INSTITUT DE PHYSIQUE NUCLÉAIRE
ORSAY

Parallel Session 7B : Work on Extended Examples Summary

I. Hrivnacova, IPN Orsay

17th Geant4 Collaboration Meeting,
10 - 14 September 2012, Chartres

Agenda

- Work on extended examples (I. Hrivnacova)
- Visualization features in examples (J. Allison)
- New classes of general interest: G4CommandLineOptions, G4RejectionTechnique, G4StatisticalManager (J. Madsen)
- EM examples review; Proposal for G4UserParameters Class (I. Hrivnacova)

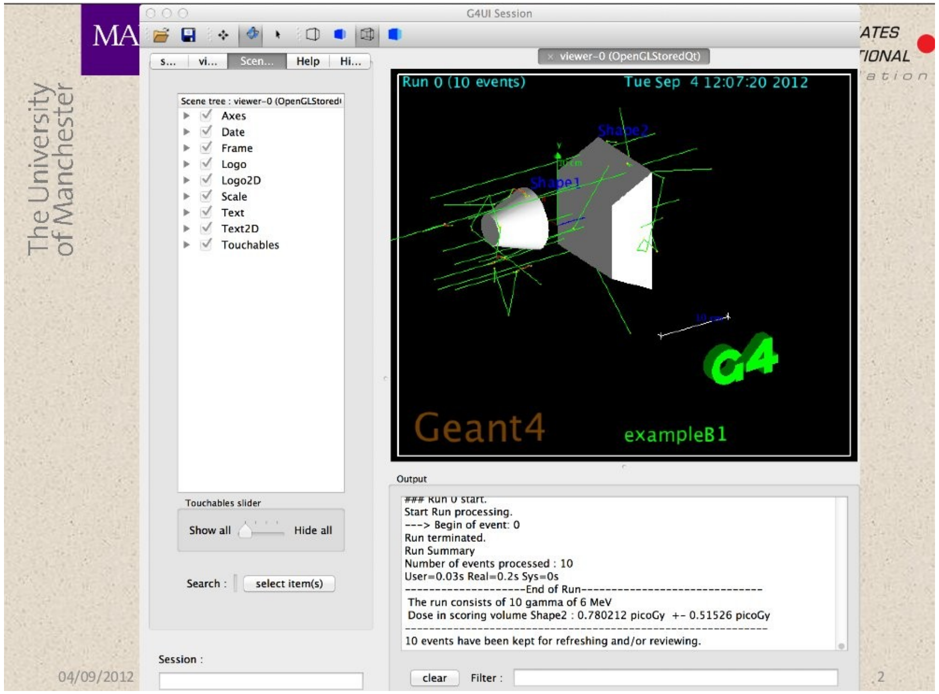
Work On Extended Examples (1)

- Continue with examples reviews
  - Fix the problems reported in the reviews (by owners) and respond to the review
  - Call for volunteers for reviewing remaining examples
- Continue with applying coding guidelines
  - Ask WG coordinators for the examples not yet “touched” to delegate this work to a member in his group
- CMake build
  - Request to support a possibility to specify a macro path in intercoms
  - Keep current version of CMakeLists.txt files (including copying scripts in the build area) until the request in intercoms is addressed

Work On Extended Examples (2)

- Documentation
  - Add description *for all macros* provided with an example in the example README page
  - Add description for *all commands* implemented in the examples messengers either in the README page or in the messenger classes (which should be then linked to the page)

Visualization commands in examples (J. Allison)



```
### Run 0 start.
Start Run processing.
---> Begin of event: 0
Run terminated.
Run Summary
Number of events processed : 10
User=0.03s Real=0.2s Sys=0s
--------------------End of Run------------------------------
 The run consists of 10 gamma of 6 MeV
 Dose in scoring volume Shape2 : 0.780212 picoGy  +- 0.51526 picoGy
------------------------------------------------------------
10 events have been kept for refreshing and/or reviewing.
```

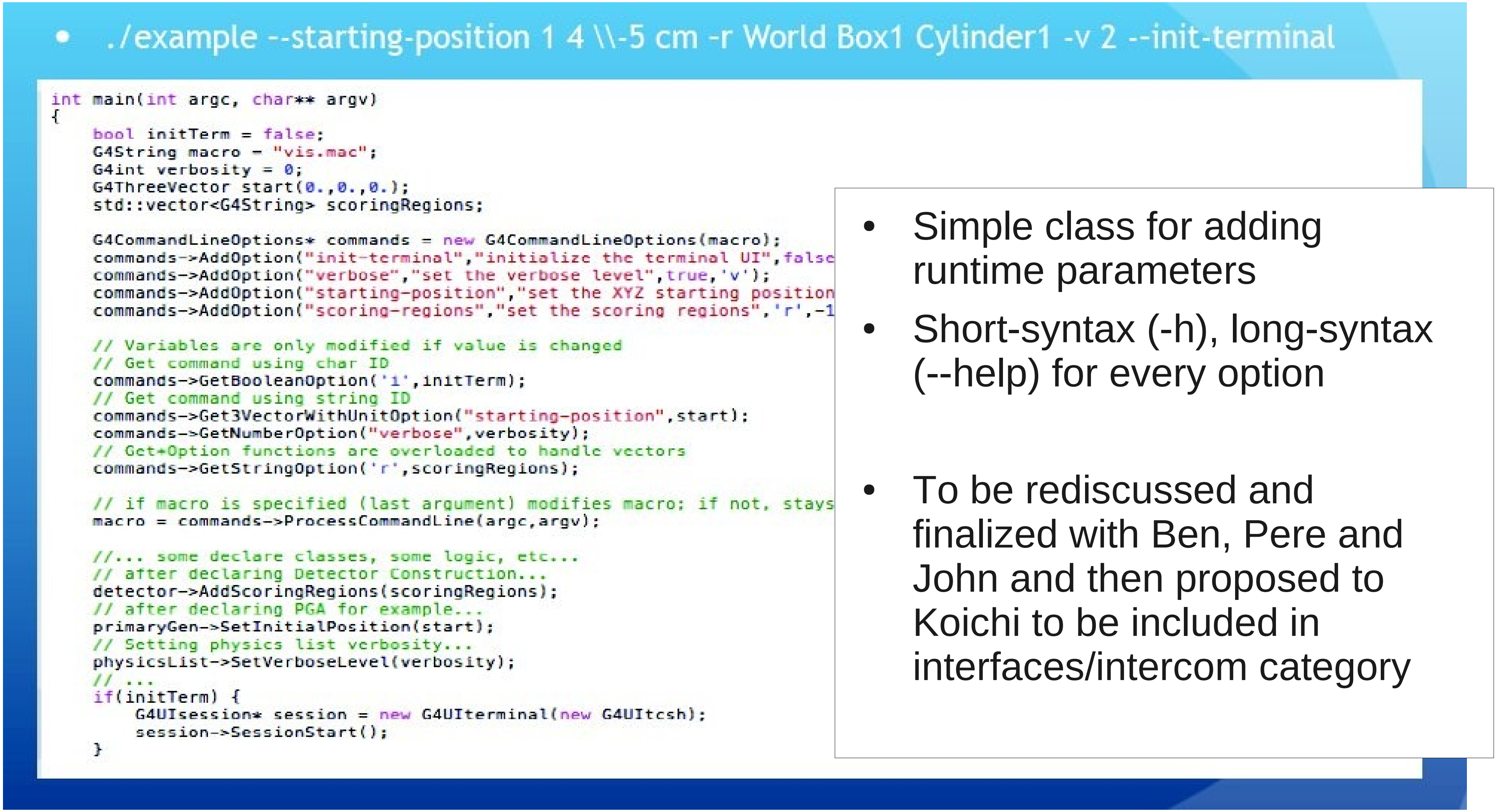
- Set of new commands to be included in the basic examples
  - Adding new objects: G4 logo, frame, axes, scale, labels
  - Make a nice view (invisible world, surface mode of detector components, ...)
- Effort to support new commands in most of drivers
  - Issue a warning when unsupported feature is called and do not draw anything in the scene

Command Line Arguments

- Make proper use of command line arguments
  - ./exampleB1 --macro run1.mac --session tcsh
  - ./exampleB1 --session tcsh run1.mac (Posix compliant)
  - ./exampleB1 run1.mac --session tcsh (interactive)
  - ./exampleB1 --session tcsh (executes vis.mac)
  - ./exampleb1 run1.mac (batch)
  - ./exampleB1 -- macro run1.mac (batch)

New Classes of General Interest: G4CommandLineOptions, G4RejectionTechnique, G4StatisticalManager (J. Madsen)

G4CommandLineOptions



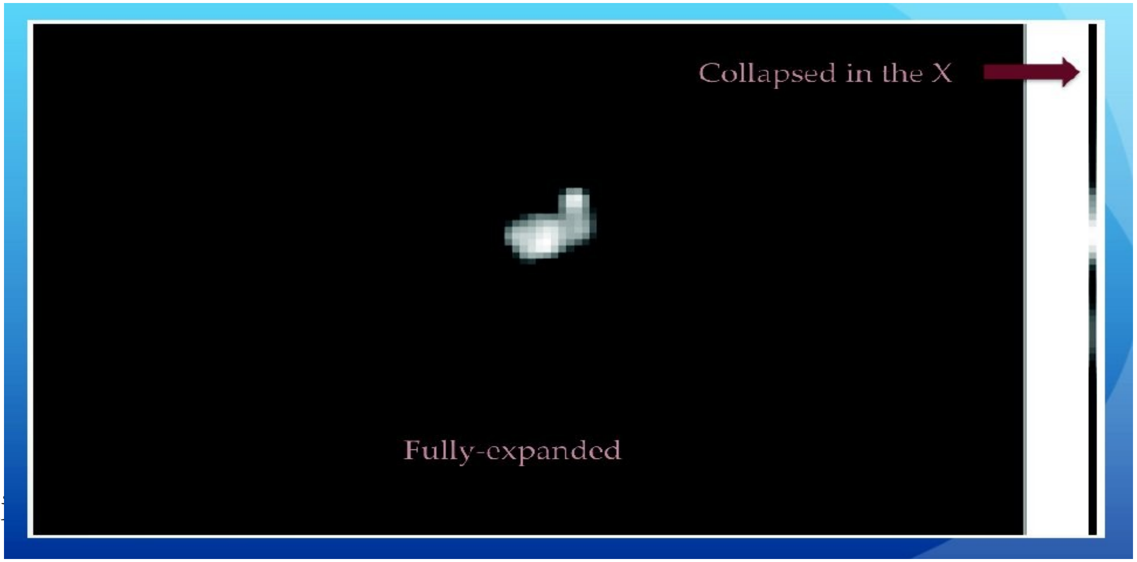
- ./example --starting-position 1 4 \\-5 cm -r World Box1 Cylinder1 -v 2 --init-terminal

```
int main(int argc, char** argv)
{
    bool initTerm = false;
    G4String macro = "vis.mac";
    G4int verbosity = 0;
    G4ThreeVector start(0.,0.,0.);
    std::vector<G4String> scoringRegions;

    G4CommandLineOptions* commands = new G4CommandLineOptions(macro);
    commands->AddOption("init-terminal","initialize the terminal UI",false
    commands->AddOption("verbose","set the verbose level",true,'v');
    commands->AddOption("starting-position","set the XYZ starting position
    commands->AddOption("scoring-regions","set the scoring regions",'r',-1

    // Variables are only modified if value is changed
    // Get command using char ID
    commands->GetBooleanOption('i',initTerm);
    // Get command using string ID
    commands->Get3VectorWithUnitOption("starting-position",start);
    commands->GetNumberOption("verbose",verbosity);
    // Get*Option functions are overloaded to handle vectors
    commands->GetStringOption('r',scoringRegions);

    // if macro is specified (last argument) modifies macro; if not, stays
    macro = commands->ProcessCommandLine(argc,argv);

    //... some declare classes, some logic, etc...
    // after declaring Detector Construction...
    detector->AddScoringRegions(scoringRegions);
    // after declaring PGA for example...
    primaryGen->SetInitialPosition(start);
    // Setting physics list verbosity...
    physicsList->SetVerboseLevel(verbosity);
    // ...
    if(initTerm) {
        G4UIsession* session = new G4UIterminal(new G4UItcsh);
        session->SessionStart();
    }
```

- Simple class for adding runtime parameters
- Short-syntax (-h), long-syntax (--help) for every option
- To be rediscussed and finalized with Ben, Pere and John and then proposed to Koichi to be included in interfaces/intercom category

G4RejectionTechnique

- Support for N-dimensional dependent set of acceptance-rejection criteria
  - 2D: collapse each row (X) into column (Y), select column, expand column and select X
- Example usage instances
  - Radioactive Decay
  - Complex distribution of starting positions (e.g. PET scan)
  - Angle distribution of primary particle
- To be sent to Gabriele and included in global or analysis category



G4StatisticalManager

- Templated class for handling statistics
- Handles set of statistical categories
  - Relative Error*, FOM*, Variance*, Standard Deviation*, Variance of Variance*, R2Eff*, R2Int*, Mean, Efficiency, Shift*
    - (* = implemented only if desired)
- Benefits over continuous/running statistical computation, over G4ConvergenceTester
- Allows usage of large numbers of scoring voxels and accumulation of multiple statistical categories without sacrificing speed and drastically reducing memory costs
- Can be utilized to handle statistics with G4SteppingAction or with scoring classes
- To be sent to Gabriele and included in global or analysis category

G4StatisticalManager

- Templated class for handling statistics
- Handles set of statistical categories
  - Relative Error*, FOM*, Variance*, Standard Deviation*, Variance of Variance*, R2Eff*, R2Int*, Mean, Efficiency, Shift*
    - (* = implemented only if desired)
- Benefits over continuous/running statistical computation, over G4ConvergenceTester
- Allows usage of large numbers of scoring voxels and accumulation of multiple statistical categories without sacrificing speed and drastically reducing memory costs
- Can be utilized to handle statistics with G4SteppingAction or with scoring classes
- To be sent to Gabriele and included in global or analysis category

EM examples review;
Proposal for G4UserParameters Class
(I. Hrivnacova)

- The report on the EM examples review
- Proposal for the G4UserParameters class

G4UserParameters

```
class DetConstruction : public ... {
  private:
     G4UserParameters   fParameters;
};


DetConstruction::DetConstruction()  {
   fParameters.Add("boxSize", 10*m, "Length");
  ...
}

DetConstruction::otherFunction() {
  G4double boxSize
     = fParameters.GetDValue("boxSize");
  ...
}

#in macro
/param/boxSize 5 m
```

- Allows to define user parameters via a name with global access
- Automatically generate “set” command
- Suggestions in a discussion:
  - To support command directories
  - Associate the parameter with a class data member (instead of name) and access it via a class getter
- Still needs more discussion to be finalized and proposed to Koichi to be included in intercoms