

Belle II Software Status

Martin Ritter

German Belle II Meeting
2020-09-14



The Belle II Software



When we say Belle II Software ...

- we usually mean the offline reconstruction and analysis
- there is a lot of other software in Belle II in different groups
- Slow Control, DAQ, Computing, Sub detector groups all have their own software
- Even every analysis is basically software

All these software efforts are critical for the experiment

- sadly not all of them are recognized equally
- and some maybe not as scrutinized as they should

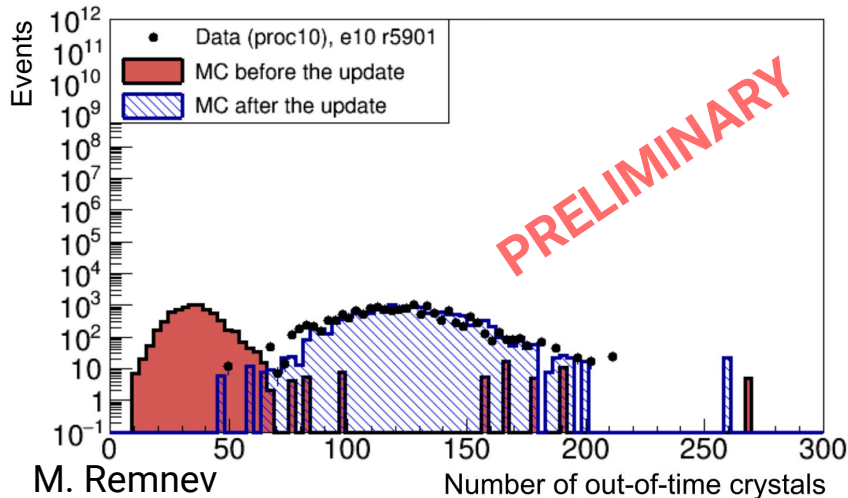
This talk will focus mostly on the offline software





Release 5

- Major Update of Geant 4: 20% speedup for simulation
- large improvements for MC/data agreement in several areas
- Also many improvements for analysis users
- Support for CentOS 8, Ubuntu 20.04
- and many more changes ...



Final release mid August

- working on first minor update
- feature freeze 28th of September

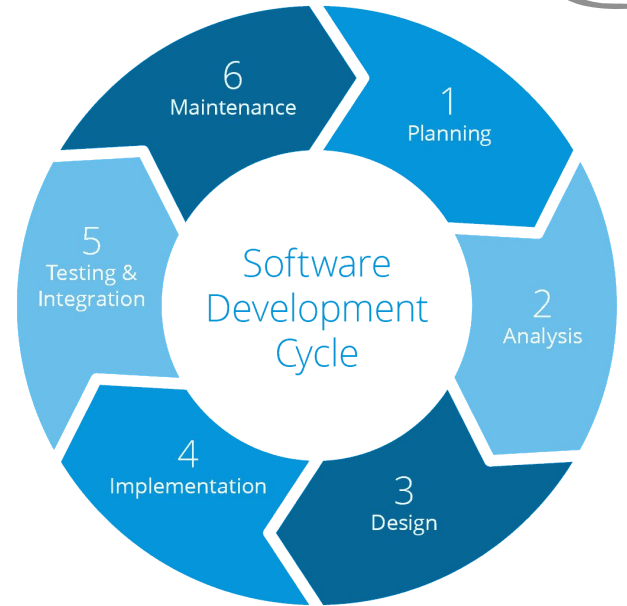
plan to use 5.1 for 2020c data taking



After Release 5

Of course we're not done with the software

- update physics generators
- still issues between MC/data.
- working on getting a common timing simulation
- we need to keep pushing on the software performance to be able to sustain high trigger rates on HLT



Release 6 in one year

- one major release per year
- to synchronize with MC campaigns and data reprocessing
- feature freeze in summer to be ready in time for autumn data taking
- **if a feature will not make it into a major release it will have to wait for a year**



Other challenges in the Software

Improve workflows also outside of reconstruction

Very successful with the run registry

- one service to keep run information used for processing
- expanding and adapting as needed by run control and DP (and possibly DQM)



⇒ There are more workflows in Belle II

Systematics framework

- provide unified framework for systematic errors
- actively worked on
- target availability in autumn

*If you're interested
feel free to join*

Publication procedure

- long list of manual checks and procedures
- actively working on a web service to automate this workflow
- aim to provide smooth review procedure



How can everyone help with the software effort?


A working, stable software doesn't come for free ...

1. nightly builds
 - many (unit-)tests and validation histograms
 - can not find everything but continuously extended and improved
2. software quality shift
 - help the software group to spot and fix easy issues
3. thorough validation before every major release
 - large amount of bugs found in this step
 - delay of release-05 indication of lack of resources
4. day-by-day data analysis by every collaborator
 - report the bugs / performance issues you find
 - simple examples to show the problems (MWE) essential



Please help us by

- reporting issues
- providing examples
- help creating tests to prevent regressions
- take SWQ shifts
- help with release validation



mentioning software issues only in e.g. physics sessions is not helpful



Open Source initiative

There wouldn't be any of our analysis without open source

- Linux, GCC, ROOT, Geant4, python + all packages, physics generators, ...
- many of them not even funded by public money.
- we should at the very least honor this by making our software public as well.

After a long discussion we now have a procedure in the bylaws

- **We're trying to get the reconstruction software made public**
- **Still many details to overcome**

- Open source doesn't just mean "make it public",
- it also means to contribute to projects not our own.
- this is also a great way to gain recognition





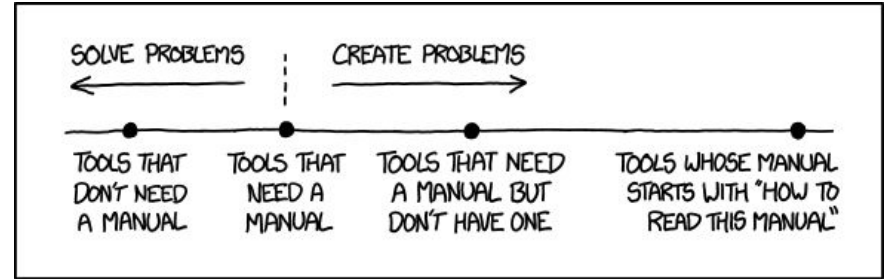
Documentation and Training

We try to put a big effort on user documentation and training events

- next “[Starterkit Workshop](#)” October 5-9
- registration is open
- also looking for more helpers

We will change the format this time: fully virtual

- kickoff meeting to explain the format and what to do
- asynchronous event with self-learning material and remote Q&A sessions for most days
- small virtual group mentoring sessions on the last day to review exercise



Huge effort ongoing to convert training materials for self study

- We need to make sure this effort is properly recognized
- Especially Kilian is also contributing to training efforts beyond Belle II

Conclusions

Software is a critical part of any HEP experiment

- sub detector and online software often not fully recognized

Release 5 of the Offline Software

- simulation speedup
- improve data / MC matching

Training

- next StarterKit workshop in October

