G4 Workshop 2002
Detector Description
Parallel Session

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Agenda

- Geometry & materials input
  - XML
  - GUI Editors
- G4 binding to detector description subsystems of experiment frameworks
  - Issues
  - Problems
  - Solutions
- New requirements to marry detector description & G4
Geometry & Materials

- **Current state of XML based solutions**
  - G4 provides GDML
  - Experiments have many others
    - Gaudi DDDB, CMS DDD, ATLAS & GLAST AGDD, ...

- **Agreement to freeze the new developments for XML based solutions and to wait for outcome of Detector Description RTAG #7 in the context of LCG**

- It’s clear that common exchange format is really needed in the area of detector description

- **G4 GDMLWriter is needed in the short time scale**
  - Possible re-use of CMS XML streamer implementation
GUI Editors

- **G4 provides Momo (GGE UI module)**
  - Using its own persistent format
  - Not clear how many users of it exist

- **Evgueni Tcherniaev’s GBuilder**
  - Data in the form of dynamically built & loaded C++ code
  - Good will to generate G4 friendly C++ geometry code or to provide import/export module (see requirements later)

- **Gaudi Java XML editor**
  - Quite flexible, can understand new XML DTDs and Schemas
  - Can be very useful when common exchange format exists

- **GraXML**
  - Independent Java based visualization
  - Understands HEP XML dialects, even GDML Beta version
  - Good will to adopt the new common exchange format if available
G4 Binding

• Issues
  - Lack of (re-)usable I/O machinery
    • Dump of solids' parameters, ...
  - Experiments have found their way to integrate G4 already
    • Mostly re-implementing steering & event loop part of G4

• Problems
  - Migration problems from G3 to G4
    • G4Exception due to precision problems
    • Not happy with the default exception “terminate” behavior
    • Not clear whether multiple or user defined exception handlers possible with the new G4 exception mechanism
# New Requirements

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<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
<th>Priority</th>
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<tbody>
<tr>
<td><strong>G4GDMLWriter</strong></td>
<td>Required mostly for testing and debugging purposes, e.g. send XML instead of C++</td>
<td>High</td>
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<tr>
<td><strong>Python interface for geometry &amp; materials</strong></td>
<td>Considered more useful then full set of G4Messenger commands, giving to users full power of Python</td>
<td>Medium</td>
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<td><strong>I/O Interface for external import/export tools</strong></td>
<td>Might be thin, but well defined &amp; documented, first client of it is GBuilder tool</td>
<td>Medium</td>
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<td><strong>G4ReflexionFactory option</strong></td>
<td>Switch-off generating of names for the objects created by the factory</td>
<td>High</td>
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<td><strong>Migration: g3tog4 option</strong></td>
<td>Switch-off transformation matrix consistency check &amp; let the user “correct” the matrix before use in G4</td>
<td>Medium</td>
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