



Git Repository Strategy

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Open Development Model

Public code repositories accepting contributions – such as *GitHub* – are part of the best practice for open source projects

- Key part of Open Science and Open Data principles
- Endorsed also by HSF
- Help to attract contributors – for whom this development model is familiar – and gives them public recognition for their work
- “Standard” development model for modern open source which we should all encourage and embrace as much as possible

Geant4 Development Model

Based on 2 git repositories

- ***geant4-dev*** : *GitLab*-based development repository restricted to developers members of the Geant4 Collaboration
 - Developer proposes a Merge Request (MR)
 - MR is evaluated by Geant4 Working Group coordinators and undergoes system testing (continuous and nightly)
 - Order of ~1000 MRs / year
- ***geant4*** : *GitHub*-based public repository, a mirror snapshot of *geant4-dev* for official releases and patches
 - Anyone can propose a Pull Request (PR)
 - This is evaluated by responsible Geant4 developers, and then eventually applied to *geant4-dev*
 - Order of ~10 PRs / year

A More Open Development Model for Geant4 ?

MC physics simulation codes need a thorough validation

- Large set of physics validation tests, not only computationally intense, but also to be evaluated by experts
- Vital for mission critical applications (e.g. LHC production or medical dosimetry) and important for all serious studies and publications
- Impossible, in practice, to guarantee this level of validation for all Geant4 source code checkouts at any time
- Disclaimers and warnings would not be sufficient
- Other reasons (private forks / branches could provide a solution but with complications for usage and system testing...)
 - Intellectual property : publish papers before public release of code
 - Preserve reputation : avoid to expose physics models not yet mature

Contributing to Geant4

- Becoming a member of Geant4 can be too demanding
 - Need to belong to at least one Geant4 Working Group;
commit to contribute for some F.T.E. for an extended period;
contribute to collaboration activities;
need Geant4 Steering Board approval (taking at least two weeks)
- Contributing to the public *geant4* *GitHub* repository
 - No Continuous Integration on PRs
 - Work is needed by Geant4 members to import and adapt *GitHub* PRs to *GitLab* MRs in the development repository
 - Public *GitHub* commits do not show up in the development history of the *GitLab* repository
 - *Thanks to Sergio Losilla for suggestions on how it is possible to improve the synchronization between the two repositories...*

Proposal: introduce a new “Contributor” role

Intended for people who want to have an active role in – and follow closely - the development of Geant4

- Not a replacement, but an addition to the existing ways to contribute
- Full access to the *GitLab* development repository (MR and CI)
 - No need to belong to a Geant4 Working Group, nor to commit to service work, but specify what is the intended contribution and agree to not distribute or publish results from non-public releases
- To enroll, web form to be filled up and renewed every year
 - Streamlined approval (~ couple of days) from the Geant4 management
 - Expected of the order of tens of people
- The hope is that “contributors” will become later full “member”
 - With greater and long-term responsibilities in the maintenance and evolution of Geant4

Sustainability of Geant4

Finding, training and keeping a new generation of developers is a top priority for Geant4

- We need collaborators who will maintain the code in the long term
- We hope that the “contributor” mechanism can help in this direction, as well as helping the careers of the young contributors
- We don't think that for-free contributions from largely unfunded sources will solve long-term support, development and maintenance issues, nor that there exist a large pool of these people with the relevant expertise and interest to contribute actively and usefully
- We strongly believe that the sustainability of Geant4 can be achieved only by ensuring stable, permanent positions to the most promising, young developers! Funding agencies are key here... 7