Automotive WG Update

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Aerospace · Automotive · Linux Features
Medical Devices · OS Engineering Process
Safety Architecture · Systems · Tools

Topics

- Working group goal & introduction
- Milestones & achievements in 2023
- Challenges and fails
- Current focus / activities
- Plans for 2024 & collaboration opportunities

Working Group Goal & Introduction

Working Group Goal

“Discuss the conditions and prerequisites the automotive sector needs to integrate Linux into a safety critical system.
We focus on actual use cases from the Automotive domain to derive the technical requirements to the kernel and the development process.”

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Milestones & Achievements

Milestones & Achievements

- One pager for Automotive Grade Linux (AGL) at CES and embedded world…
- Panel with Eclipse Software Defined Vehicle at Exida Symposium
- Reproducible CI Setup of meta-elisa (AGL enhanced cluster demo)
  - Daily tested builds with downloadable images
  - Including SBOM generation for yocto parts
- Strong participation of Automotive companies during ELISA Workshops
- Many automotive centric material created by members and affiliates

ELISA One Pager

Workload Tracing Packages Added to the CI

– Documentation upstream available:
  linux.git/tree/Documentation/admin-guide/workload-tracing.rst

index : kernel/git/torvalds/linux.git

Linux kernel source tree

about summary refs log **tree** commit diff stats

path: root/Documentation/admin-guide/workload-tracing.rst

blob: b2e254ec8ee846afe78eede74a825b51c6ab119b (plain)

```
.. SPDX-License-Identifier: (GPL-2.0+ OR CC-BY-4.0)

======================================================
Discovering Linux kernel subsystems used by a workload
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Key Points
==========

 * Understanding system resources necessary to build and run a workload
   is important.
 * Linux tracing and strace can be used to discover the system resources
   in use by a workload. The completeness of the system usage information
   depends on the completeness of coverage of a workload.
 * Performance and security of the operating system can be analyzed with
   the help of tools such as:
   `perf <https://man7.org/linux/man-pages/man1/perf.1.html>`_,
   `stress-ng <https://www.mankier.com/1/stress-ng>`_,
   `paxtest <https://github.com/opntr/paxtest-freebsd>`_.
 * Once we discover and understand the workload needs, we can focus on them
   to avoid regressions and use it to evaluate safety considerations.
```
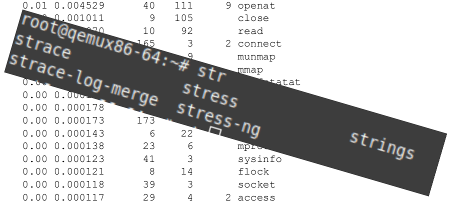

```
root@qemux86-64:~# strace -c  stress-ng --netdev 1 -t 60 --metrics
stress-ng: info:  [395] setting to a 60 second run per stressor
stress-ng: info:  [395] dispatching hogs: 1 netdev
stress-ng: info:  [395] successful run completed in 60.01s (1 min,
0.01 secs)
stress-ng: info:  [395] stressor   bogo ops real time  usr
time  sys time   bogo ops/s bogo ops/s CPU used per
stress-ng: info:  [395]                           (secs) (secs)
(secs)   (real time) (usr+sys time) instance (%)
stress-ng: info:  [395] netdev     13566190 60.00  8.17 48.40
226102.70  239812.44    94.28
% time seconds  usecs/call calls errors syscall
------ ----------- ----------- --------- --------- ----------------
 99.97   48.405401 24202700     2     1 wait4
  0.01 0.004856      539     9       write
  0.01 0.004529       40   111     9 openat
       0.001011        9   105       close
                      10    92       read
                              3     2 connect
                                     munmap
                                     mmap
  0.0
  0.00 0.000
  0.00 0.000178
  0.00 0.000173      173
  0.00 0.000143        6    22
  0.00 0.000138       23     6       mpr
  0.00 0.000123       41     3       sysinfo
  0.00 0.000121        8    14       flock
  0.00 0.000118       39     3       socket
  0.00 0.000117       29     4     2 access
  0.00 0.000102       11     9       getpid
  0.00 0.000051       10     5       prlimit64
  0.00 0.000049       16     3       sendto
  0.00 0.000046       46     1       getppid
  0.00 0.000026       26     1       getrusage
  0.00 0.000026       26     1       statfs
  0.00 0.000017        5     3       geteuid
  0.00 0.000015        5     3       brk
  0.00 0.000013        6     2       getuid
  0.00 0.000012        6     2       lseek
  0.00 0.000012       12     1     1 rt_sigreturn
  0.00 0.000011       11     1       getcwd
  0.00 0.000010        2     4       pread64
  0.00 0.000008        8     1       getrandom
  0.00 0.000007        7     1       sigaltstack
  0.00 0.000005        5     1       uname
  0.00 0.000002        2     1       alarm
  0.00 0.000002        2     1     1 setpgid
  0.00 0.000002        1     2     1 arch_prctl
  0.00 0.000002        2     1       set_tid_address
  0.00 0.000001        1     1       set_robust_list
  0.00 0.000001        1     1       rseq
  0.00 0.000000        0     1       execve
------ ----------- ----------- --------- --------- ----------------
100.00    48.419806    97228   498    25 total
root@qemux86-64:~#
```



Challenges & Fails

- Automotive business remains a very conservative and intellectual property driven business
- Setting a use case with the right balance between attractiveness and complexity.
  - Something else then telltale (warning signs) is needed.

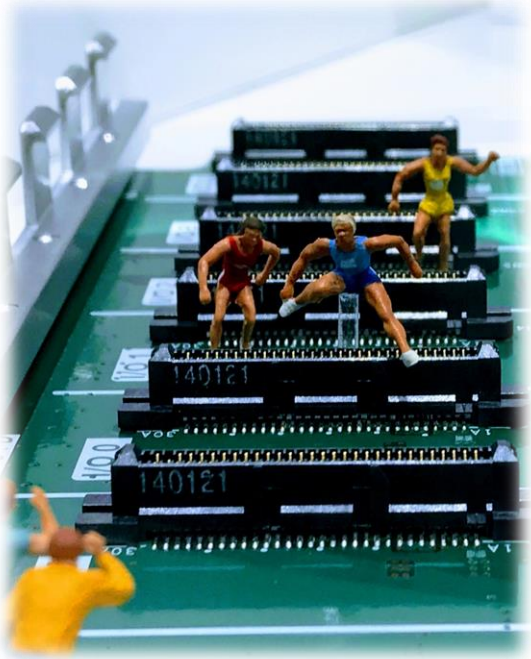


Photo by John Cameron on Unsplash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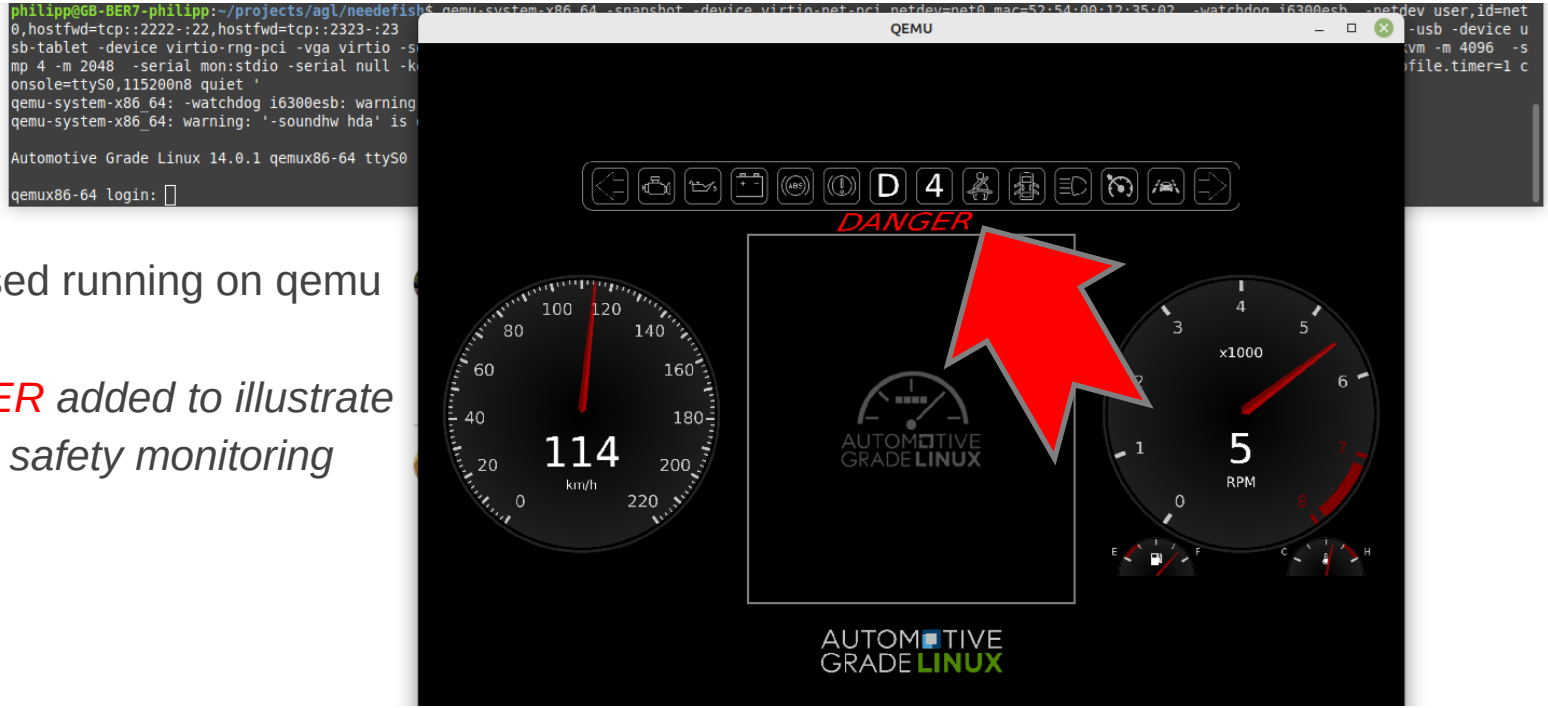
meta-elisa
CI Details

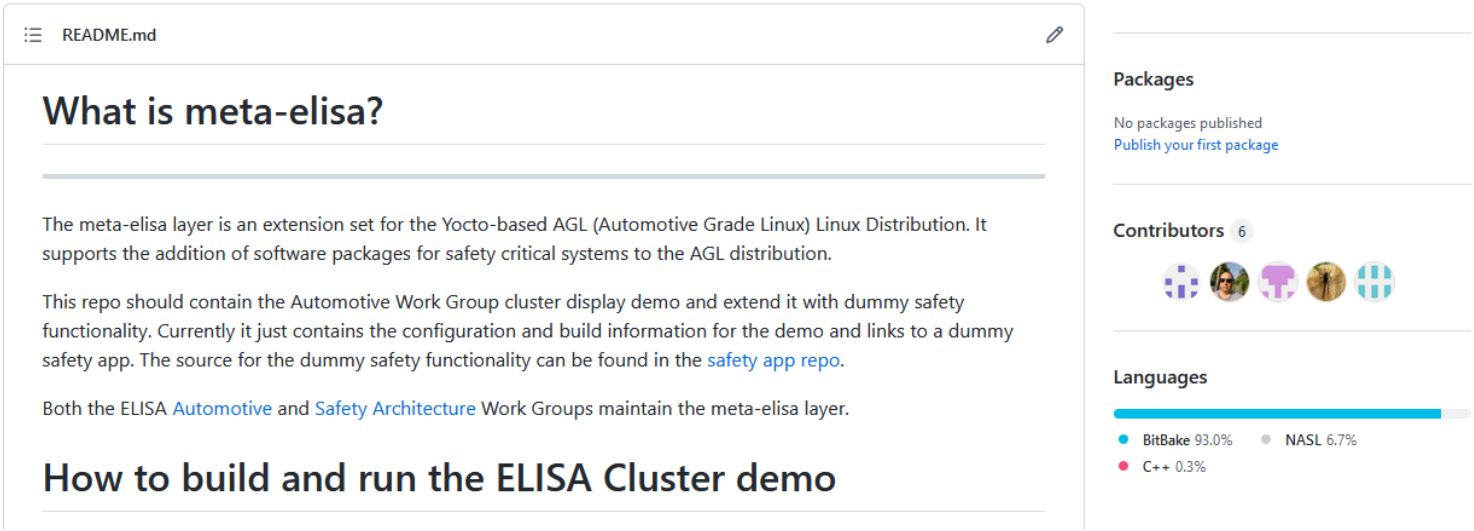
AGL Instrument Cluster Enhancements



- QT based running on qemu
- *DANGER added to illustrate tell tale safety monitoring*

Instrument Cluster CI

- Sources are fetched from meta-elisa
  https://github.com/elisa-tech/meta-elisa


README.md

What is meta-elisa?

The meta-elisa layer is an extension set for the Yocto-based AGL (Automotive Grade Linux) Linux Distribution. It supports the addition of software packages for safety critical systems to the AGL distribution.

This repo should contain the Automotive Work Group cluster display demo and extend it with dummy safety functionality. Currently it just contains the configuration and build information for the demo and links to a dummy safety app. The source for the dummy safety functionality can be found in the safety app repo.

Both the ELISA Automotive and Safety Architecture Work Groups maintain the meta-elisa layer.

How to build and run the ELISA Cluster demo

Packages

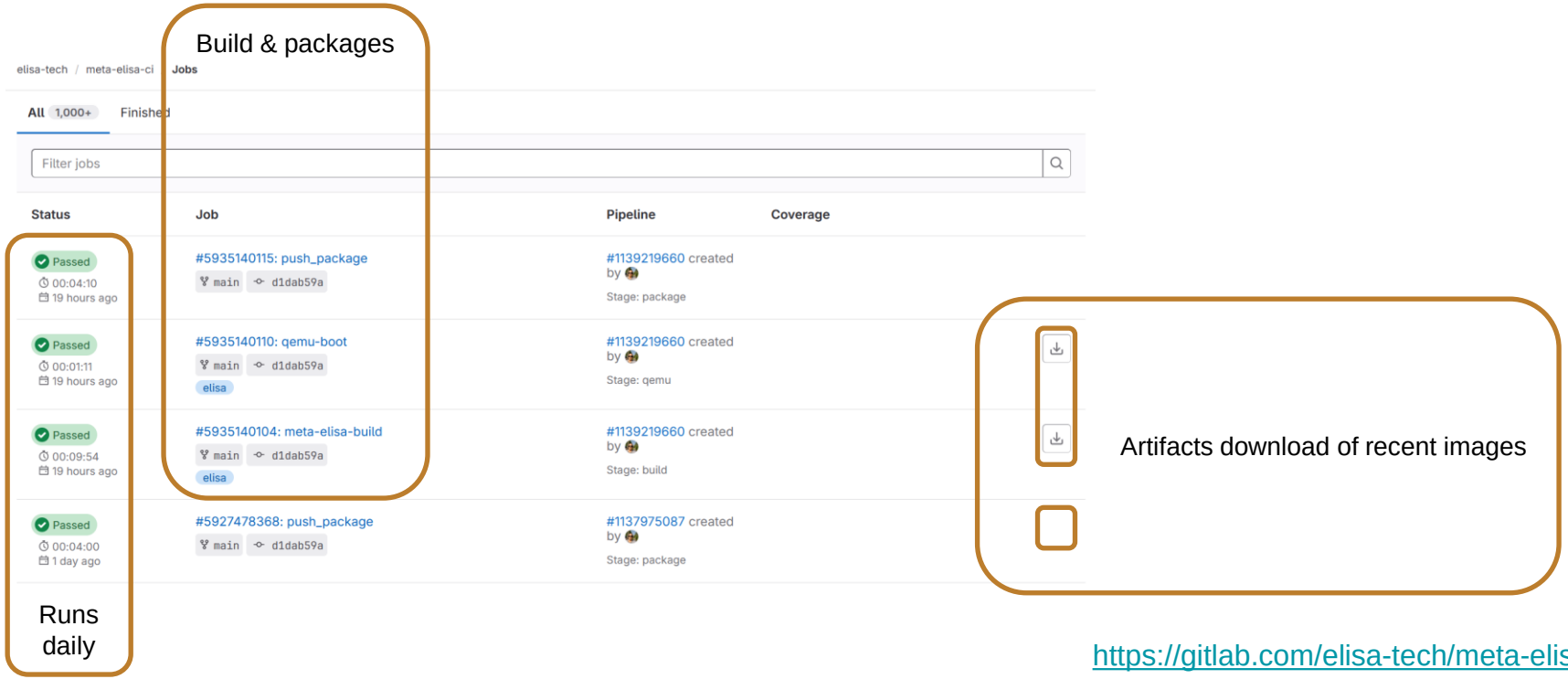
No packages published
Publish your first package

Contributors 6

Languages

BitBake 93.0% · NASL 6.7% · C++ 0.3%

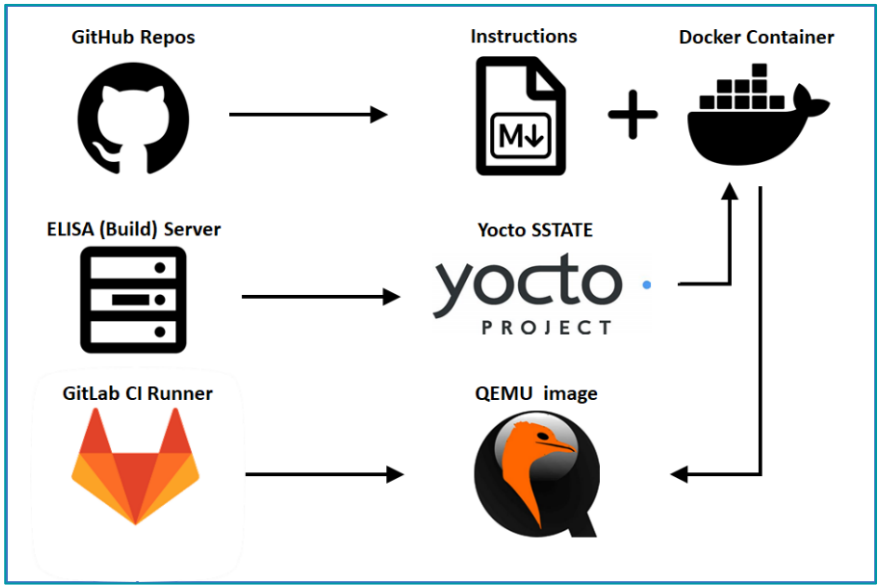
meta-elisa: CI Enablement



https://gitlab.com/elisa-tech/meta-elisa-ci

meta-elisa: Various Starting Points Provided

- Plain and native from source
  https://github.com/elisa-tech/meta-elisa
- Using docker container
  https://github.com/elisa-tech/wg-automotive/tree/master/Docker_container
- With cached build using SSTATE
  modify “`conf/local.conf`“ after the "`source`" command before the "`bitbake`” command
- Download binaries directly from build server
  https://gitlab.com/elisa-tech/meta-elisa-ci

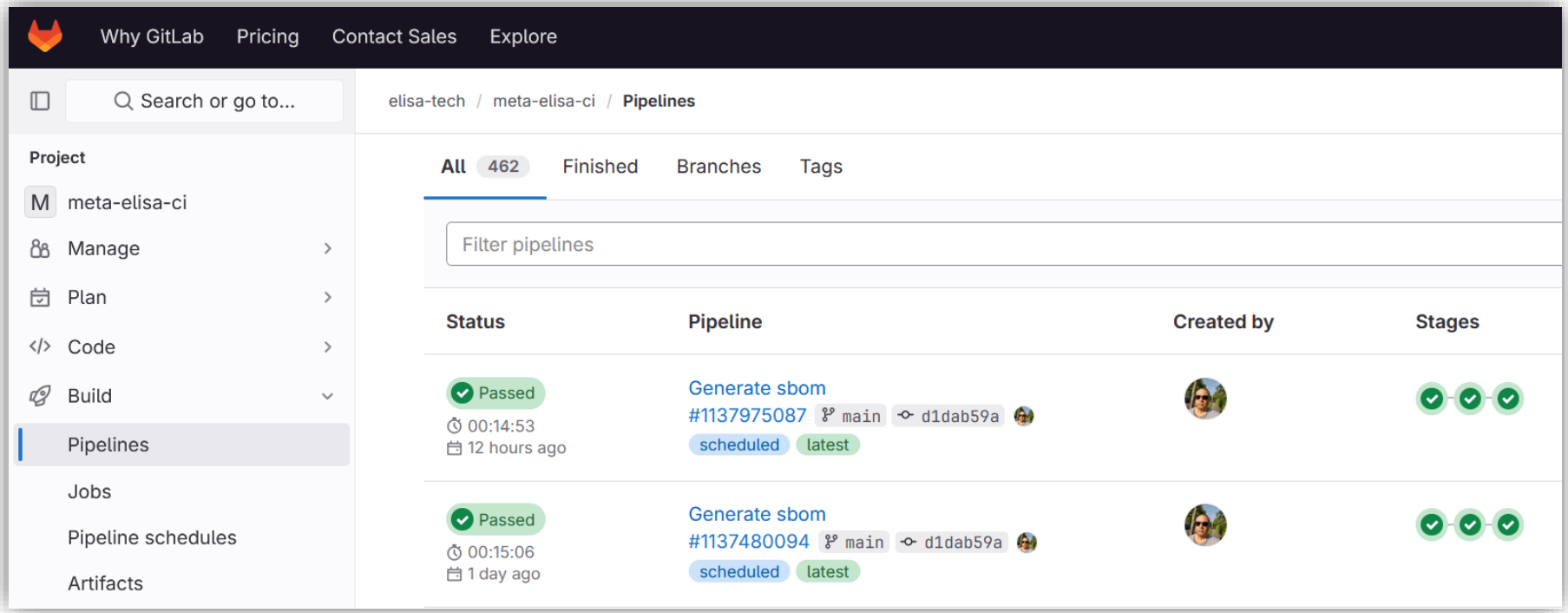


AGL Cluster Demo SBOM Available

- Enablement by adding INHERIT += "create-spdx" to your build
- "SPDX_PRETTY" for human readable form

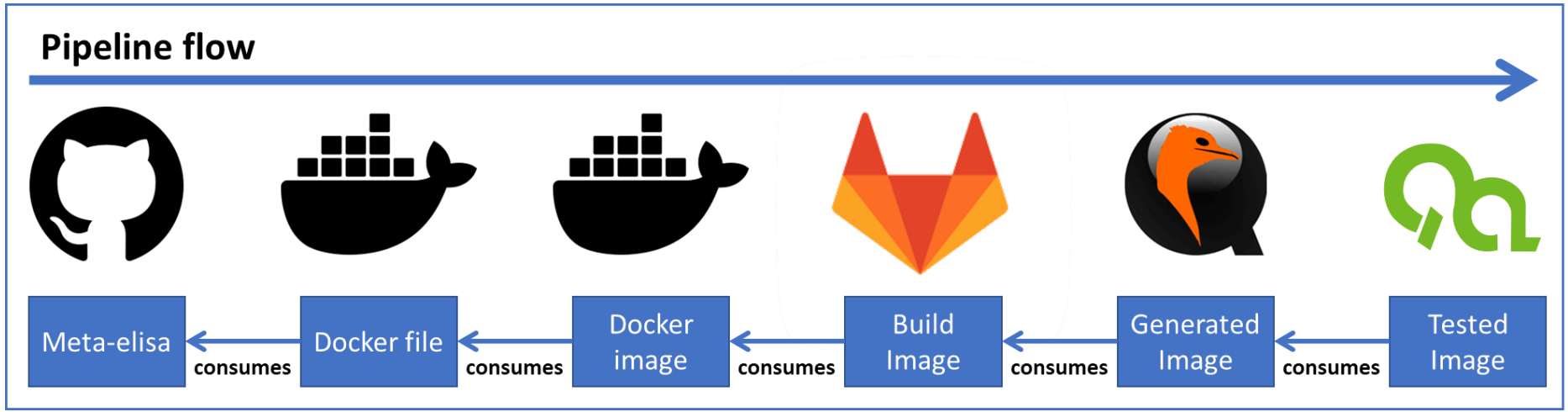
https://gitlab.com/elisa-tech/meta-elisa-ci/-/pipelines

AGL Cluster Demo SBOM Available



https://gitlab.com/elisa-tech/meta-elisa-ci/-/pipelines

meta-elisa: Pipeline Dependencies



Full description in the blog

https://elisa.tech/blog/2023/04/05/elisa-ci-enablement-automation-tools-for-easier-collaboration/

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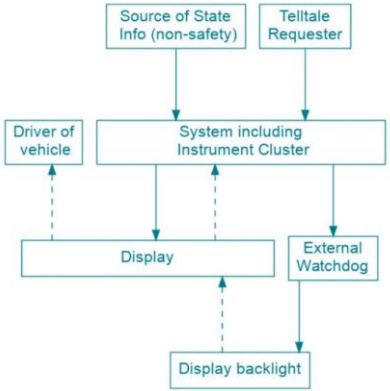
Current Focus / Activities

Current Focus / Activities

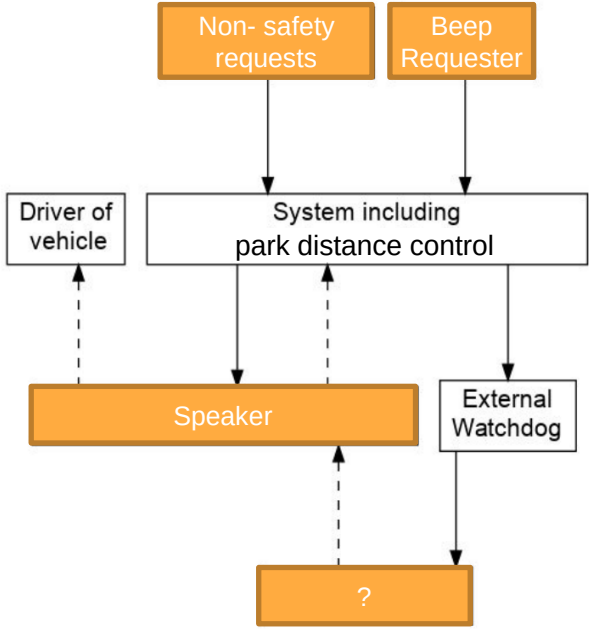
- Interaction with other communities like Eclipse SDV, SOAFEE, AGL, …
- Looking for a new use case after the telltale use case where the analysis work can be applied to.

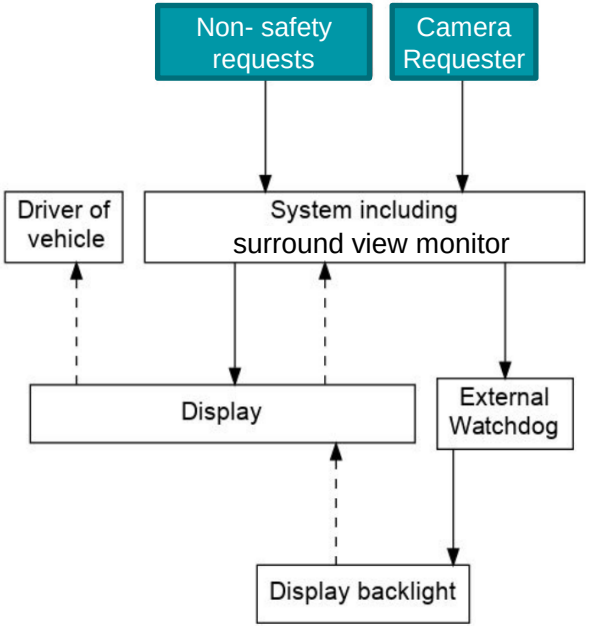
Similarity With Other Use Cases

Basic challenges representative for more complex use cases



Use the tell tale use case work to derive your own use case.





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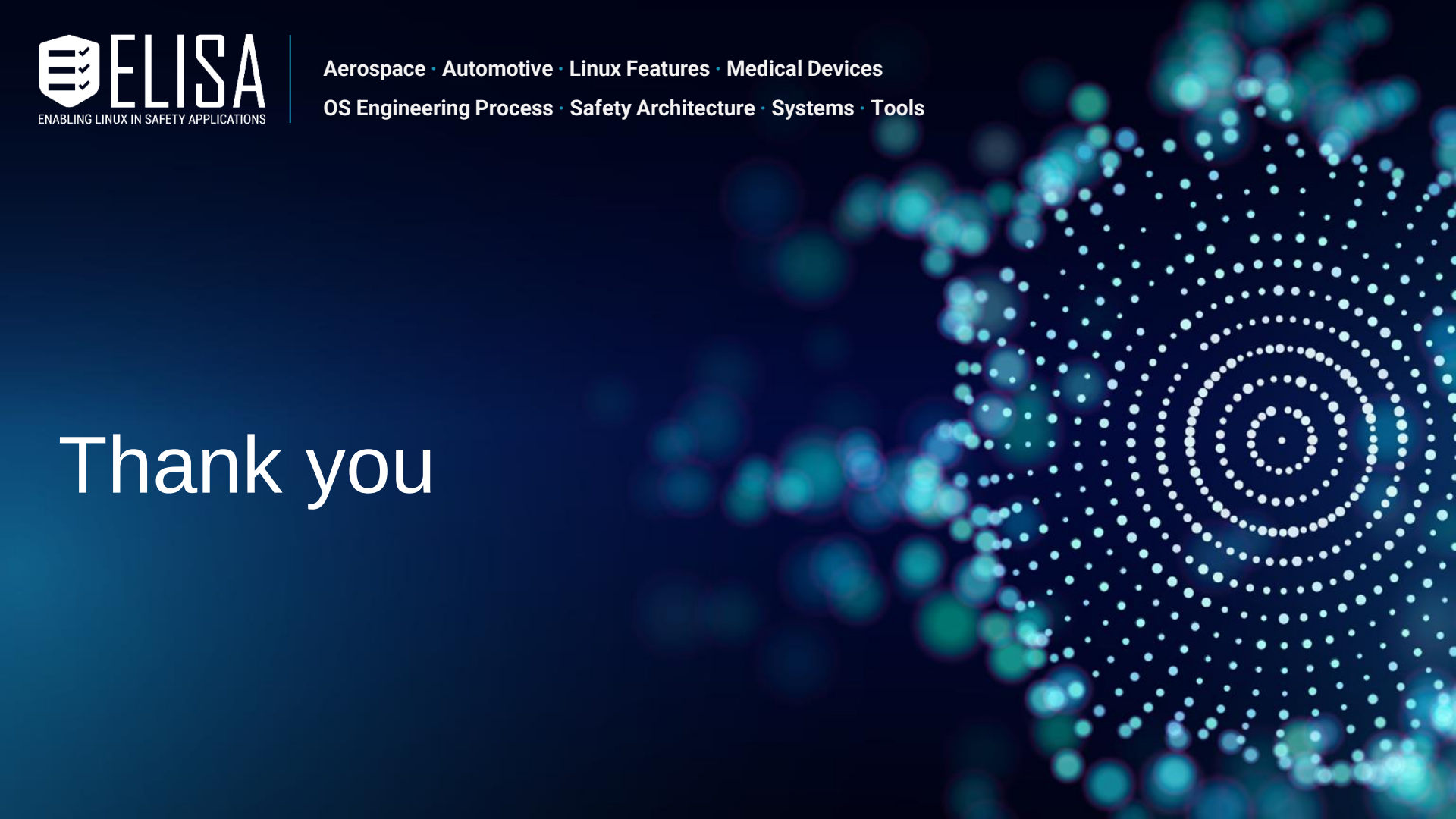
Plans for 2024 & Collaboration Opportunities

Plans for 2024 & Collaboration Opportunities

- **Acquire a new use case driven by an OEM or Tier1.**
- **Support other communities who miss safety focus/knowledge.**
- **Reach out to AGL, Eclipse SDV, SOAFEE, COVESA…**

Join our journey with a simple mail on the mailing list: https://lists.elisa.tech/g/automotive

Photo by Javier Allegue Barros on Unsplash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Thank you

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JOIN THE COMMUNITY

ELISA members are defining and maintaining a common set of elements, processes and tools that can be incorporated into specific Linux-based, safety-critical systems amenable to safety certification. ELISA is also working with certification authorities and standardization bodies in multiple industries to establish how Linux can be used as a component in safety-critical systems.
Join us to expand the use of Linux across new industries including healthcare, energy, transportation, and manufacturing. Learn more today to participate and support ELISA.

Join mailing lists | Participate in meetings | Contribute to documentations | Get involved in WGs | Collaborate at Workshops