Take-home messages

Preamble

- This session was originally planned for further discussions

    - For topics touched during the meeting but that need more time

    - And for new topics and issues that emerge during the week

- Likely because of the new format, we had already plenty of discussions and we felt that there was need for neither further nor new discussions

    - Please speak up now if this is not the case !

- Let's then try to recall some "take-home" messages

    - At high level, avoiding details

    - Not a summary of the whole Collaboration Meeting !

    - This is the first draft, to be improved with the feedback in this session !

From the "*Open Requirements*" session

- We shall remember to include in CC the relevant experiments/users when opening Geant4 JIRA tickets on user requirements

  - To make them aware of what is going on

- Shall we add an explicit warning in our web page for the users to pick up the latest patch version available for a given version of Geant4 ?

  - *E.g.* G4 10.6.p03 vs. 10.6.p01

- To minimise unnecessary changes, in particular on physics:

  - Making the adoption of newer versions of Geant4 easier and quicker

  - Wish of separating between "technical" and "physics" developments

From the "*Collaboration Matter I*" session

- 4th General Paper

  - Agreed on the time schedule and organisation proposed
    - So far, Andrea Dell'Acqua and A.R. volunteer as possible editors

- Next major release

  - Improve in clarity and level of details our GitLab Merge Request
    - To be discussed today at the Steering Board how to enforce this

From "*Development Tools*" session

- Agreed to try out a Git-based database for Geant4 papers and presentations

- *Geant-val* : increasing number of contributors, whereas for the core maintenance & development still relying in one person

    - Proposal, to be discussed today at the Steering Board, to focus the WG "*Physics Lists and Validation Tools*" to it – or rename it "*Geant-val*"

        - The hope is to make the work on *geant-val* more visible and recognised so to attract new, young contributors

From "*Geant4 kernel*" session

- Lot of interest, both among the Geant4 members and the users, to know and understand more about the parallelisation capabilities of Geant4

  - In particular for tasking and sub-event parallelism

From "*Geometry*" session

- On-going developments

  - Surface-based geometry actively under development

  - Some progress also on the solid-based geometry and transportation in fields

  - On-going comparisons between solid-based and surface-based geometry models on GPUs for complex HEP detectors

From "*UI and Visualisation*" session

- Growing interest on Vtk

  - Choice between maintaining several tools or relying more on Vtk should be evaluated carefully based on person-power available

From "*Basic/Extended/Advanced Examples*" session

- Continuous effort to improve existing examples and introducing new ones
  - Both documentation (README file) and code are important !

From "*Parallelisation of Initialisation*" session

- First version of parallelisation of geometry achieved

- Preliminary work necessary for the parallelisation of physics achieved

- For G4 11.3, speed up due to parallel initialisation of geometry only, to be refined and completed with the physics one for G4 11.4

- Discussion on how to cope with too many and small files in our datasets for efficient HPC use

From "*Computing Performance*" session

- Always crucially important !

  - We rely heavily on monitoring and benchmarking computing performance

- More opportunities for improving computing performance from application-specific solutions, rather than general Geant4 developments

  - Examples from LHC experiments

From "*R&D*" session

- Progress of both *AdePT* and *Celeritas*, but still difficult to draw conclusions or even recommendations

- Postpone the delta assessment from December 2024 to Spring 2025

  - Aimed to be the last delta assessment by Geant4

  - To come up shortly with a proposed date and a set of benchmarks

From "*Generic Processes and Materials*" session

- **ML FastSim investigations very active !**

  - Very much experiment-specific, but, from our Geant4 side, we aim at sharing as much as possible tools, approaches and experiences that might be useful to other experiments and users

- **Combined process *vs.* generic biasing**

  - Agreed to leave the combined processes as they are

    - Special combinations to two or more processes aimed at reducing "interaction length" calls in granular geometries

    rather than trying to recast them in the context of generic biasing

From "*EM & HAD Physics*" (plenary & parallel) sessions

- Sustained development effort aimed at improving the accuracy of our physics models, as well as to extend their physics coverage

- Two risks:

  - Balance between maintenance and development
    - Geant4 is used in production in many critical experiments
    - Active development is essential, but we shall avoid "noise"-type of changes (*i.e.* neither more precision nor faster execution)

  - Loosing critical expertise and knowledge
    - Only one solution: finding, training and retaining young collaborators !
      - On "finding", we are doing well so far, with a good dose of luck! Not sure it will last forever…
      - On "training", we are not doing progressing on either "internal notes" or "internal seminars" – fortunately, our young collaborators are learning quickly by themselves…
      - On "retaining" them by offering stable positions is the most difficult part, with notable failures in the past, and the therefore the vital need of doing better !

Final: format of the next Collaboration Meeting

- Looking at posteriori at this Collaboration Meeting, with a free first session on Friday morning, we could have 2 more plenary sessions and no parallel at all

  - On Wednesday afternoon, a plenary EM session

  - On Friday morning, a plenary HAD session

- Shall we keep the same structure for next year ?

  - For the first time ever, we completed and covered all our discussion items !
    - Having fewer and shorter talks should be an incentive to have more WG meetings at least few times per year

  - I have received a suggestion so far to have more questions of the type "Shall we do A or B ?" during our presentations, and then decide on Friday
    - Leaving some time for thinking and making up our minds

  - Any other suggestions ?