

Continuous Integration of FPGA firmware and software

A CASE STUDY



LHCb Run3 Upgrade

Subdetectors

Test beams:

May 9th - May 22nd

June 27th - July 18th

Oct 10th - Oct 23th

LHCb Commissioning

LHC commissioning:

From March



PCIe40



20v1+1 +24 +50 +280 +343 (& acceptance tests)

Online

Commissioning racks:
2 SX + 1 UX

Datacenter: TFC+ECS for
From April **commissioning:** **Eventbuilder**
(I/O modules) From August **commissioning**

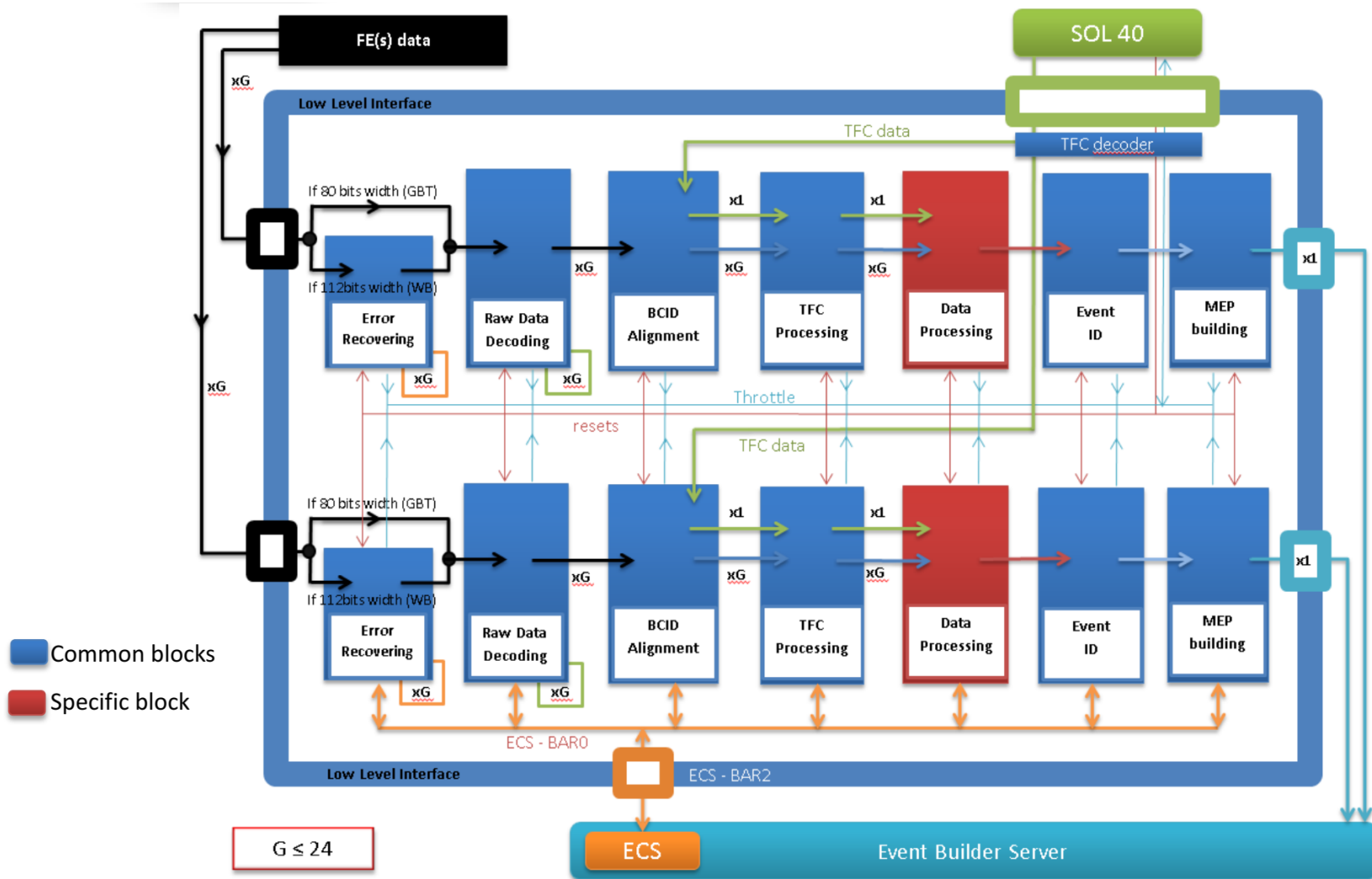
Vertical slice:
From october

UX fibers:
From July

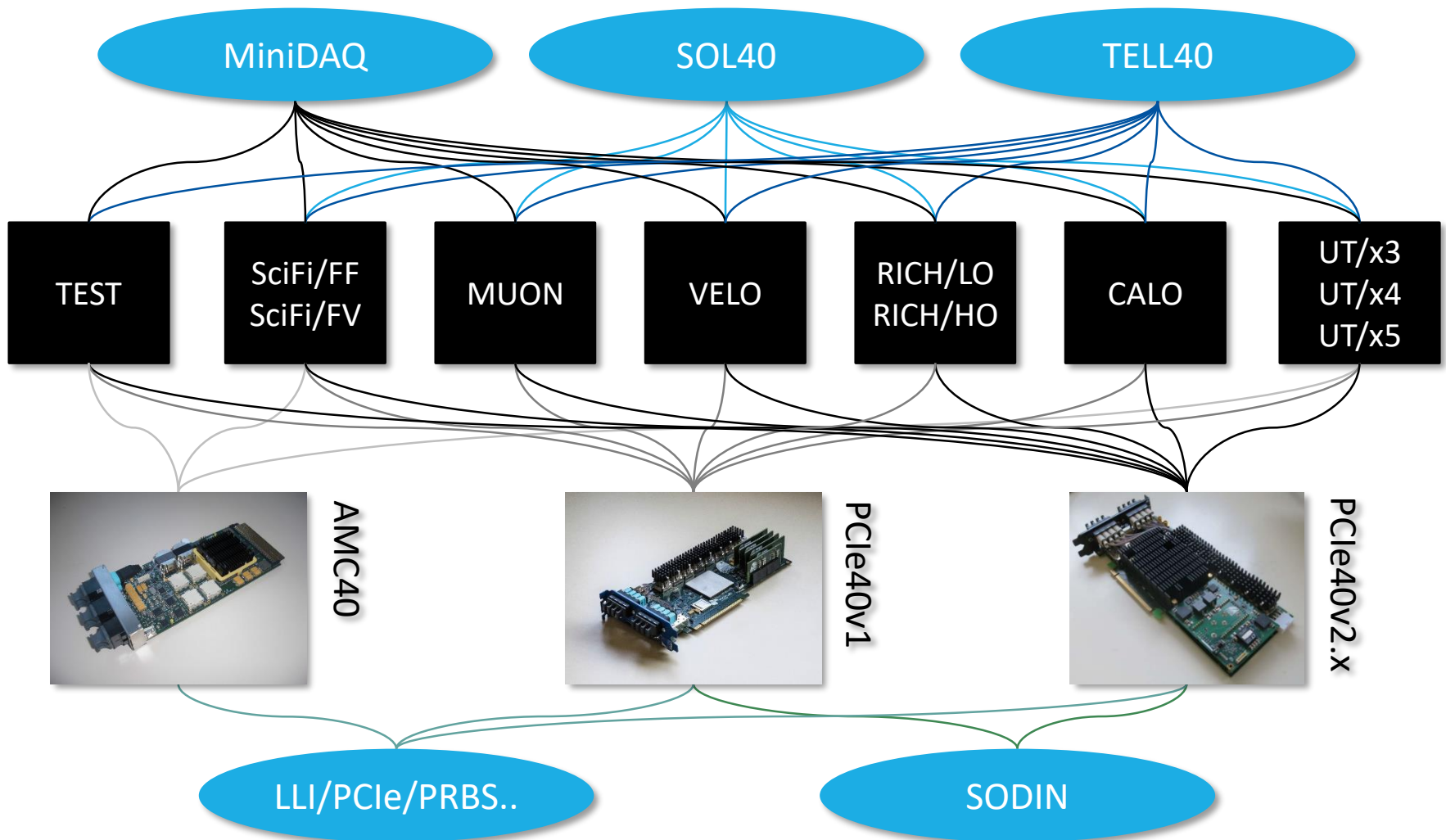
“dense” DAQ for
commissioning:
From September

HLT farm
commissioning

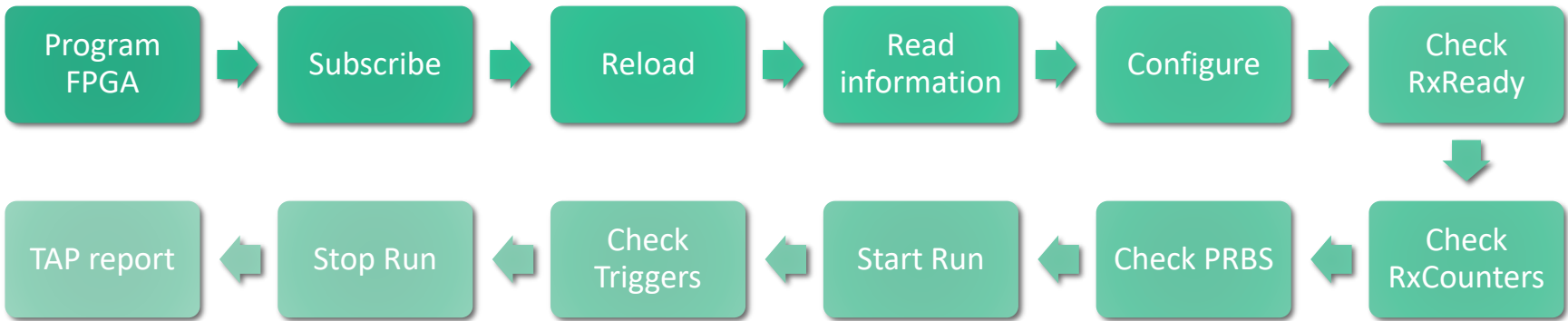
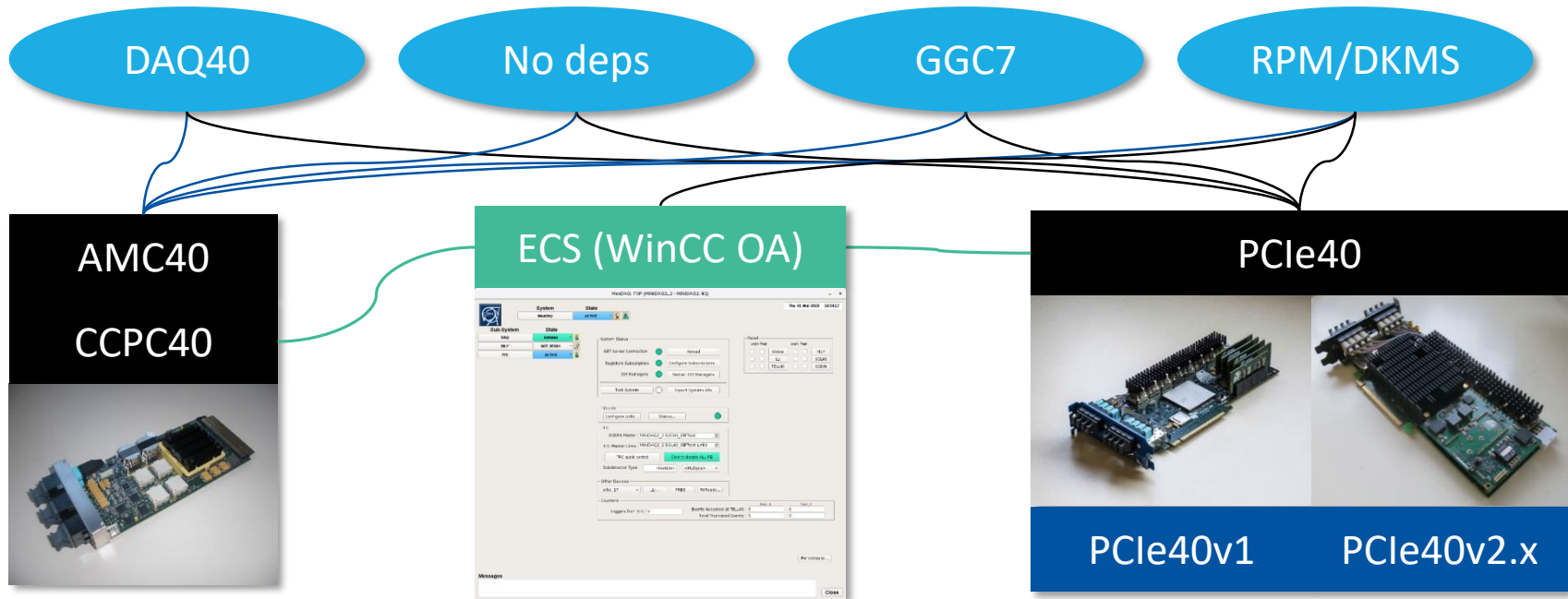
Firmware example (TELL40)



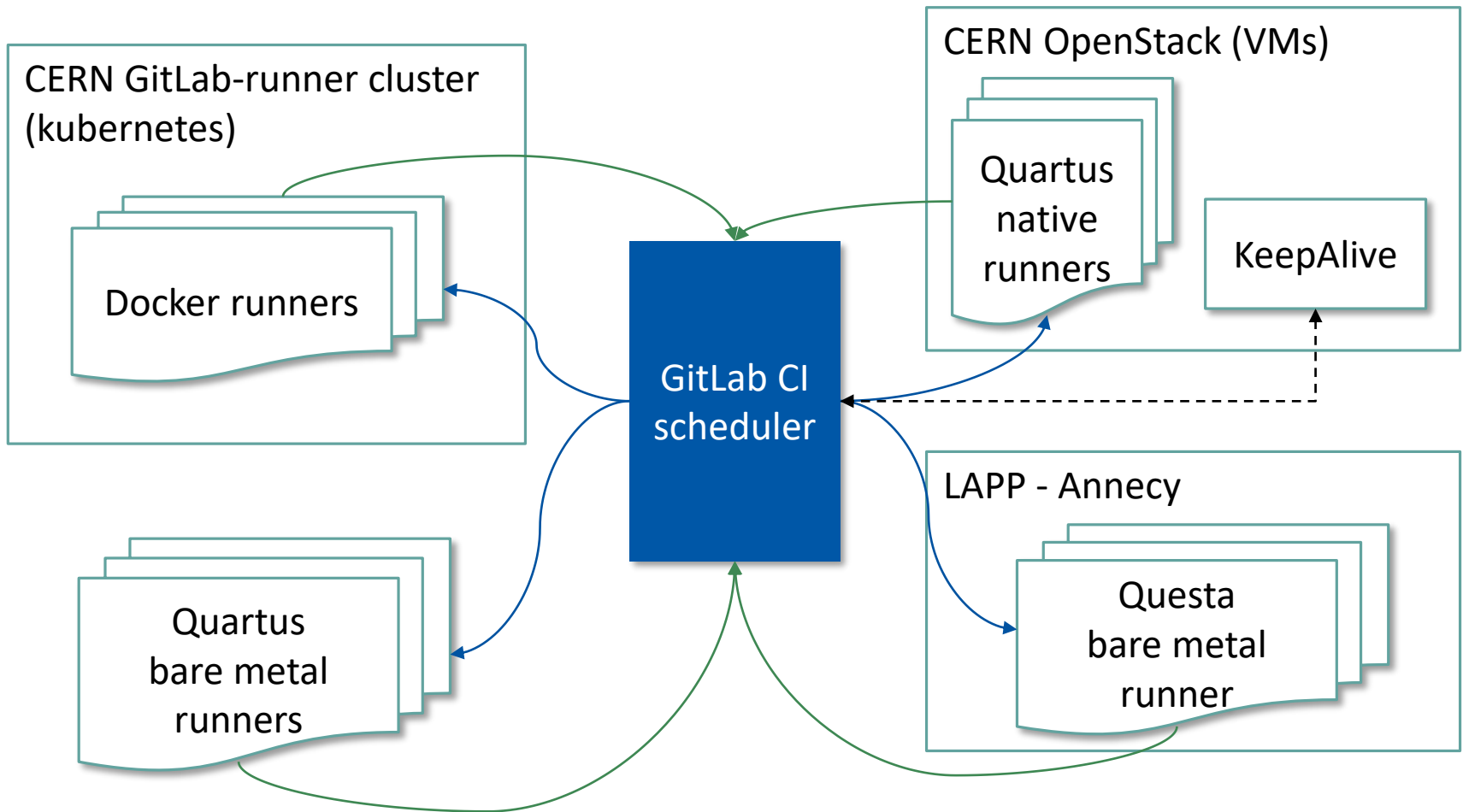
Firmware combinatorics



Software integration

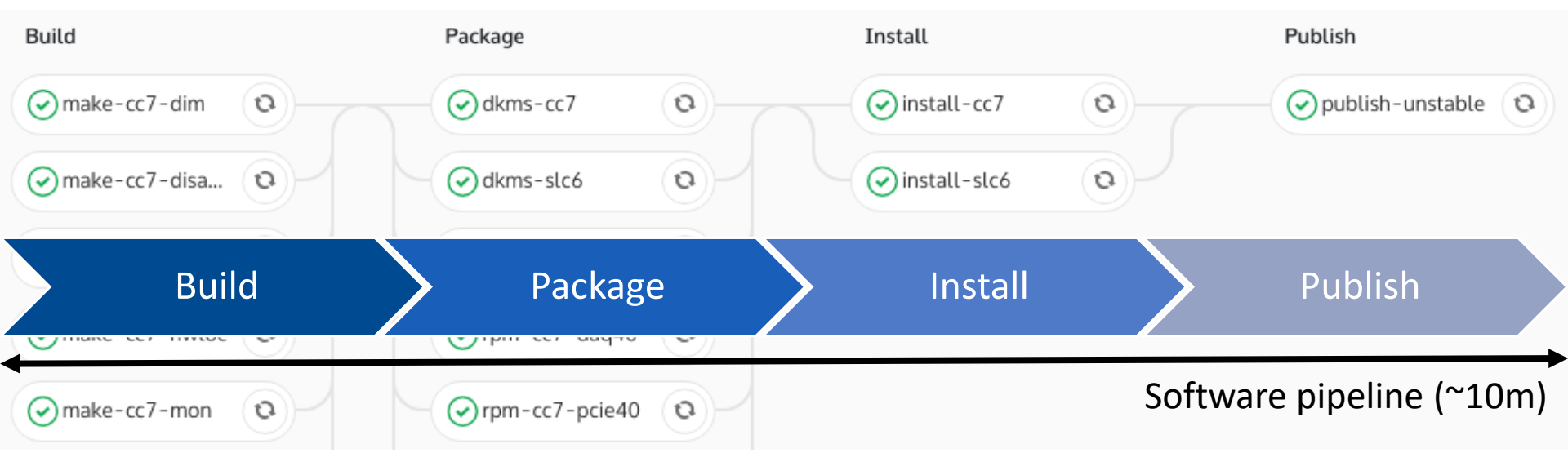
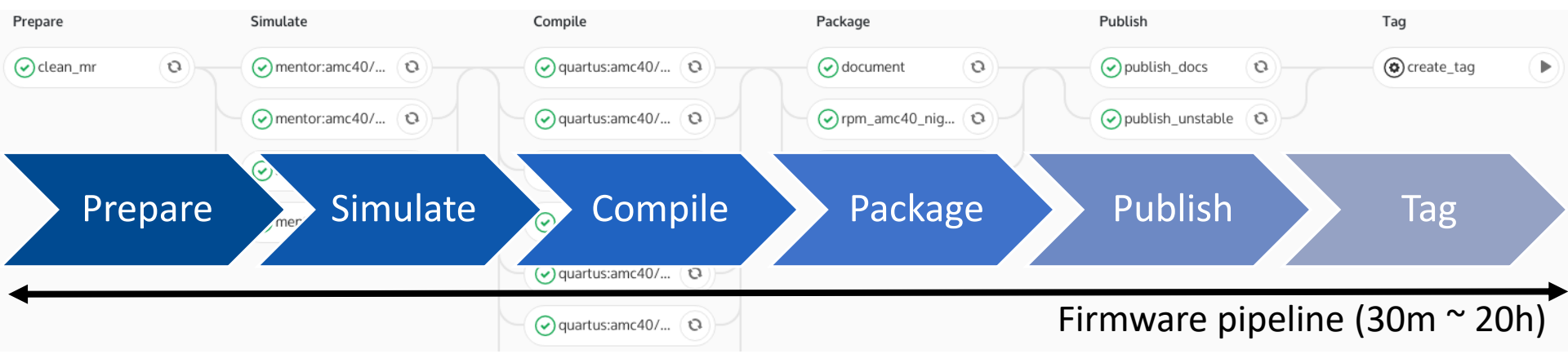


Execution model

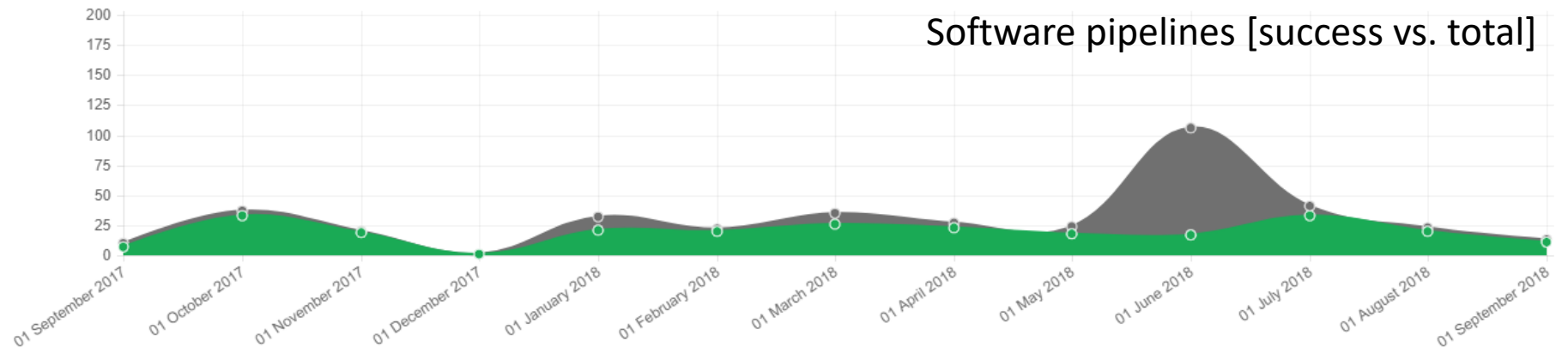
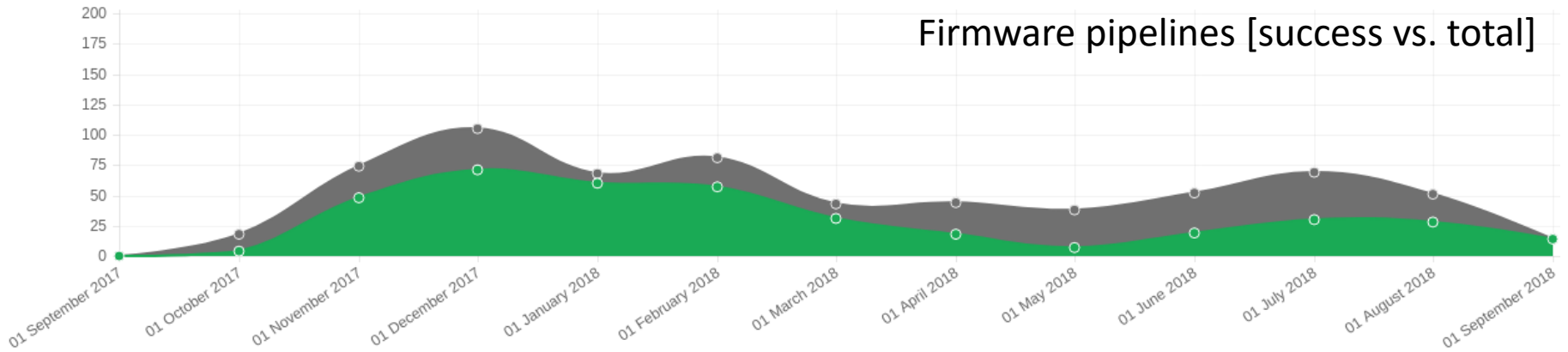


● scripts ● artifacts

Pipeline layout



Pipeline history



Issues and lessons (1/2)

- GitLab assumes short jobs and many runners available
 - Implement CI queue monitor on top of GitLab APIs
- EDA licensing limitations
 - Schedule runners according to license capacity
- Firmware partitioning
 - Use submodules (or subtrees) with custom tooling to manage them
- Reproducibility
 - Review flow scripts for race conditions
- Compilation times
 - Cache artifacts and write tooling to examine change history

Issues and lessons (2/2)

- Traceability
 - Custom tools for firmware identification, firmware database
- WinCC OA integration
 - Custom scripts to initialize new projects and drive JCOP installer
- Reliance on 3rd party infrastructure
 - Anticipate failures
- The “Ops” part of DevOps
 - Team requires operations skills in addition to development skills
- Adoption
 - Clear documentation, clear benefit proposition

GitLab@CERN Day

<https://indico.cern.ch/event/749059/>

GitLab@CERN Day

📅 Wednesday 3 Oct 2018, 10:00 → 15:30 Europe/Zurich

📍 31-3-004 - IT Amphitheatre (CERN)

Registration

🔗 Participants

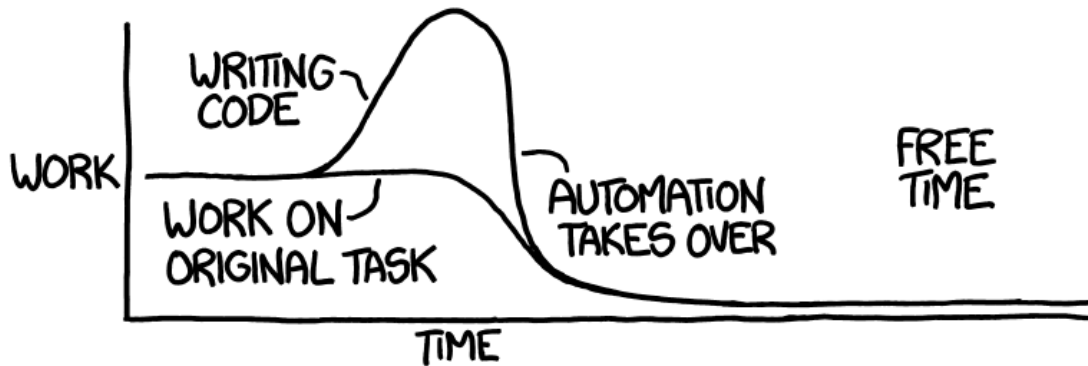
📄 Register

10:30 → 12:10 Morning session

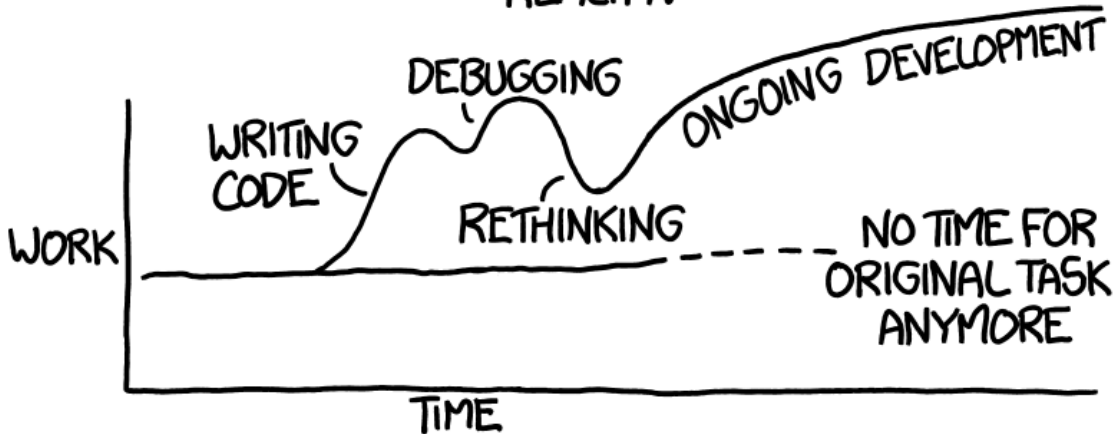
- | | |
|--------------|--|
| 10:30 | CERN opening talk 🕒 15m |
| | Welcome talk, introductions |
| | Speaker: Alexandre Lossent (CERN) |
| 10:45 | CERN presentation of GitLab deployment at CERN 🕒 15m |
| | History of the GitLab project at CERN
Some numbers about CERN's GitLab instance
How CERN deploys and operates GitLab
High-level use cases |
| | Speaker: Alexandre Lossent (CERN) |

"I SPEND A LOT OF TIME ON THIS TASK.
I SHOULD WRITE A PROGRAM AUTOMATING IT!"

THEORY:



REALITY:



Thank you
for your
attention