Issues for the Collaboration Meeting

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Overview

- Key issues
- Accuracy, Geant4 and our users
- Internal communication
- Making the most of the workshop
- These is my personal perspective!
- Notation:
 - !? = interesting
 - ?! = dubious

Key/hot issues

- Validating Geant4 Physics
 - At increasing accuracy for established uses,
 - At initial level in new or less widespread application areas?
 - Reliable/'stable' for existing, predictive for untried use cases.
- Providing acceptable accuracy for key use cases
 - Find 'big surprises' in physics (and fix) before general users
 - Involve friendly users to assess, control (!?)
- Improve computing performance
 - for many applications it is the/a leading constraint of Geant4 use (or results)
 - See Sessions on CPU Perf., Geometry Challenges
- Explaining, clarifying, showing what we 'have'
 - What is available in existing Physics Lists
 - Clear starting points for additional domains/ use cases
 - Letting users know our assessments/expectations of +/- ives
 - How to find out/communicate physics performance

Validation / accuracy

- Validating physics models/lists
 - Thin-target, simple setups
 - List existing and desired comparisons
 - Thick target, full use cases
 - Use-case derived,
- Continue to identify strengths, weaknesses

Of existing physics models, lists
 Keep team, collaborators updated

Physics 'development'

- Catalog key development needs
 - Improve existing models
 - Complete new implementation
 - Seek additional models/modelling approaches
- How could additional models/people help
 - What event generators can we check for complementary strengths?
 - What could the next new contributor do?

CPU Performance

- Approaches for particular application(s)
 - Substituting limiting component/class
 - Specialized replacing 'general' components
 - Choosing/creating physics models which are 'good enough'
- Potential approaches in G4 toolkit
 - Reducing number of steps
 - Profiling different benchmarks, applications to identify hotspots, common characteristics
 - Identify classes/methods to examine, look for improvements
 - Code reviews good experience
 - Investigate new approaches
 - Try existing tools (eg stacking action), prototype radical ideas

Looking beyond 'hot issues'

- Experiences creating tools built on Geant4 – Are there major/common issues not known to G4
- Recognizing the spread and diversity of expertise in utilizing / extending Geant4
 - Need to exchange, pool experiences
 - Opportunity to involve users in different areas
- How to utilize Geant4 reliably and efficiently?
 - Increasing complexity, age of components
 - Are there hidden side-effects of major developments?
 - Are aged designs/implementations adequate/suitable today
 - When there are many ways to do something, which is best (or at least 'very good')

Where/how we can improve

Some personal perspective, questions, ideas

Accuracy: how to address?

- Does Geant4 physics accuracy for application domain X reach the required level?
 - Radiotherapy
 - Highly segmented detectors
 - Shielding applications
- If not (yet), what are key limitations, missing parts, issues ?
 - Document known issues
 - Identifying areas where external effort is vital or needed
- If we cannot do 'everything', be clear(er) about how we (G4) choose what to do, and
 - Make more effort to seek resources,
 - Involve user communities in search and enable them to do

Accuracy and physics models

- Existing models (non-G4) are a major potential resource
 - Recent example INCL/ABLA is 'arriving' to Geant4
 - I think that there are many opportunities
 - should try to establish relations with event generators

– QGSJET, DPMJET, ...

While sparing no effort to improve existing G4 implementations/models

Accuracy and validation

- Scientific = comparisons to measurement
 - Yet many measurements not adequate
- What about areas where data does not exist?
 - Scaling laws
 - 'Extrapolating' models
 - ?
- What to compare, how to assess?
 - 'Gold standard' for application area
 - Compare with other MCs (!? or ?!)

Non-technical aspects

- There must be a Geant4 'position' on key / sensitive topics
 - Cannot express clashing views to users
 - This creates confusion, devalues all
 - Need constructive internal dialog, and MUST resolve issues not agree to disagree
- Lack of internal/external communication
 - Web pages have improved, and have much more room to improve
 - Clearly dedicating the effort is a real issue
 - yet results known only to authors are pointless
 - Focus on this issue in planning, SB
 - Provide opportunities for less-experienced/younger to learn, have their contributions be more visible

Internal communication

GOOD

- Most groups/teams present results to collaboration
 - At all G4 meetings
 - Workshops, review, ...
- Mini-workshops
 - Focused effort on one topic

TO IMPROVE

- Others must (also) report results 'in' G4
- Dialog = speaking of two people? NO!
- Communication of SB to collaboration

People Changes since Lisbon

- New Geant4 institutions / members
 - FNAL:
 - Sunanda Banerjee, Daniel Elvira, (hadronic phys.)
 - Marc Paterno, Mark Fischler, Jim Kowalkowski, Softw.Mng. (Performance, reliability)
 - Other:
 - Ben Morgan (Warwick, UK/STFC=PPARC, Soft.Mng.)
 - Anton Lechner (CERN),
 - Andreas Schalicke (DESY Zeuthen, Std-EM)
 - Omrane Kadri (NCNST, Tunis, Std-EM)
 - Proposed:
 - Jose Manuel Quesada, Hadronics (precompound)
 - Alain Boudard (INCL4)
- Departures
 - Susanna Guatelli, Barbara Mascialino

Goals – a different view

- Inform each other
 - Reports on application areas, studies
- Identify key or common issues
 - Problems, challenges, requirements
- Hold discussions (in sessions, or '1-on-1')
 Investigate some disrepancies
- Meet each other and improve contacts
 - Establish communication, grow 'trust'

Making the most of it

- Must make sure that there is time to discuss issues raised
 - After every talk
 - At the end of every session
- Face to face meetings are key for great communication
 - Take the opportunity to meet each other
 - Discuss tricky technical issues, ...
- Many times the most lasting effects of workshop are not planned:
 - the personal interactions
 - off-sessions discussions.
- Let's make the most of our sessions and workshop!