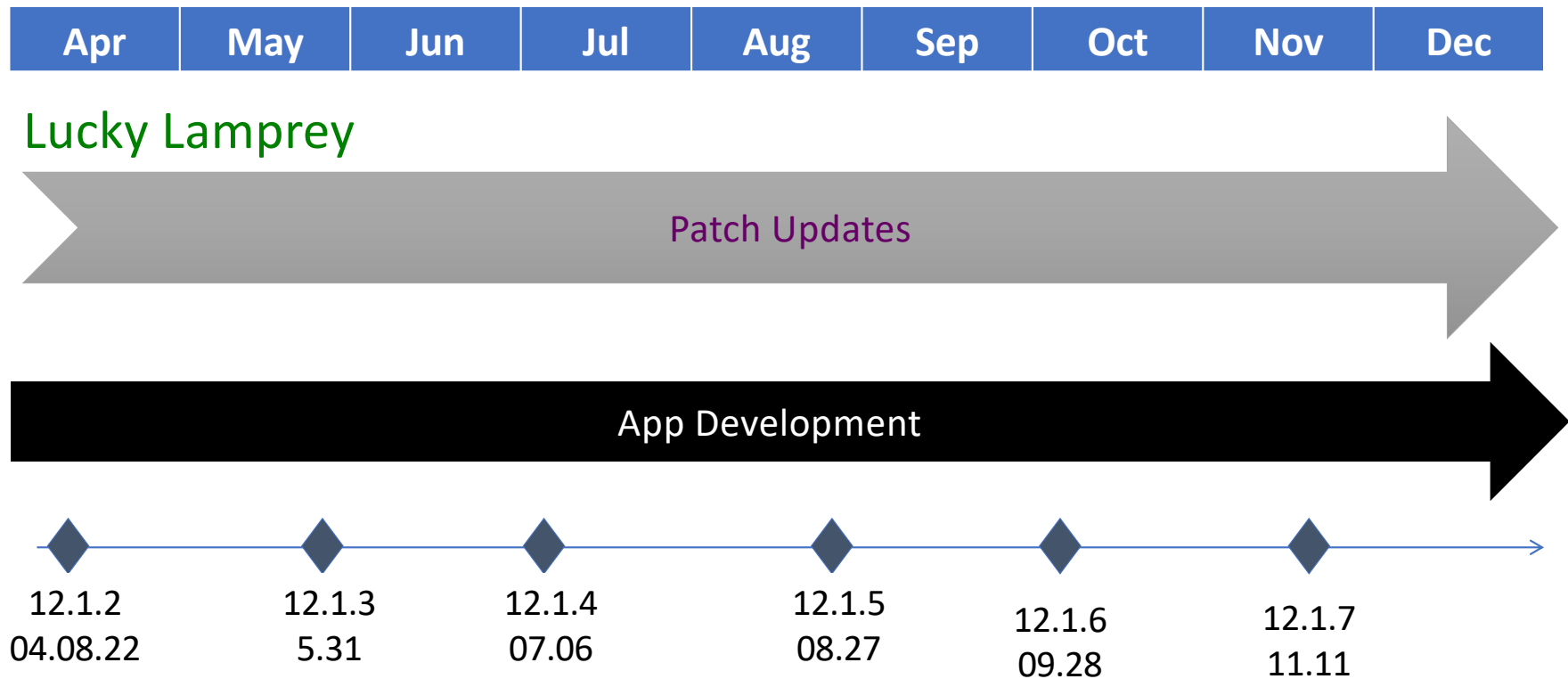


AGL Transformation (Lamprey)

- With Lamprey release we had invested in PipeWire, Wire Plumber, AGL Compositor, and Web App Manager and more.
- Lamprey (12.1.x) will be supported with updates until 2024.
- YP 3.1.x LTS updates to continue until 2024
- Lamprey final release with Legacy AGL App Framework support



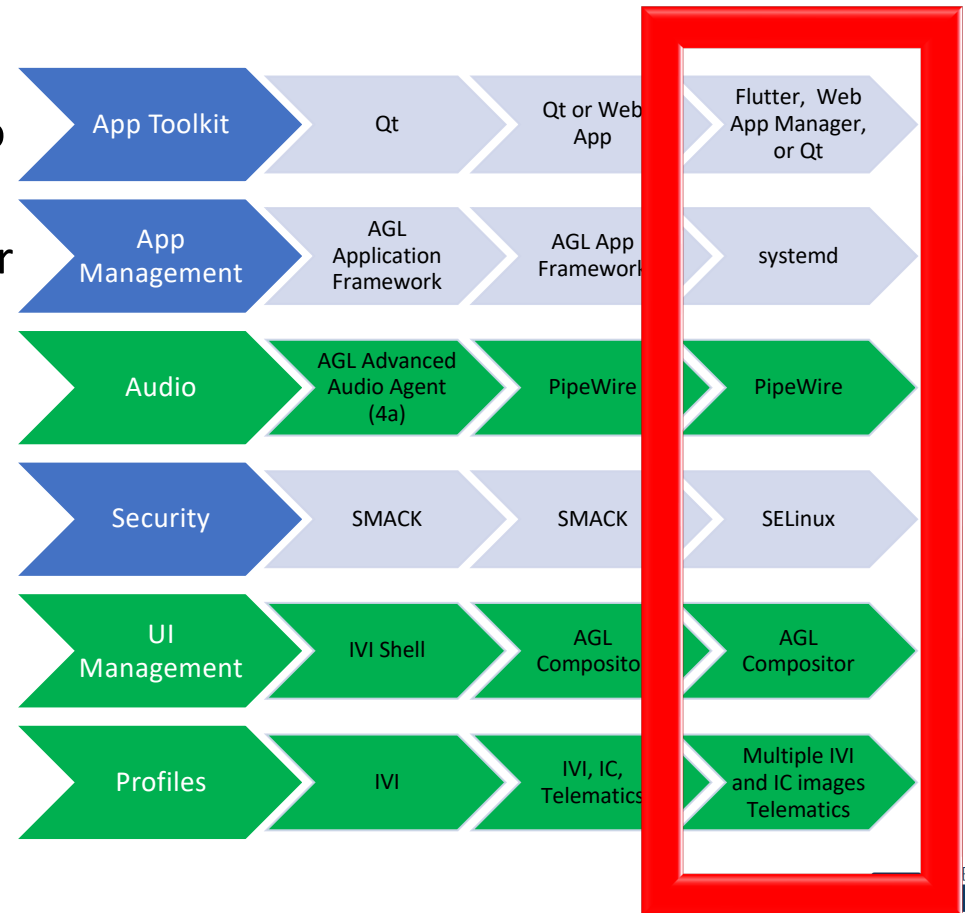
Lucky Lamprey Patch Releases



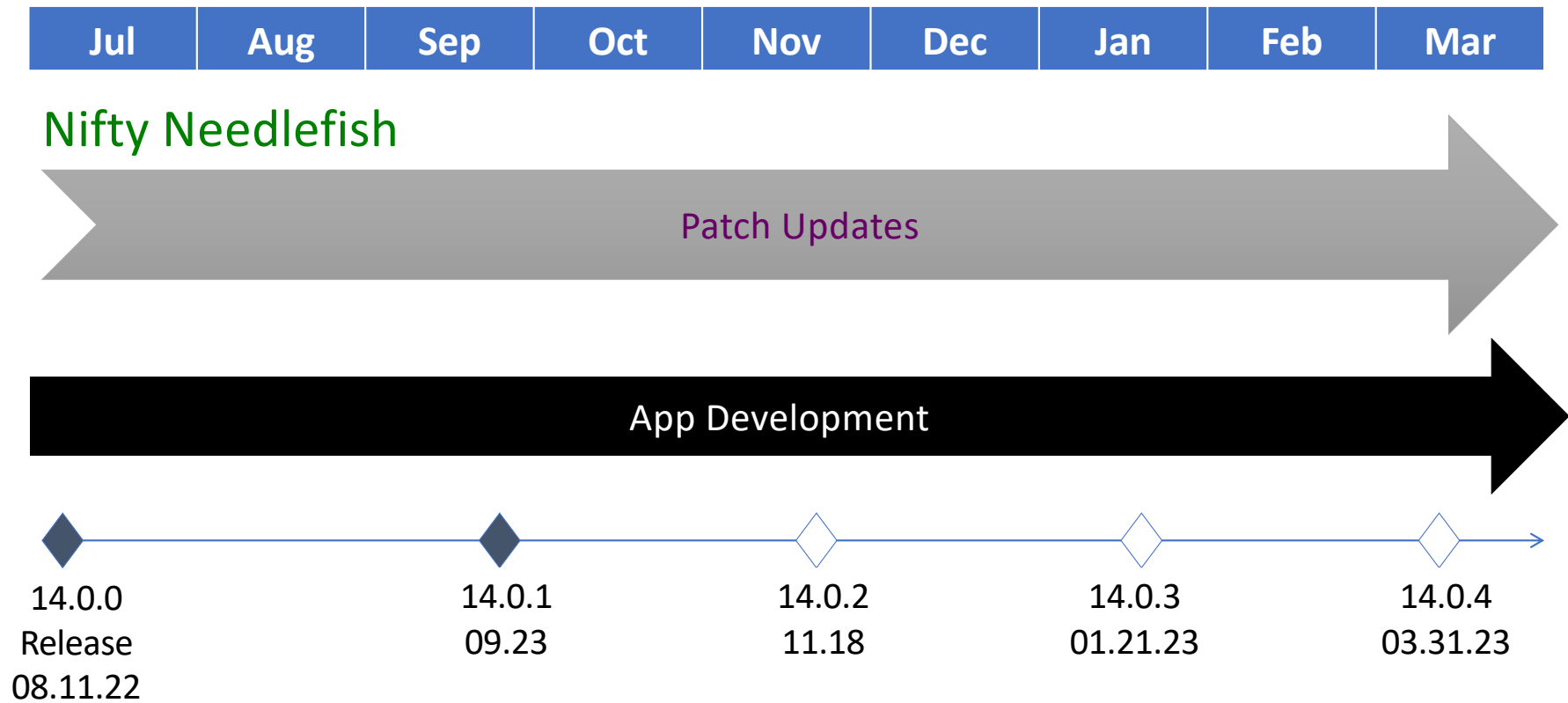
As of 30 November 2022

AGL Transformation (Needlefish)

- 2022 saw us transitioning AGL Reference Apps and Service Binders to newer technologies
- Replace Qt reference Apps with Flutter and Web Apps
- Replaced Vehicle Signal Manager with kuksa.val and VSS
- YP 4.0.x (kirkstone) LTS updates to continue until 2024
- Use Systemd units for app management

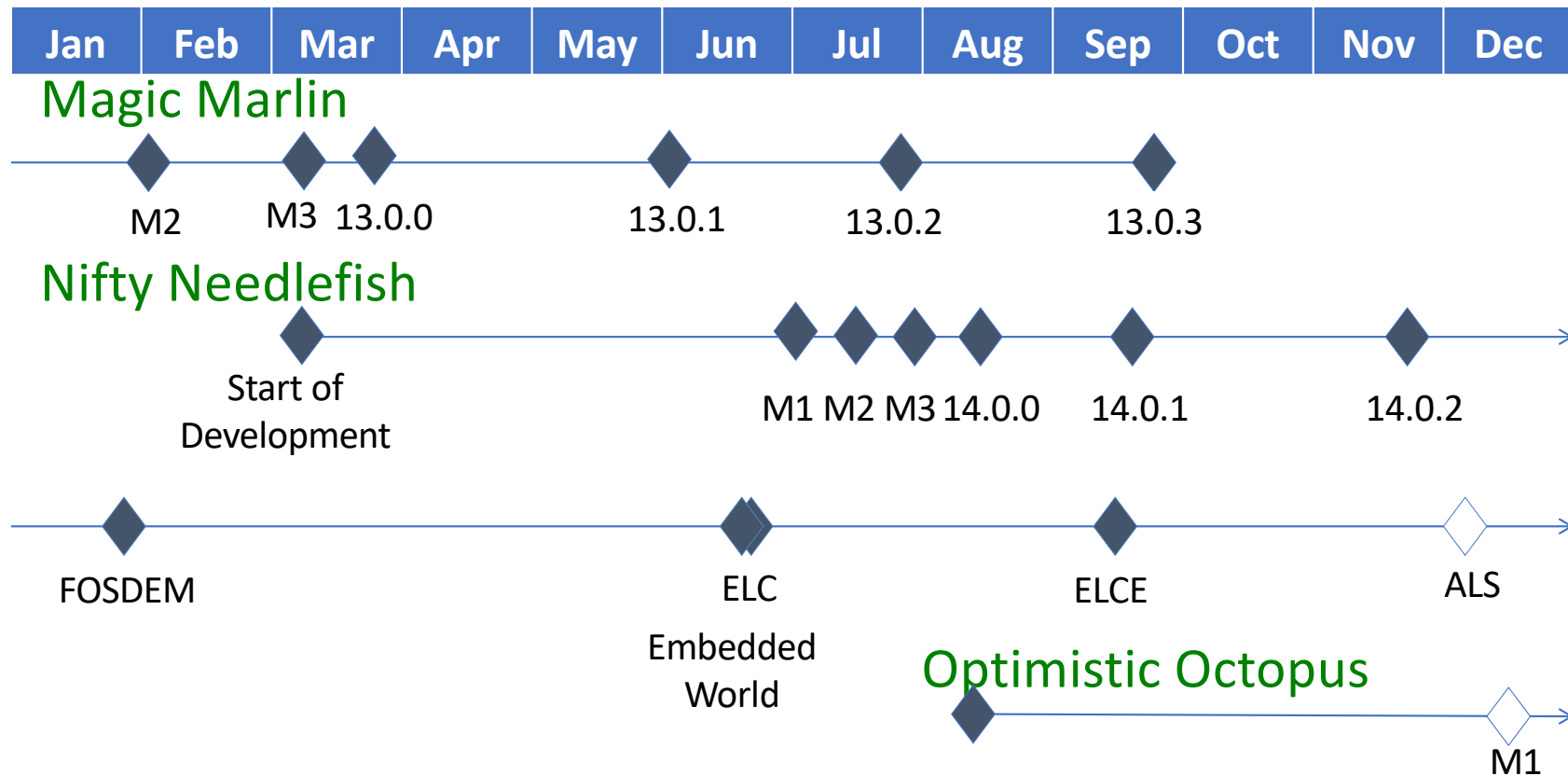


Nifty Needlefish Patch Releases



As of 30 November 2022

2022 AGL Schedule



As of 30 Nov 2022

Flutter Embedder

- Toyota has developed a Flutter embedder solution for AGL.
- Reference apps are included in the next release (Feb 2023) and can be previewed in the AGL Sponsor Booth
- Joel Winarske from Toyota will provide detailed information on the Flutter solution at 1:30 pm

Instrument Cluster EG

- DRM Lease added to IC profile in UCB
- Refence solution with IC and IVI in containers completed and can be previewed in the AGL Sponsor Booth
- See presentation by Harunouo Kurokawa at 1:50 pm for more details.

AGL App FW

Feature	Lamprey	Needlefish	Pike
App Start/Stop	App Framework Main	Applaunchd	Applaunchd
LSM	SMACK	SELinux	SELinux
Sandboxing	SMACK based	N/A	To be added
Packaging	W3C Widgets	N/A	TBD
IPC	Websockets	Not standardized	gRPC

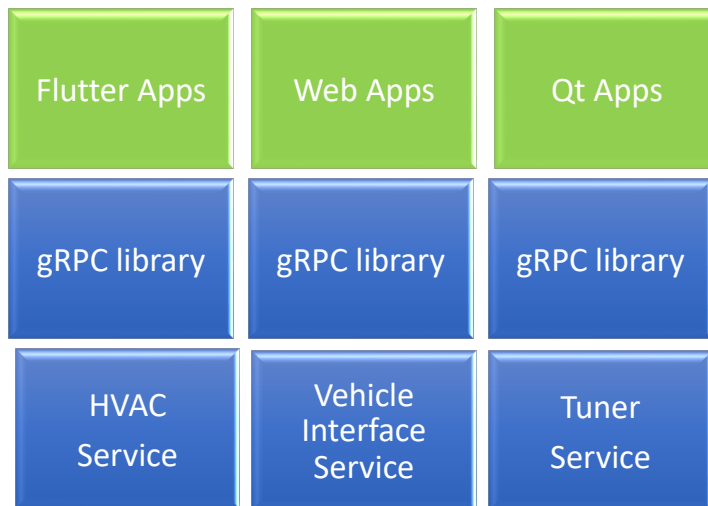
- Applaunchd uses systemd units. Less maintenance, more future proof.
- SELinux in permissive mode

Packaging/ Sandboxing

- W3C deprecated widget support so that was not really an option anymore
- Studied flatpack
 - In theory meets most of our requirements
 - Extensive, custom runtime support would be required for AGL
- We do not have resources to build a new custom runtime for packaging without an OEM/ Tier One giving preference and committing to it long-term (i.e. providing resources and support)
- Working to enable some basic sandboxing using systemd

IPC

- Standardizing IPC to gRPC and protobufs across UCB
- Replace legacy web socket based AGL service binders with gRPC API



- Easier to add future toolkits.
- No custom code to be maintained per toolkit.
- Standard methodology to add new services

SELinux

- UCB runs SELinux in permissive mode
- Need donation or developer to work on rules for non-permissive SELinux

AGL Compositor

- Invested in creating a Wayland AGL Compositor to replace Qt Compositor used in older versions of the UCB
- See
 - <https://www.collabora.com/news-and-blog/news-and-events/a-libweston-based-compositor-for-automotive-grade-linux.html>
- IVI Shell still being used. Need to explore how to augment the compositor in 2023 to cover these use cases
- Marius Vlad has a presentation at 3:30 pm JST

AGL Audio

- Significant investment in Pipewire and Wireplumber for audio routing, management and policies
- For Pipewire see
 - https://wiki.automotivelinux.org/_media/agl-distro/tokyo-als-pipewire-july-2019.pdf
 - <https://www.youtube.com/watch?v=TWvketpgpec>
- WirePlumber
 - <https://www.collabora.com/news-and-blog/blog/2020/05/07/wireplumber-the-pipewire-session-manager/>

AGL CI

- AGL uses Jenkins and Lava to drive our CI
- See
 - <https://www.youtube.com/watch?v=Q-wxPRYS>
- See Jan-Simon Möller's presentation following this one for tips on speeding up builds

Roadmap 2023

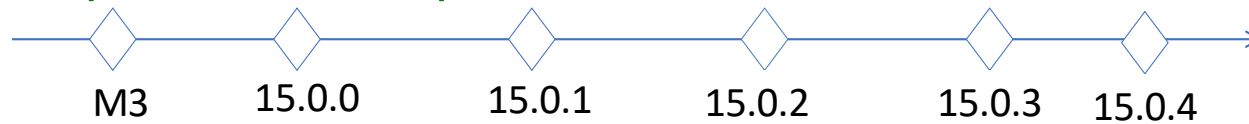
Release Planning

- Optimistic Octopus (Feb 2023)
 - YP Kirkstone (latest YP LTS)
 - App FW and IPC evolution hardened
 - CES demo using Flutter OR WAM reference apps.
 - SELinux in non-permissive mode (looking for donation of rules)
 - Instrument Cluster production ready

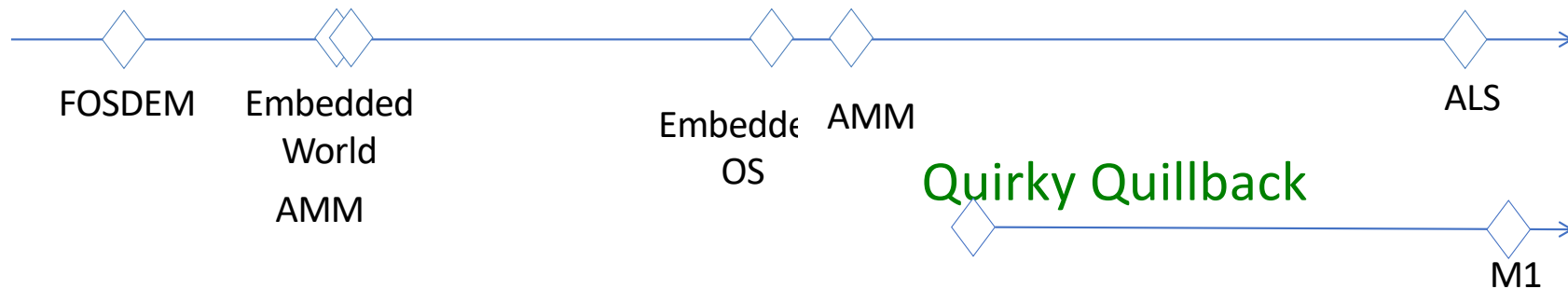
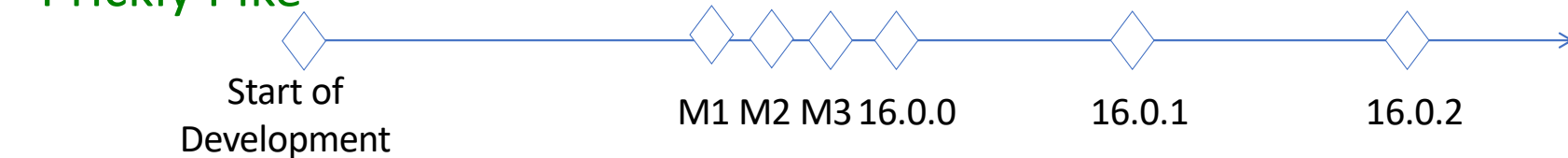
2023 AGL Schedule

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Optimistic Octopus



Prickly Pike

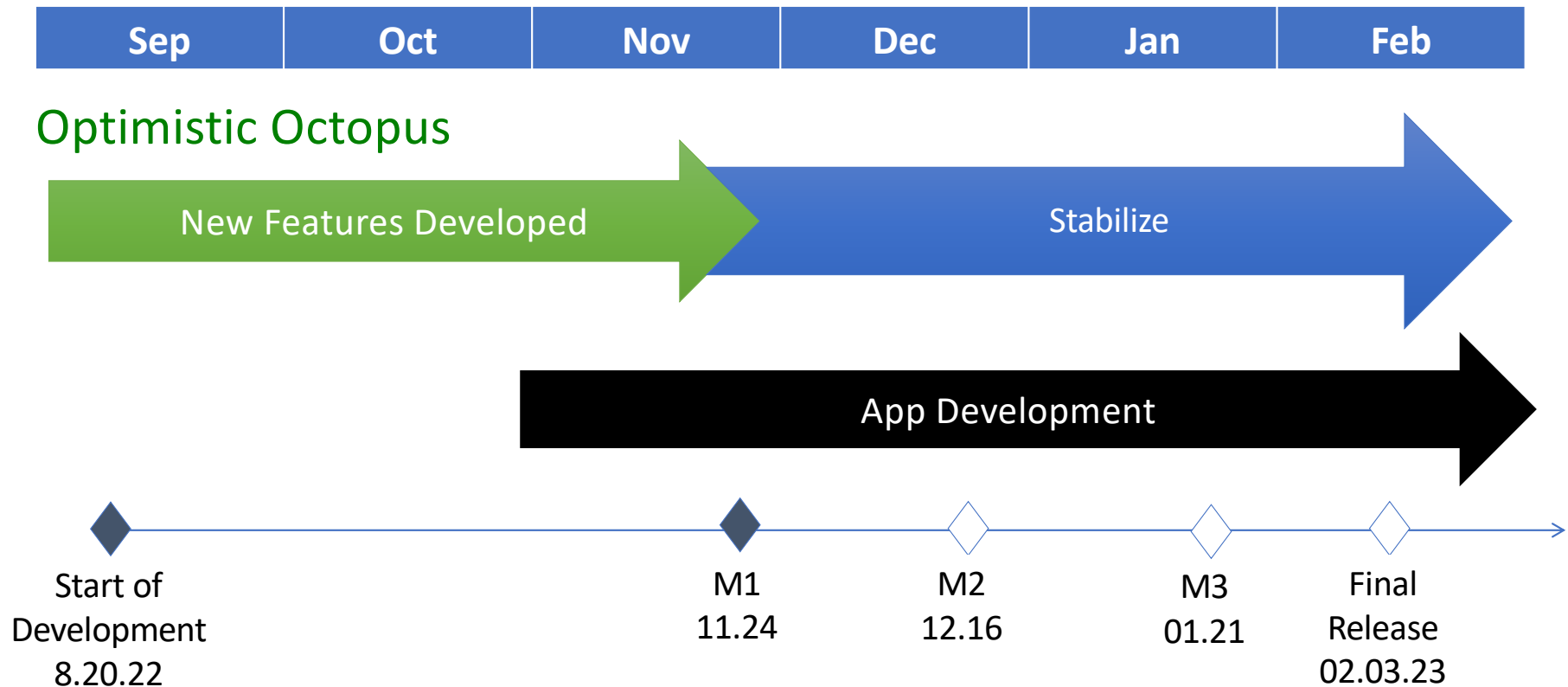


Quirky Quillback

Start of Development

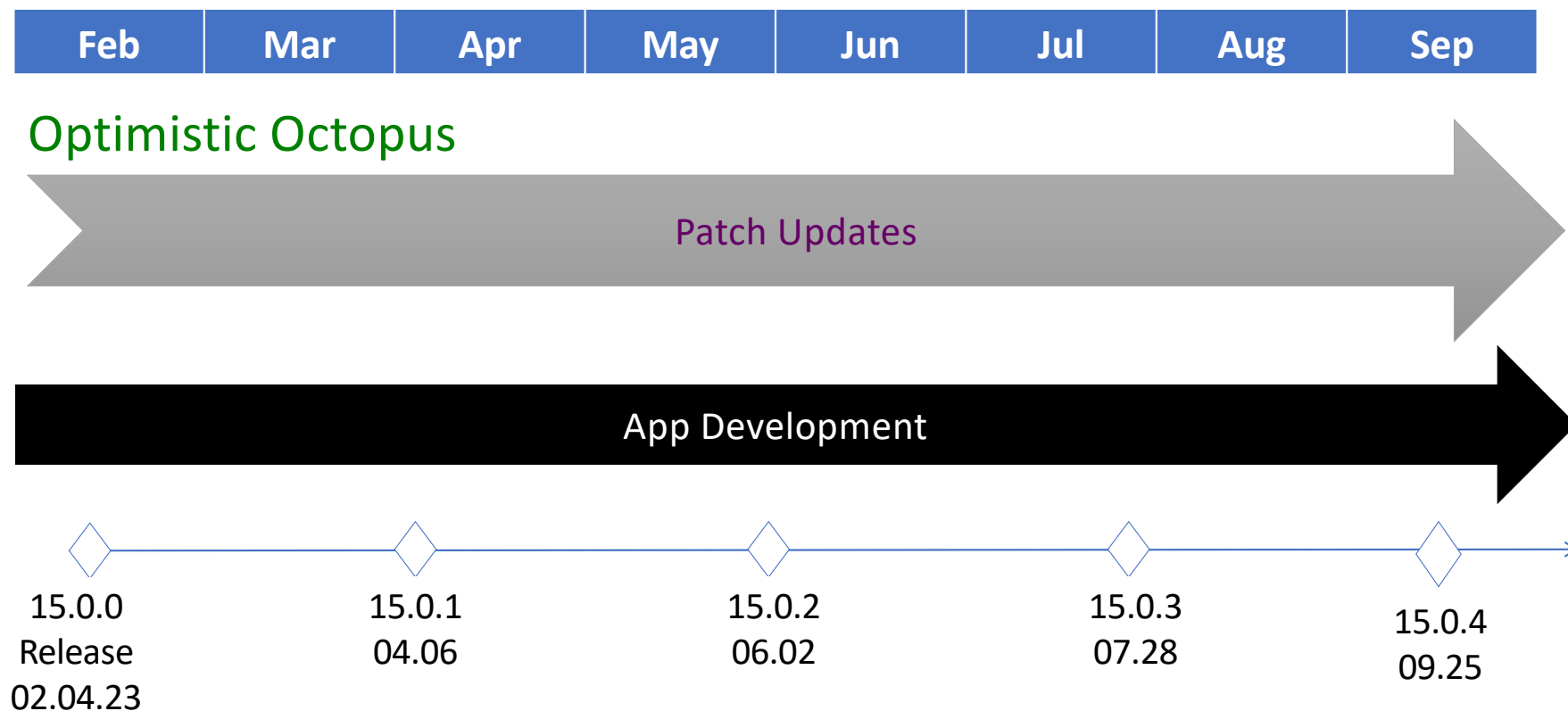
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Optimistic Octopus



As of 30 November 2022

Optimistic Octopus Patch Releases



As of 30 November 2022

IVI EG

- Toyota will continue to add features to the Flutter embedder
- Synergy
 - AGL upstreaming fixes and lessons learned to Toyota
 - UCB Reference apps developed by non-Toyota engineers provide stress tests and additional use cases to Toyota developers
 - Additional reference apps will be added to the UCB

Vehicle to Cloud EG

- New Lead identified – James Simon AMS
- AWS is creating a specification, message schema, and reference implementation for cloud communication using MQTT to be open sourced with AGL
- VSS to be used for in-vehicle communications – tie in with Connectivity EG work

V2C Tasks for 2023

- Detailed for secure connection and provisioning for vehicle to designs cloud communication with MQTT
- Detailed flow diagrams for common vehicle messaging MQTT Request/Response Patterns with error handling and resilience mechanisms
- General Guidance on using MQTT 5 and proper topic design
- VSS Compliant Protocol Buffer message schemas for all of the most common vehicle communication use cases (Data Collection, configuration, remote diagnostics, remote commands etc...) Along with detailed designs for topics and message orchestration
- GRPC Schemas for MEC (Wavelength) communication
- Reference implementation code for Proto Messages and GRPC

Virtualization and Containers

- VirtIO has been the focus of since 2021
- KVM available in AGL UCB running the Panasonic demo shown in AGL Sponsor Booth
- Working with AWS on Graviton solution for developing and deploying AGL
- Service mesh vehicle concept for 2023
- See Jerry Zhao and Haydn Peterswald presentation today at 16:35

Ask Questions

- Weekly Developer Call on Tuesdays

<https://wiki.automotivelinux.org/dev-call-info>

- IRC channel #automotive on libera.chat

Discussion about open source software for vehicles. No help for mechanical issues should be accepted from anyone on this channel.

- Dev Community Mail List

<https://lists.automotivelinux.org/g/agl-dev-community>

THANK YOU
