Closing remarks

Makoto Asai and Marc Verderi

2012 Geant4 Collaboration Meeting

Chartres

We made progress

- We could have made solid steps and also solid work plan toward the version 9.6 release in November 2012 and version 10.0 in November 2013.
  - Let's keep working together toward our targets.
- We could also have productive discussions on improving our credibility, and brainstormed for our longer term strategic plan.

Timeline toward Geant4 version 10

- Geant4 9.6 release on Nov.30
  - Must already include “obsoleting” messages for functionalities planned for removal in the major release of 2013
- Dec 2012
  - Drop obsolete classes/methods and code cleanup
- Jan 2013
  - Conversion of (cleaned) v9.6 to G4MT
  - Adiabatically integrate Geant4-MT 9.6 features to main development trunk
    - Developments toward version X will be made to main trunk as usual
    - Patches to release 9.6 will be included in dedicated SVN branch
- Feb-May 2013
  - Adaptation of system testing and CMake build system
  - Migration of relevant examples and tests
  - Stress tests for both CPU and physics performance
- June 2013
  - Beta release : all changes for multi-threading and interfaces should be included
- Nov 2013
  - Final major release

Credibility

- The key of our past, current and future success is satisfaction of our customer users. We have to make them feel well taken care of and well supported.
- There are many open bug reports. Please update bug report you are assigned to.
  - The Steering Board is now checking every open bug report at every SB meeting.
- There are many unattended HyperNews postings even though they are asking reasonable questions. We have to address to them.
- Join the collaboration-wide efforts.
  - Testing, computing and physics performance monitoring
  - Examples, documentation, web
  - Publication
- Please encourage your local users to attend to the Technical Forum.
  - If needs are, we may have it more than 4 times a year, and you may locally host it.
- Let's discuss how we can refine our user-support processes.

Before we conclude the collaboration meeting

- Before we move to the final slides, let's see some presentations outside of this collaboration meeting.
  - CHEP2012
  - Transforming Geant4 to the Future Workshop
  - Open Symposium of European Strategy Preparatory Group

High Energy Physics and Computing – Perspectives from DOE

CHEP
May 21, 2012

Dr. Glen Crawford
Office of High Energy Physics
Office of Science, U.S. Department of Energy

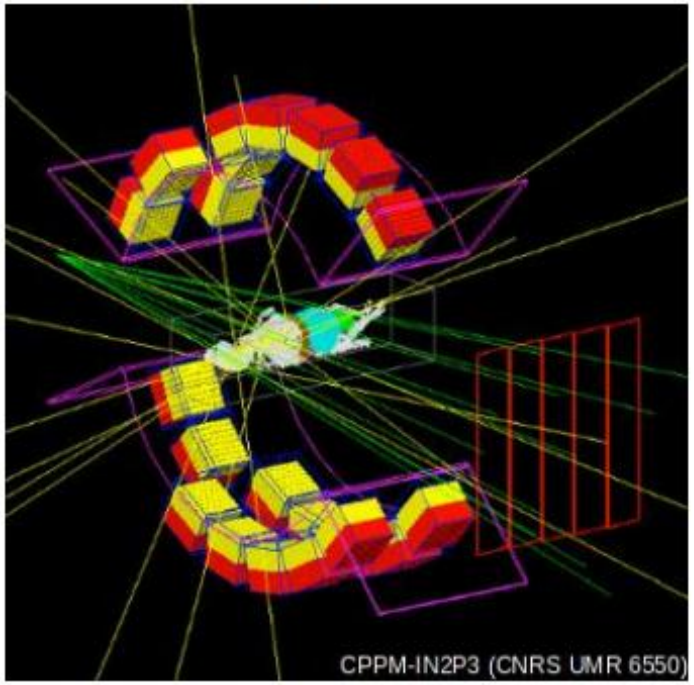
Applications Beyond HEP

- **In addition to being vital for our ongoing detector simulation, GEANT4 captures the experience and knowledge of particle physics about what happens when particles pass through matter.**
- **GEANT4 is freely available to the public and has found important uses in industry.**

• Aerospace and medical devices companies use the software in their work. Boeing and Lockheed Martin use it to study the effects of cosmic rays on the electronics in satellites.

- Electronics have become so sensitive that a single cosmic ray can affect the proper operation.
- Monte Carlo Radiative Energy Deposition (MRED) software uses GEANT4.

•Geant4 Application for Tomographic scanning



EmissionSimulation of PET scans and Radiotherapy using GEANT4 as its base.

Transforming Geant4 for the Future Workshop

Sponsored by the U.S. Department of Energy, Office of Advanced Scientific Computing Research and Office of High Energy Physics

Rockville Hilton, Rockville MD, May 8–9, 2012

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Registration

The Department of Energy's (DOE) Office of Advanced Scientific Computing Research (ASCR) and Office of High Energy Physics (HEP) are co-sponsoring a workshop to identify opportunities and needs for leveraging the powerful physics capabilities of Geant4 into a robust, sustainable software infrastructure.

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Geant4 is a software toolkit that was developed for the simulation of particle-matter interactions for high energy physics (HEP) research. One of the most commonly used simulation tools in experimental HEP, GEANT 4 is critical for LHC experiments at the Energy Frontier. It is an important tool in the design of high energy physics detectors and their subsequent data handling, and thus a key component of an experiment's overall physics analysis toolkit.

The workshop will identify applied mathematics, computer science and algorithm development challenges in effectively transitioning Geant4 to new computer architectures and will examine opportunities for discovery enabled by numerical algorithms and optimization tools to meet these challenges. Transforming the code will increase its performance and allow the incorporation of additional physical models that will further increase its accuracy. This transformation will also facilitate handling of the exponentially increasing volume of experimental and simulation data that must be collected, stored, simulated and analyzed to enable further discovery of the fundamental workings of nature.

The Department of Energy's (DOE) Office of Advanced Scientific Computing Research (ASCR) and Office of High Energy Physics (HEP) are co-sponsoring a workshop to identify opportunities and needs for leveraging the powerful physics capabilities of Geant4 into a robust, sustainable software infrastructure.

Closing Session

https://europeanstrategygroup.web.cern.ch/EuropeanStrategyGroup/

Open Symposium

Cracow, Poland, 10-12 September 2012

T. Nakada

EPFL-LPHE

Lausanne, Switzerland

Scientific Secretary for Strategy Session of CERN Council

Chair of Strategy Group and Preparatory Group

Instrumentation, Computing and General Infrastructure

Detector R&D for Discovery Science:

-Many ongoing R&D efforts in Tracking (50%) / Calorimetry / PID / electronics
-New technologies: ~15 years R&D from conception to production ➔ need to start early
-Step from R&D to realization requires industrialization / Technology transfer.

Discussion: More coherent / collaborative work among R&D communities.
More effort on education of and recognition for young physicists on detectors.
Is there a need to revive the DRDC committee?

Large scale projects / Infrastructures:

-LHC experiments pioneered an approach applicable to future large projects,
-Project management and strong host laboratory is pivotal to deliver large scale projects,
-Maintain local expertise at large laboratories to cope with production/commissioning.

Discussion: Training and education of young generation via specialized schools has to be supported / stronger role of Universities advisable.
Support of small size experiments as training platform for next generation.
How best to provide infrastructure/support for "greenfield" experiments?

Computing:

-Great success of LHC computing / WLCG, but needed ~15 years development
-Tier-structure lead to speedy delivery of results. Future funding uncertainties ? new computing model needed ?
-Must handle multiple core processors in future ➔ Experienced computing engineers needed
-GEANT4 very successful, but need further developments to cope with experiments and detector R&D of the future.

COMPUTING AND DATA MANAGEMENT FOR PARTICLE PHYSICS IN 2020

Tommaso Boccali – INFN Pisa

Event Simulation

- Particle-matter simulation toolkits, born in HEP for HEP, are a huge gift to non-HEP world, and are widely used in science and industry. Citations' count for Geant4, for example, exceeds 3.2k and still growing fast (and, most of these are not references from HEP!)

- **In the close future, we need to:**
  - Have an improved descriptions of microscopic interactions. This is needed to cope with next generation detector R&D, where new materials are beyond the scope of current approximations.
    - Do not assume that since today simulations are usable, they have reached end of development phase

- **Ensure a better use of resources:**
  - **Geant4 is the single software component which takes more CPU in HEP processing**
  - If you want, the toolkit is responsible for most $$$ spent on computing, OR
  - A 1% performance improvement here is more $$$ than elsewhere
    - **Be it via use of new architectures or by rewriting critical parts of the code**

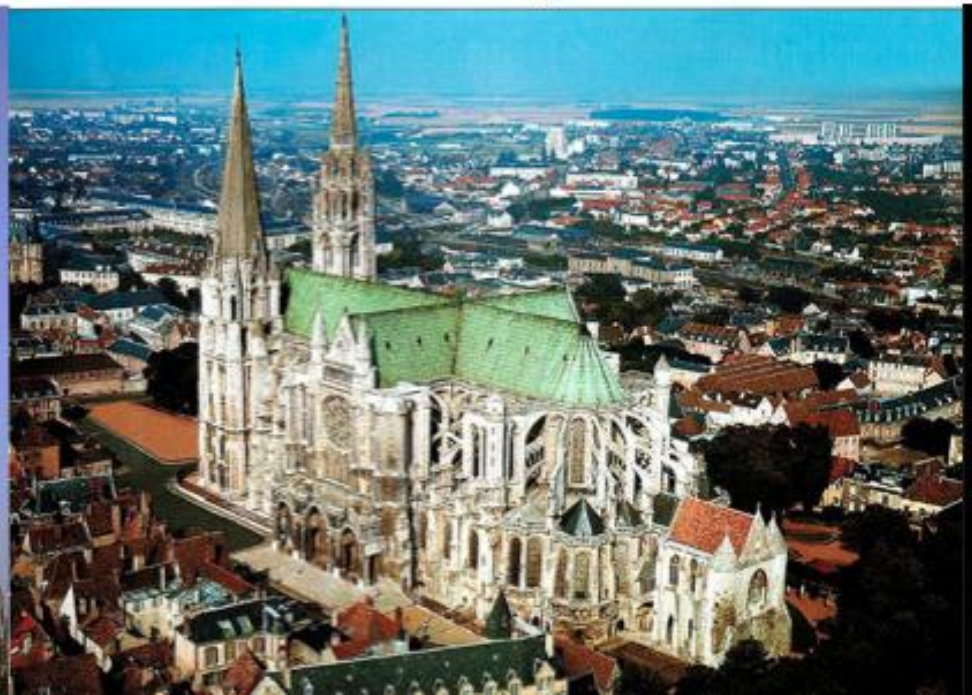
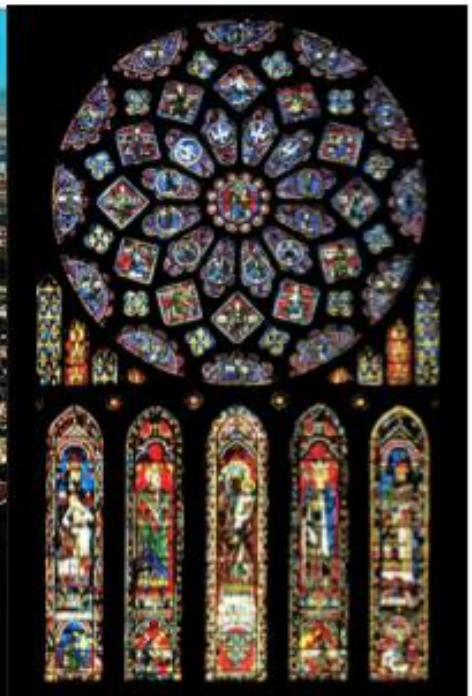
These slides should be read…

- We have achieved tremendous job and Geant4 now wins a big success. But we need to do more, and people expect our further achievements.
- Physics performance and rich functionality are essential. No doubt on this.
- But we need to put our major efforts on improving the cost performance of Geant4-based simulation. No single solution here.
  - Code cleanup, data locality improvements, richer event biasing options, multi-threading, code reengineering, new trends e.g. GPGPU, etc.
  - Just a 10% performance improvement benefits millions of dollars for LHC, for example.

Last year we concluded the collaboration with this slide.

Last slide

- See you all at Chartres next year.

So, this year we conclude with this.

Last slide

- Thank you for your participation and contribution!
- Please join warmest appreciation to
  - Alex Howard and Alberto Ribon as the program committee,
  - Ivana Hrivnacova and Laurent Garnier as the program committee and local organizer,
  - Nora, Sylvaine, Sarah, Thu and Marina for their most devoted supports, and
  - Marc Verderi. Since we couldn't be here without his dedication.
- See you all at Seville next year!