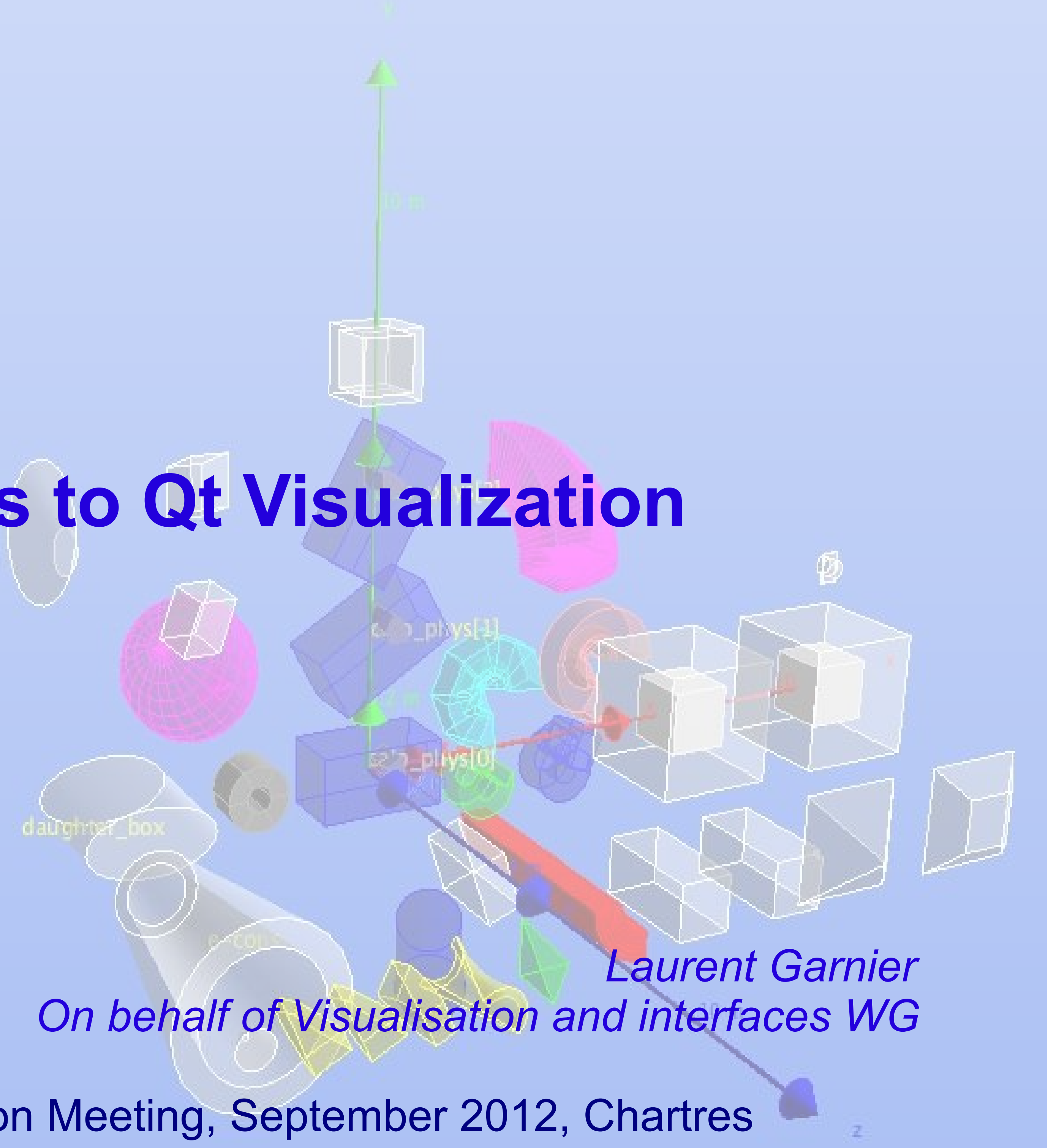
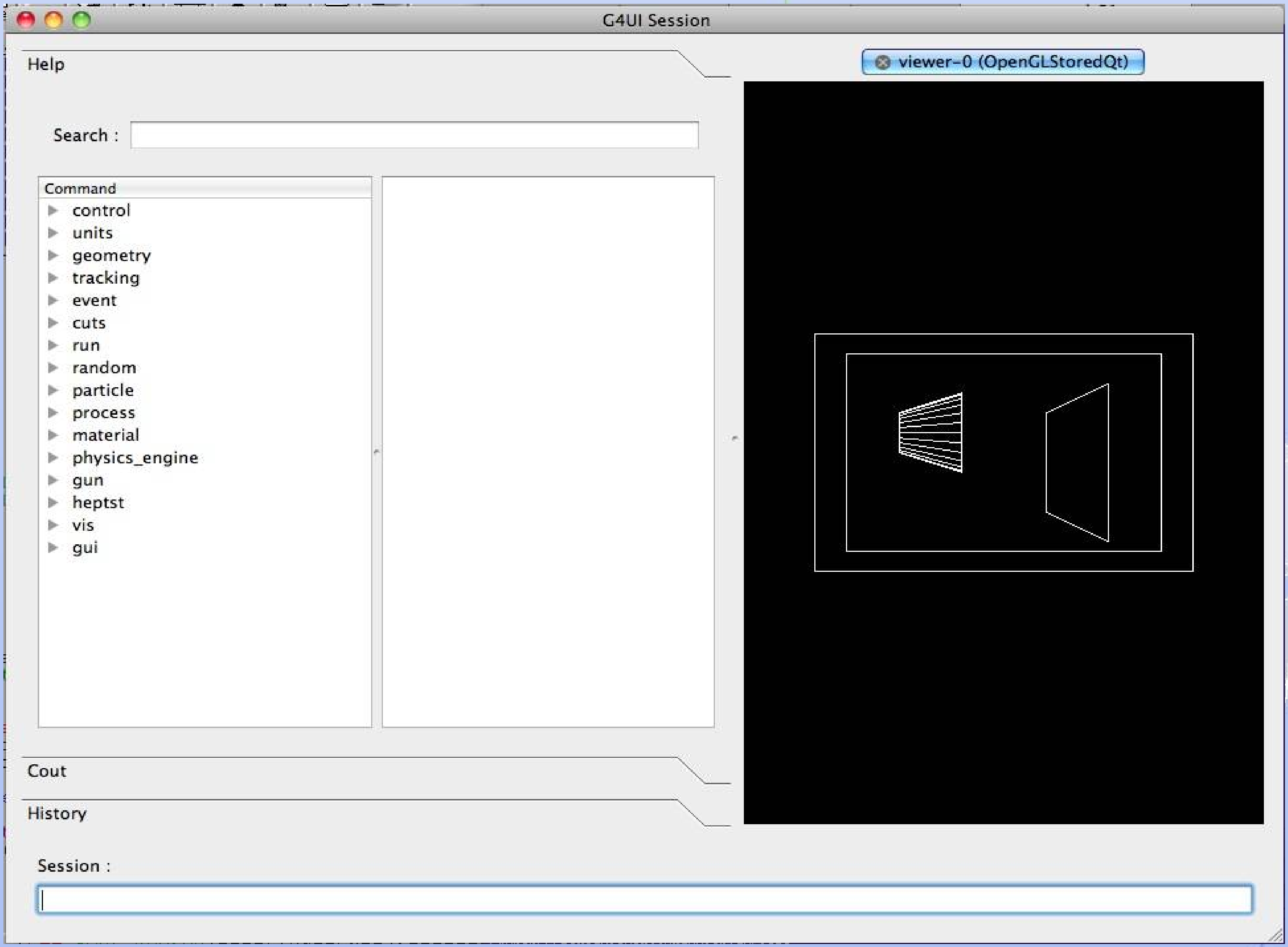
# Updates to Qt Visualization



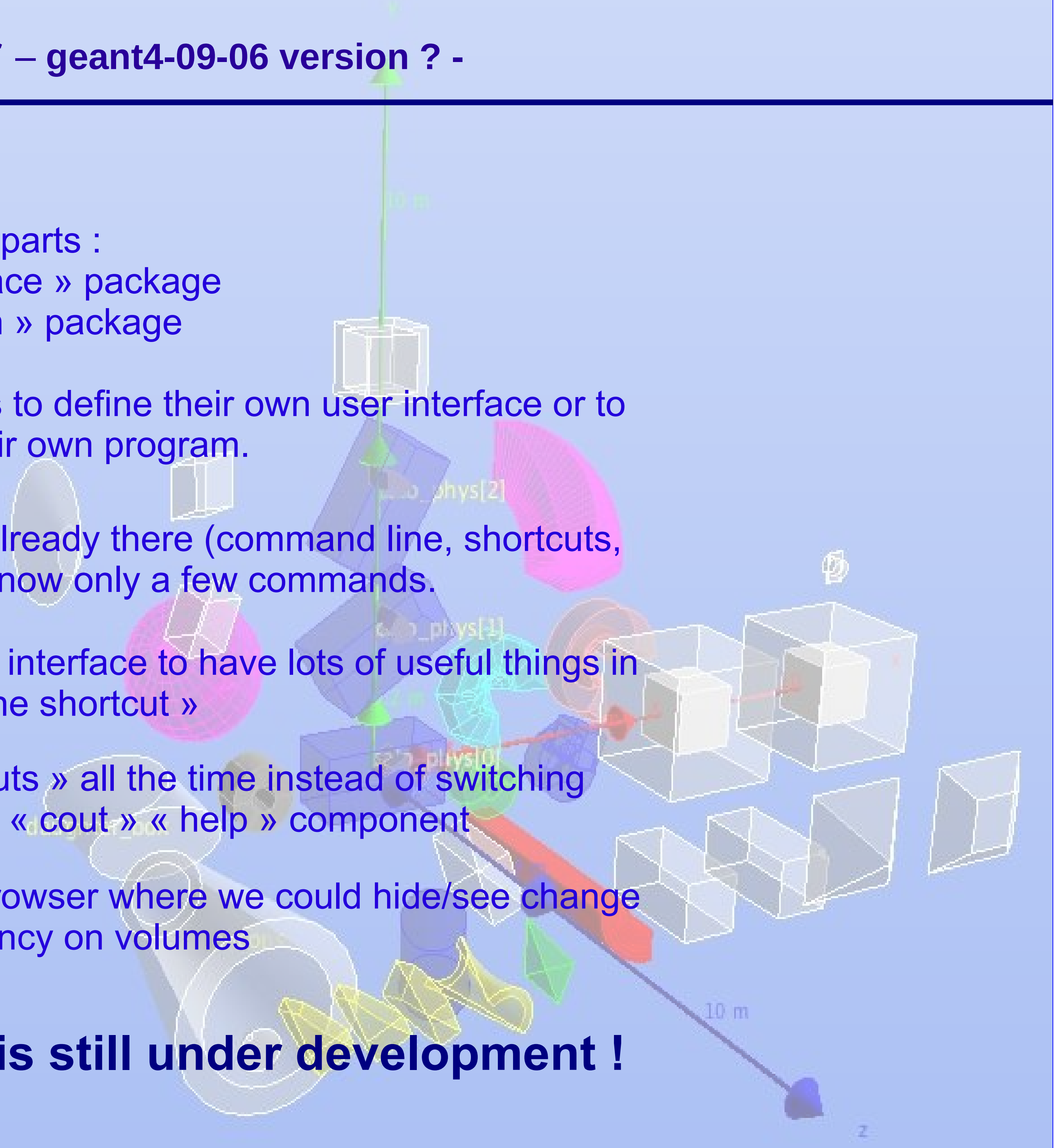
*Laurent Garnier*
*On behalf of Visualisation and interfaces WG*

17th Geant4 Collaborattion Meeting, September 2012, Chartres

# Qt Visualisation Driver – **geant4-09-05 version -**



# Qt Visualisation Driver – **geant4-09-06 version ? -**



Qt driver is originaly in two parts :

- User interface in « interface » package
- Viewers in « visualization » package

This modularity allow users to define their own user interface or to integrate only viewer in their own program.

Lots of functionalities are already there (command line, shortcuts, context menu), but users know only a few commands.

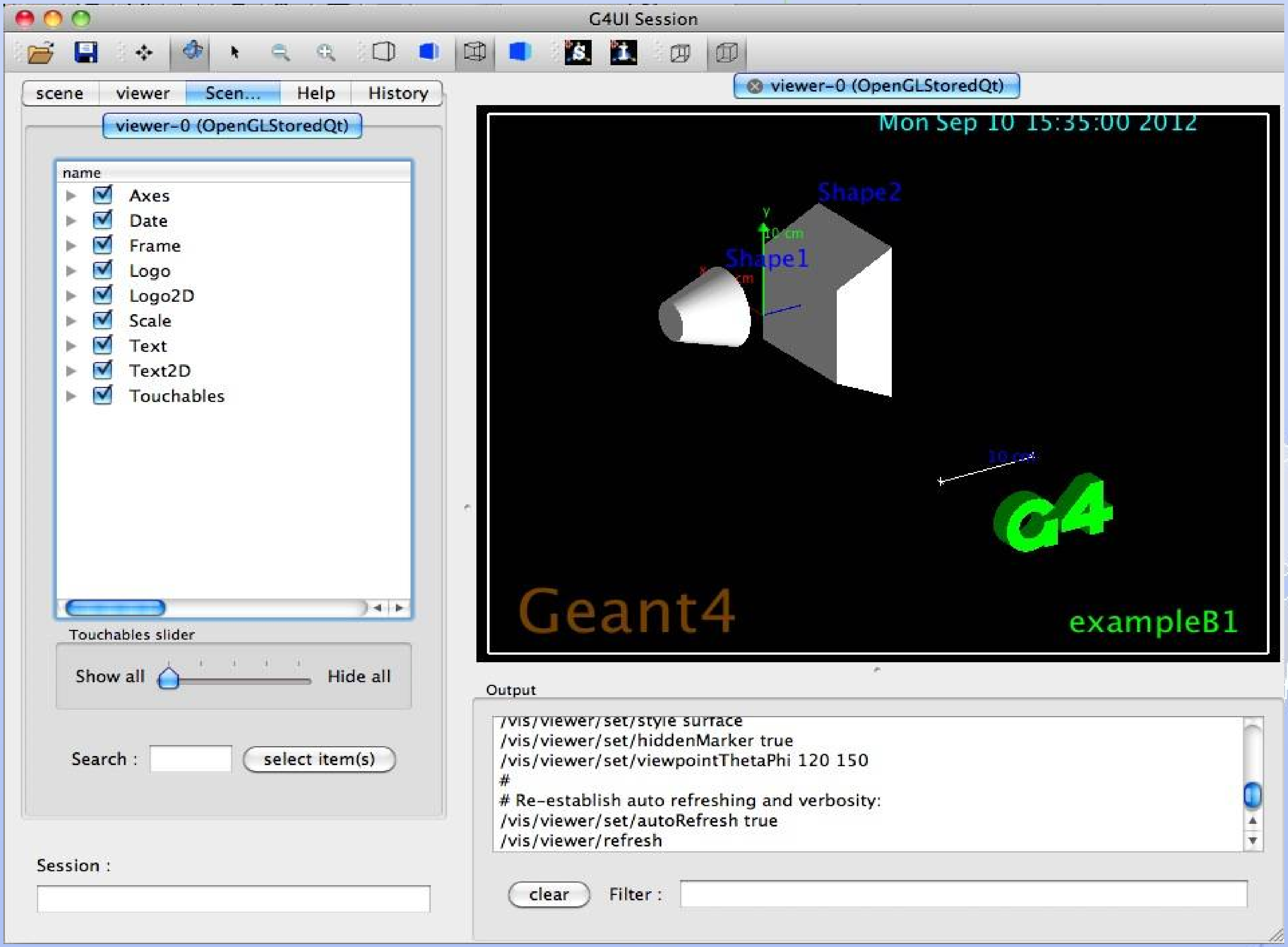
⇨ Try to redefine user interface to have lots of useful things in « one click » or « one shortcut »

⇨ Allow to see « outputs » all the time instead of switching between « history » « cout » « help » component

⇨ Add a scene tree browser where we could hide/see change color and transparency on volumes

**Everything is still under development !**

# Qt Visualisation Driver – **geant4-09-06 version ? -**



```
/vis/viewer/set/style surface
/vis/viewer/set/hiddenMarker true
/vis/viewer/set/viewpointThetaPhi 120 150
#
# Re-establish auto refreshing and verbosity:
/vis/viewer/set/autoRefresh true
/vis/viewer/refresh
```

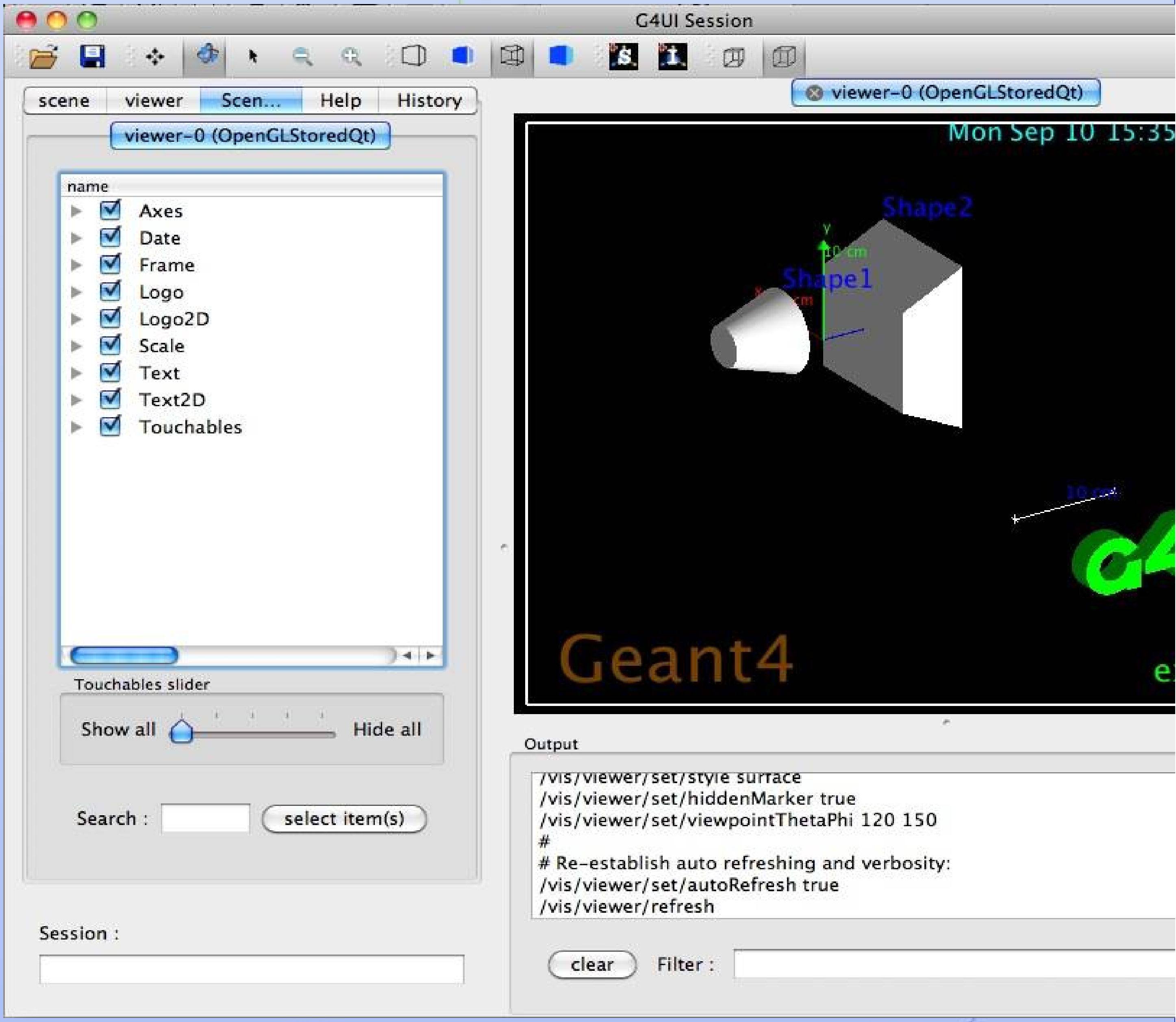
# Qt Visualisation Driver – **geant4-09-06 version ? -**

What's new ?

- Icon toolbar
- Left widget tabstack
- Scene tree browser

All previous components are still there :

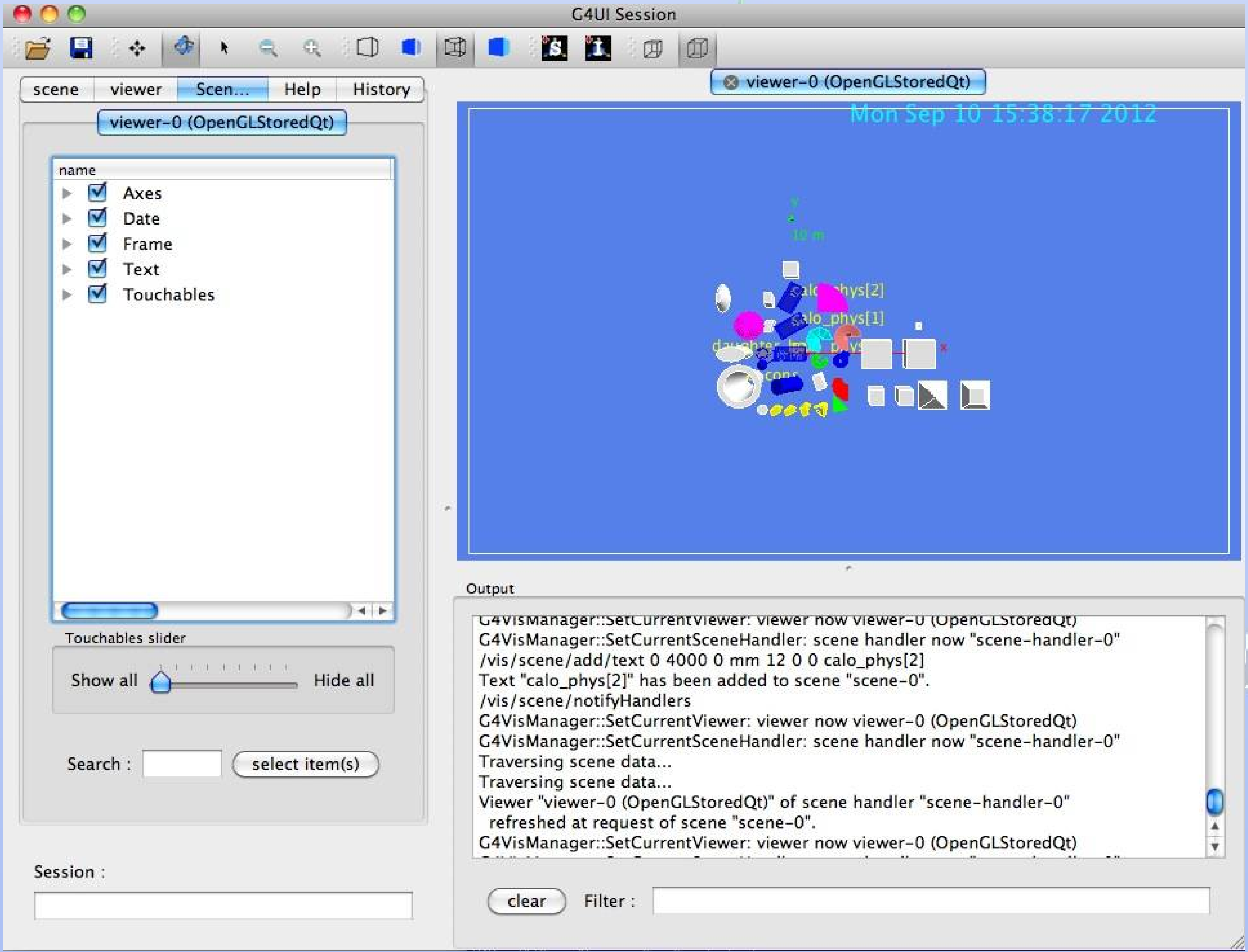
- Help widget
- Output window
- History
- Viewers
- Session



☑ Axes
☑ Date
☑ Frame
☑ Logo
☑ Logo2D
☑ Scale
☑ Text
☑ Text2D
☑ Touchables

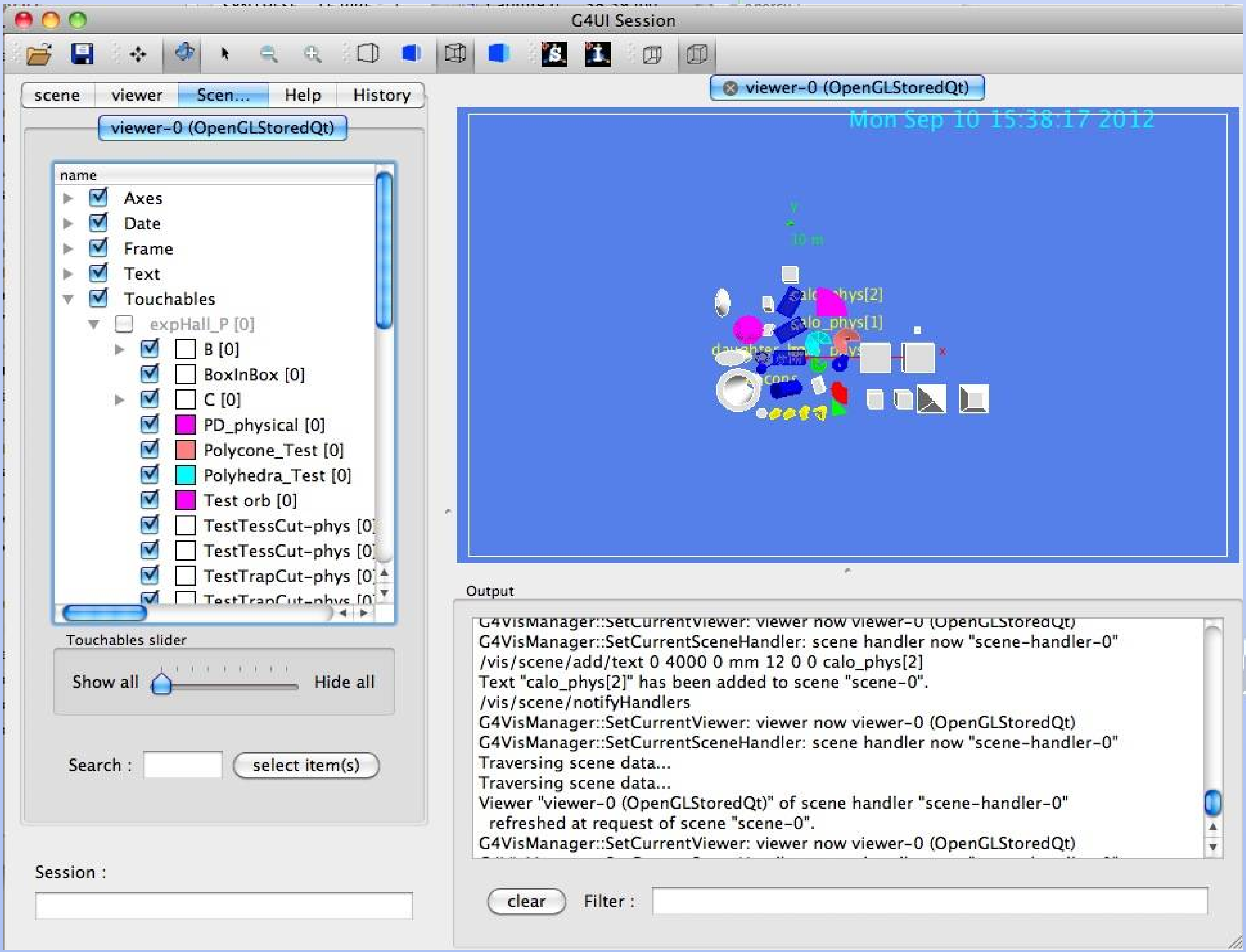
```
/vis/viewer/set/style surface
/vis/viewer/set/hiddenMarker true
/vis/viewer/set/viewpointThetaPhi 120 150
#
# Re-establish auto refreshing and verbosity:
/vis/viewer/set/autoRefresh true
/vis/viewer/refresh
```

# Qt Visualisation Driver – Test202 example -



```
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
G4VisManager::SetCurrentSceneHandler: scene handler now "scene-handler-0"
/vis/scene/add/text 0 4000 0 mm 12 0 0 calo_phys[2]
Text "calo_phys[2]" has been added to scene "scene-0".
/vis/scene/notifyHandlers
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
G4VisManager::SetCurrentSceneHandler: scene handler now "scene-handler-0"
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" of scene handler "scene-handler-0"
  refreshed at request of scene "scene-0".
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
```

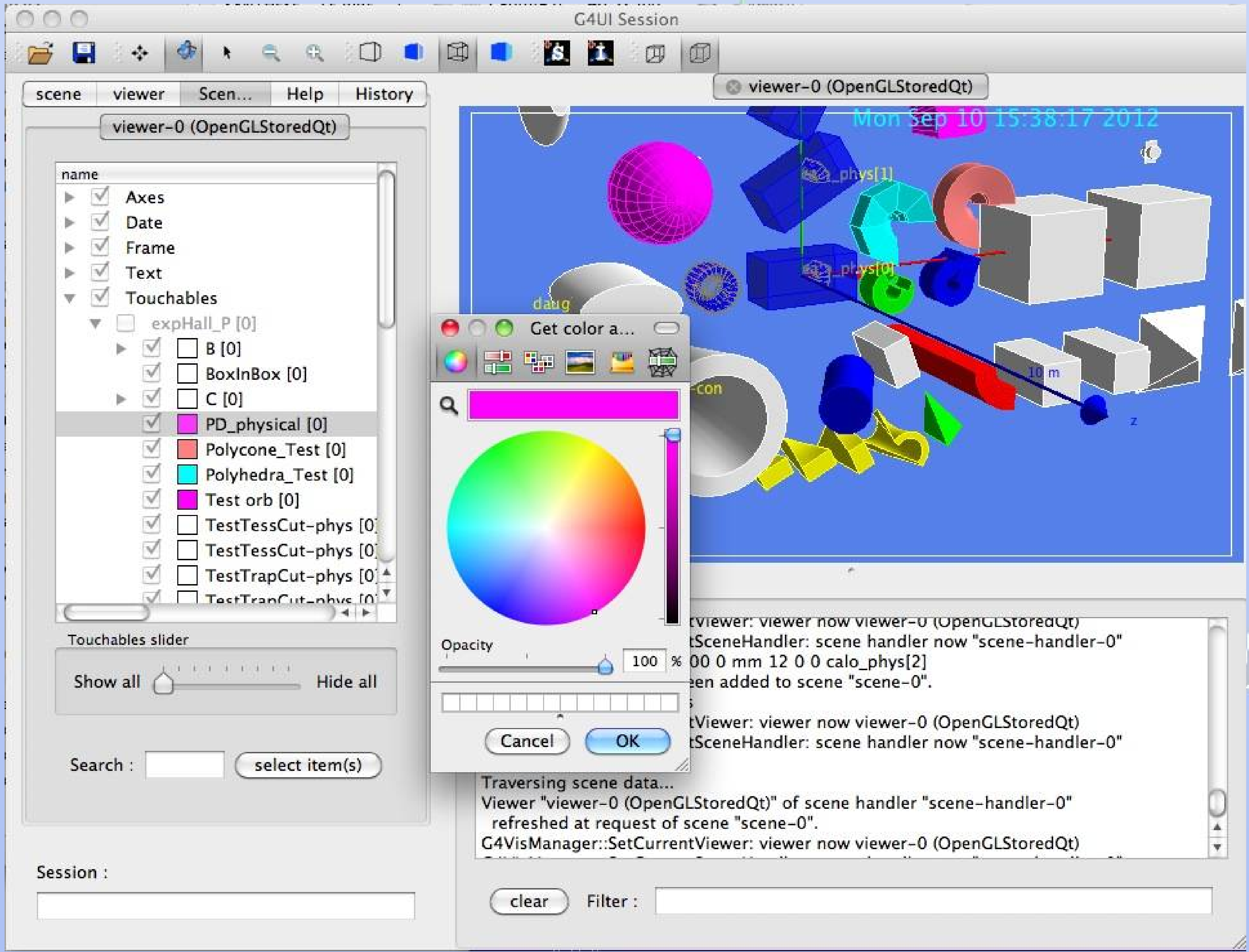
# Qt Visualisation Driver – Test202 example – scene tree



- ☑ Axes
- ☑ Date
- ☑ Frame
- ☑ Text
- ☑ Touchables
  - ☐ expHall_P [0]
    - ☑ ☐ B [0]
    - ☑ ☐ BoxInBox [0]
    - ☑ ☐ C [0]
    - ☑ ■ PD_physical [0]
    - ☑ ■ Polycone_Test [0]
    - ☑ ■ Polyhedra_Test [0]
    - ☑ ■ Test orb [0]
    - ☑ ☐ TestTessCut-phys [0]
    - ☑ ☐ TestTessCut-phys [0]
    - ☑ ☐ TestTrapCut-phys [0]
    - ☑ ☐ TestTrapCut-phys [0]

```
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
G4VisManager::SetCurrentSceneHandler: scene handler now "scene-handler-0"
/vis/scene/add/text 0 4000 0 mm 12 0 0 calo_phys[2]
Text "calo_phys[2]" has been added to scene "scene-0".
/vis/scene/notifyHandlers
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
G4VisManager::SetCurrentSceneHandler: scene handler now "scene-handler-0"
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" of scene handler "scene-handler-0"
  refreshed at request of scene "scene-0".
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
```

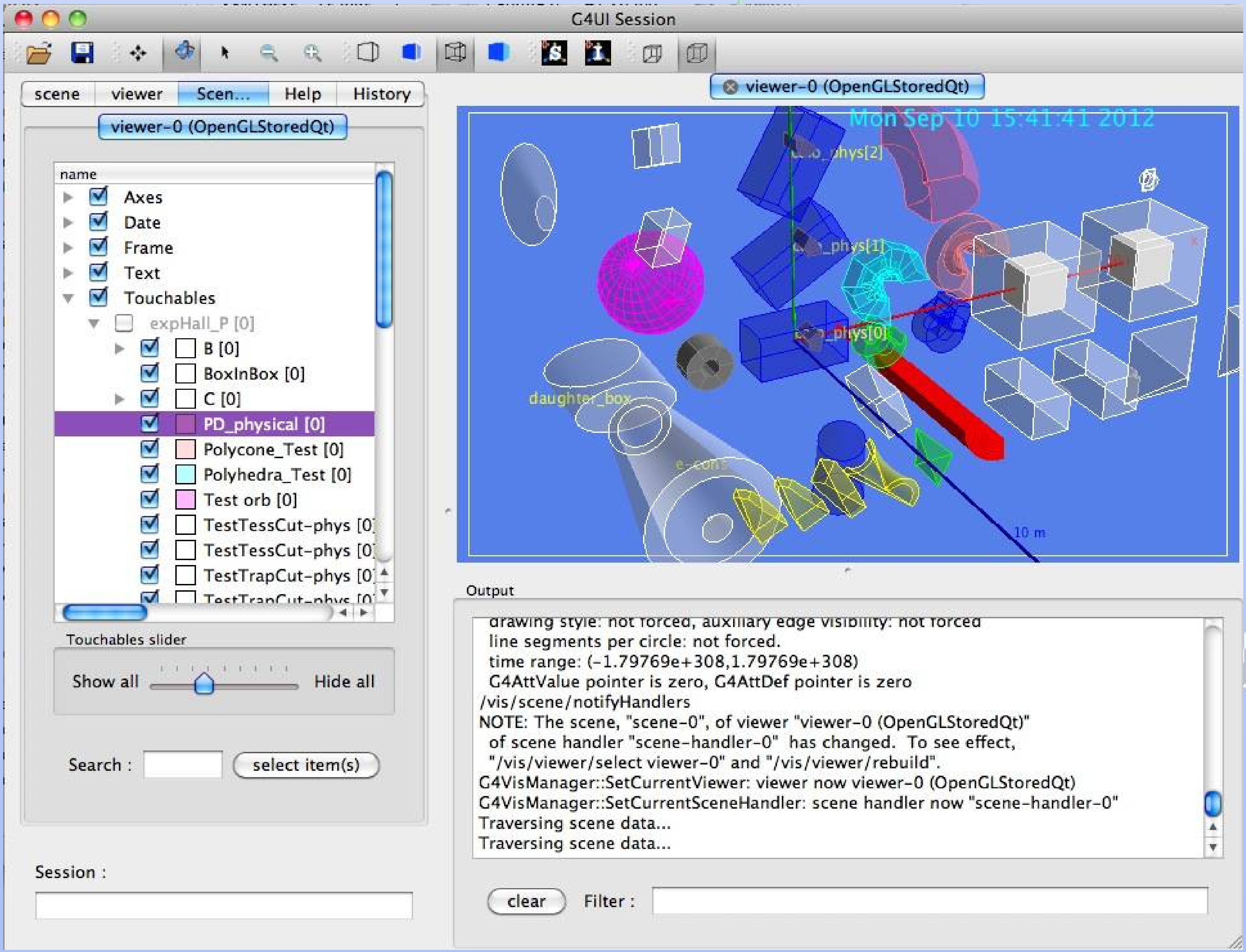
# Qt Visualisation Driver – Test202 example – changing color and transparency



```
tViewer: viewer now viewer-0 (OpenGLStoredQt)
tSceneHandler: scene handler now "scene-handler-0"
00 0 mm 12 0 0 calo_phys[2]
een added to scene "scene-0".
s
tViewer: viewer now viewer-0 (OpenGLStoredQt)
tSceneHandler: scene handler now "scene-handler-0"

Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" of scene handler "scene-handler-0"
  refreshed at request of scene "scene-0".
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
```

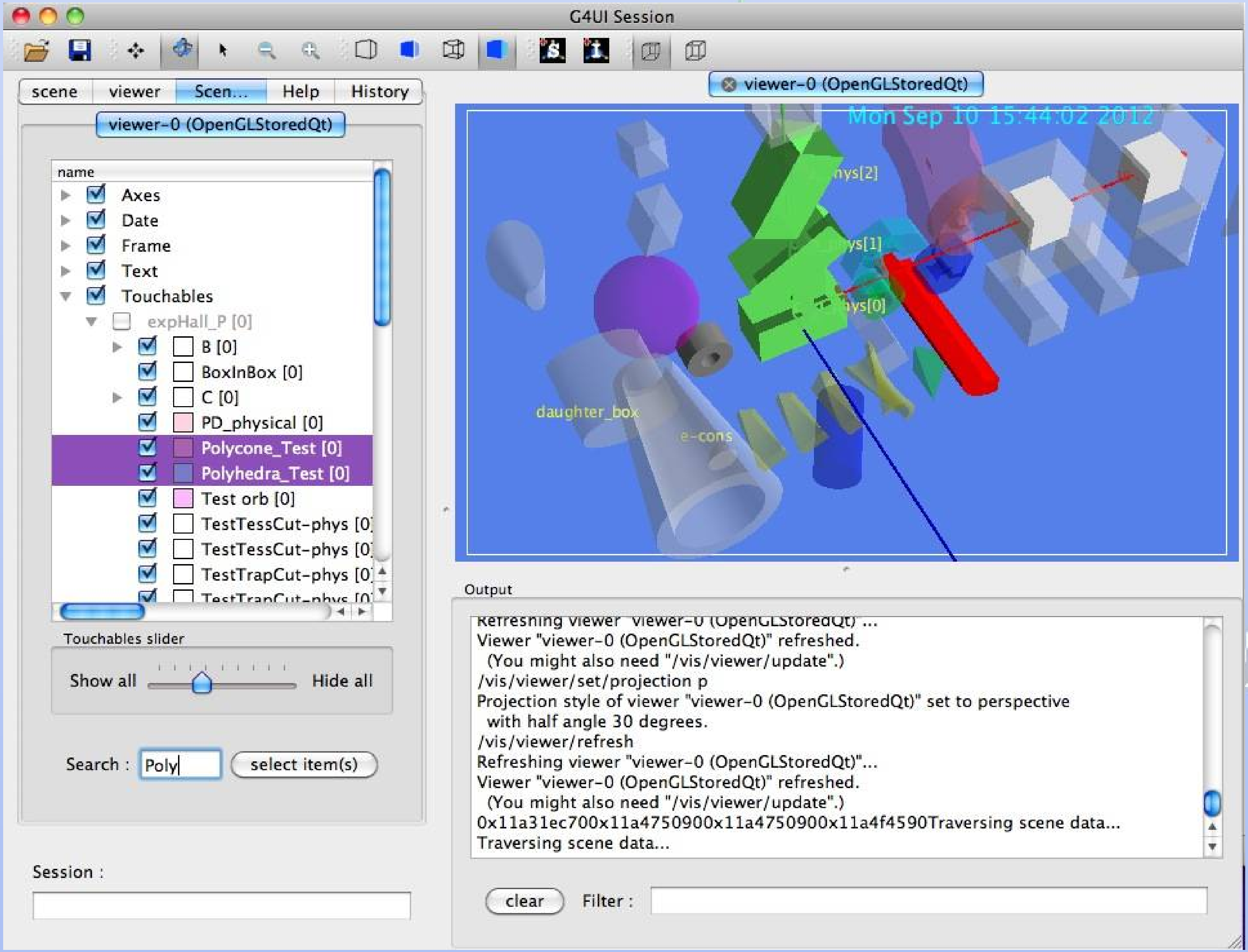
# Qt Visualisation Driver – Test202 example – **touchables slider**



- ☑ Axes
- ☑ Date
- ☑ Frame
- ☑ Text
- ☑ Touchables
  - □ expHall_P [0]
    - ☑ □ B [0]
    - ☑ □ BoxInBox [0]
    - ☑ □ C [0]
    - ☑ ▨ PD_physical [0]
    - ☑ ▨ Polycone_Test [0]
    - ☑ ▨ Polyhedra_Test [0]
    - ☑ ▨ Test orb [0]
    - ☑ □ TestTessCut-phys [0]
    - ☑ □ TestTessCut-phys [0]
    - ☑ □ TestTrapCut-phys [0]
    - ☑ □ TestTrapCut-phys [0]

```
  drawing style: not forced, auxiliary edge visibility: not forced
  line segments per circle: not forced.
  time range: (-1.79769e+308,1.79769e+308)
  G4AttValue pointer is zero, G4AttDef pointer is zero
/vis/scene/notifyHandlers
NOTE: The scene, "scene-0", of viewer "viewer-0 (OpenGLStoredQt)"
  of scene handler "scene-handler-0"  has changed.  To see effect,
  "/vis/viewer/select viewer-0" and "/vis/viewer/rebuild".
G4VisManager::SetCurrentViewer: viewer now viewer-0 (OpenGLStoredQt)
G4VisManager::SetCurrentSceneHandler: scene handler now "scene-handler-0"
Traversing scene data...
Traversing scene data...
```

# Qt Visualisation Driver – Test202 example **– looking for a volume**

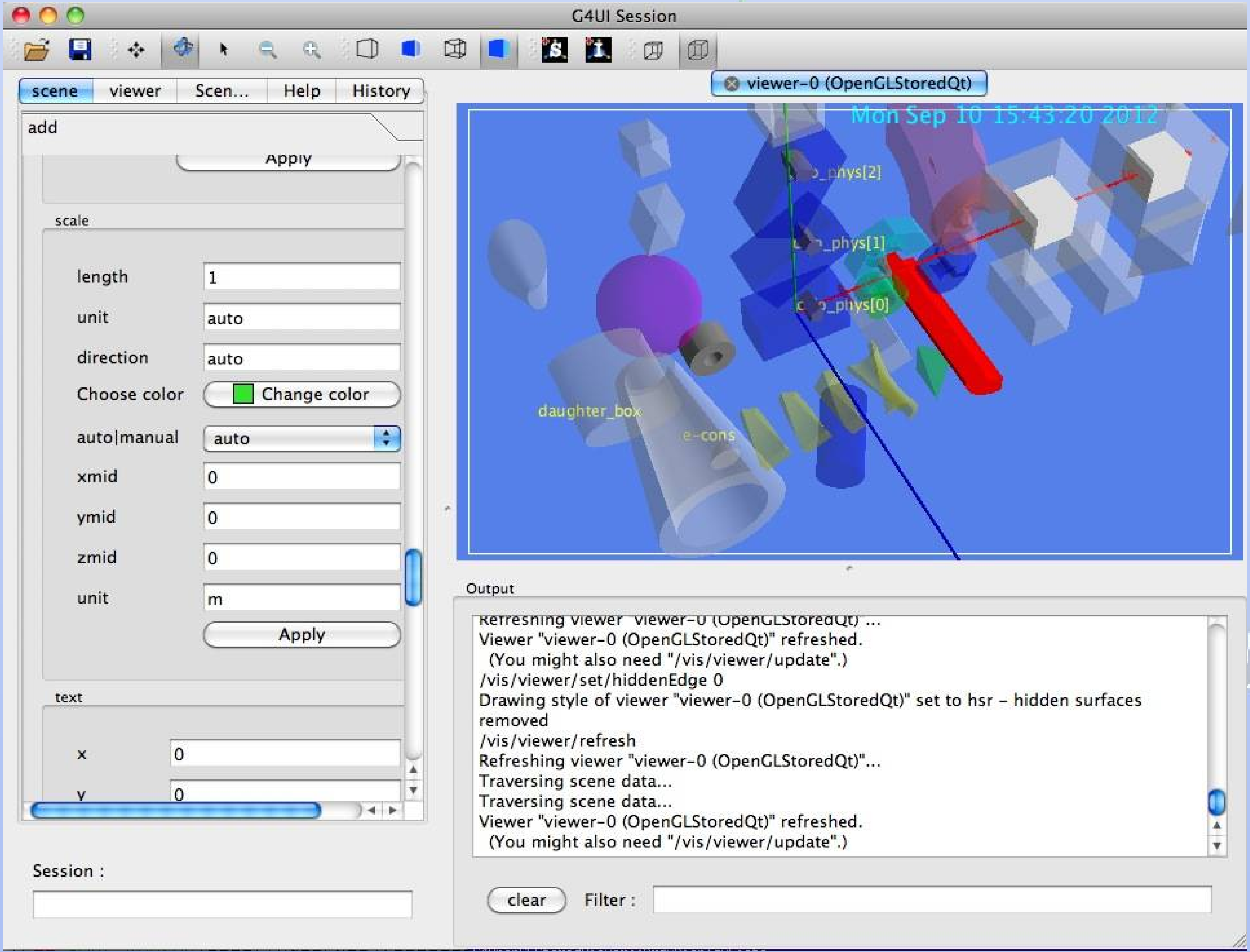


- ▸ ☑ Axes
- ▸ ☑ Date
- ▸ ☑ Frame
- ▸ ☑ Text
- ▾ ☑ Touchables
  - ▾ □ expHall_P [0]
    - ▸ ☑ □ B [0]
    - ☑ □ BoxInBox [0]
    - ▸ ☑ □ C [0]
    - ☑ ■ PD_physical [0]
    - ☑ ■ Polycone_Test [0]
    - ☑ ■ Polyhedra_Test [0]
    - ☑ ■ Test orb [0]
    - ☑ □ TestTessCut-phys [0]
    - ☑ □ TestTessCut-phys [0]
    - ☑ □ TestTrapCut-phys [0]
    - ☑ □ TestTrapCut-phys [0

Search : Poly

```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/projection p
Projection style of viewer "viewer-0 (OpenGLStoredQt)" set to perspective
  with half angle 30 degrees.
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
0x11a31ec700x11a4750900x11a4750900x11a4f4590Traversing scene data...
Traversing scene data...
```

# Qt Visualisation Driver – Test202 example **– scene/viewer component**



scale

length 1

unit auto

direction auto

Choose color 🟩 Change color

auto|manual auto

xmid 0

ymid 0

zmid 0

unit m

Apply

text

x 0

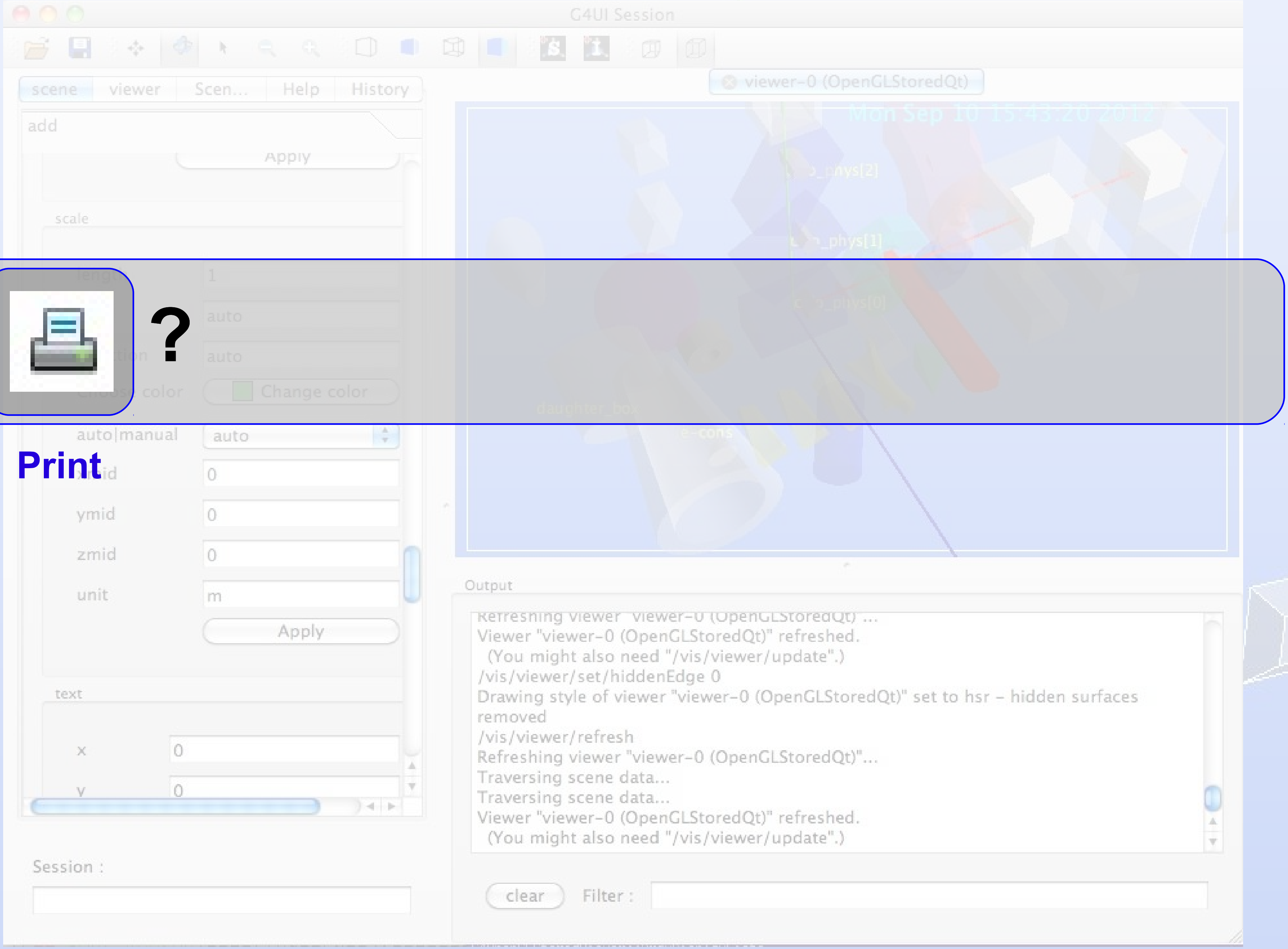
y 0

```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

# Qt Visualisation Driver – What next ? –

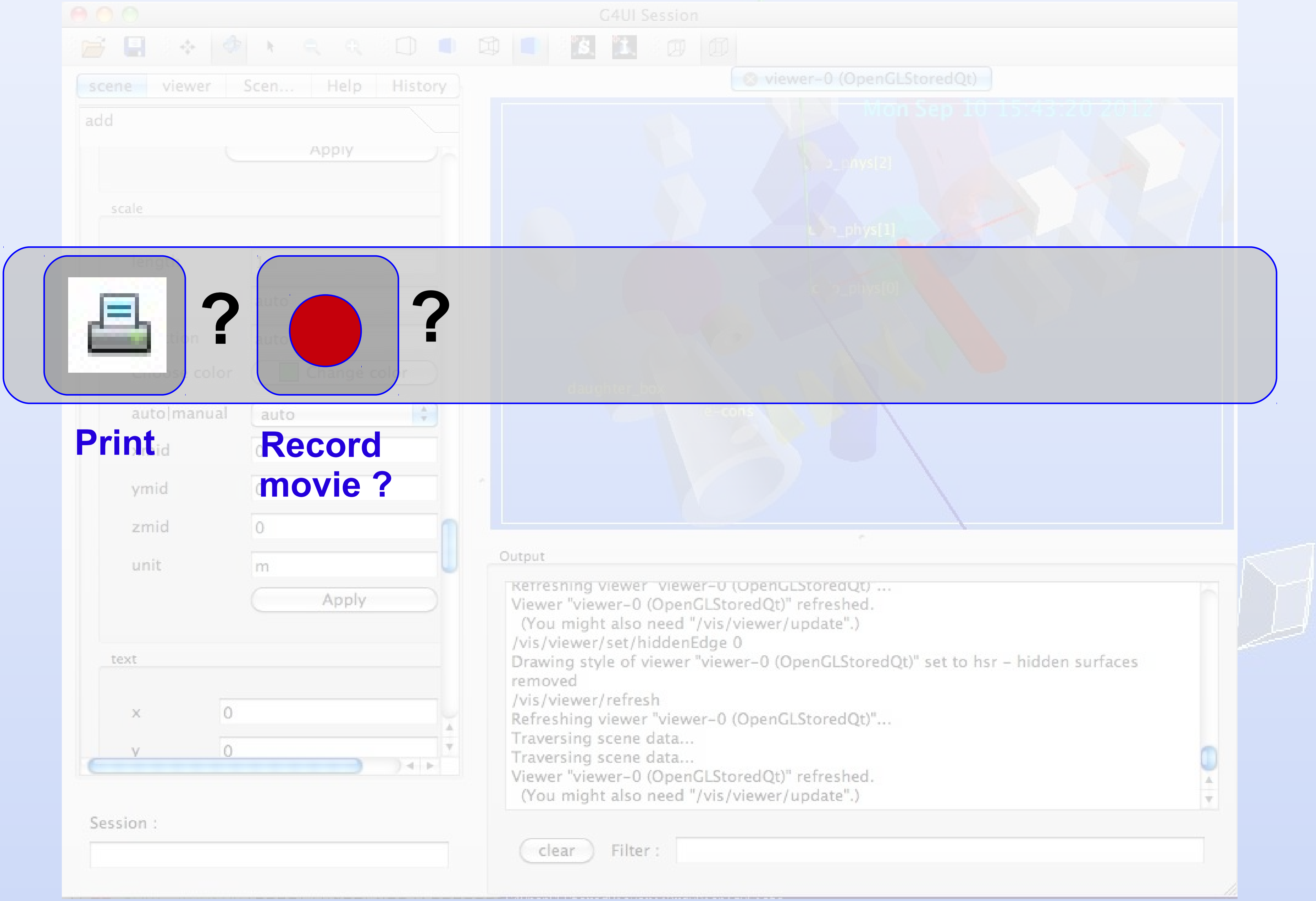
?

**Print**



```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

# Qt Visualisation Driver – What next ? –

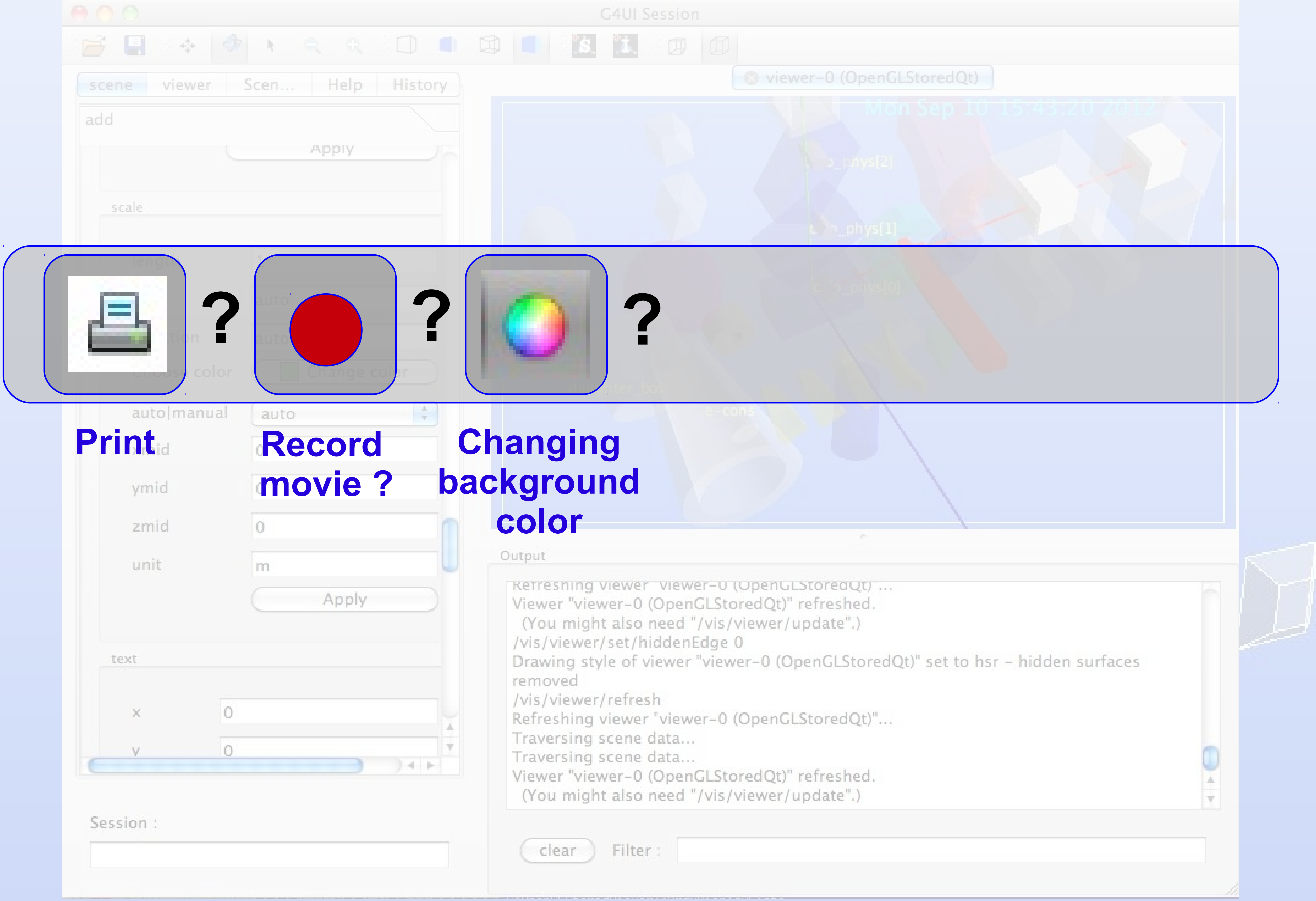


```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

**Print**

**Record movie ?**

# Qt Visualisation Driver – What next ? –



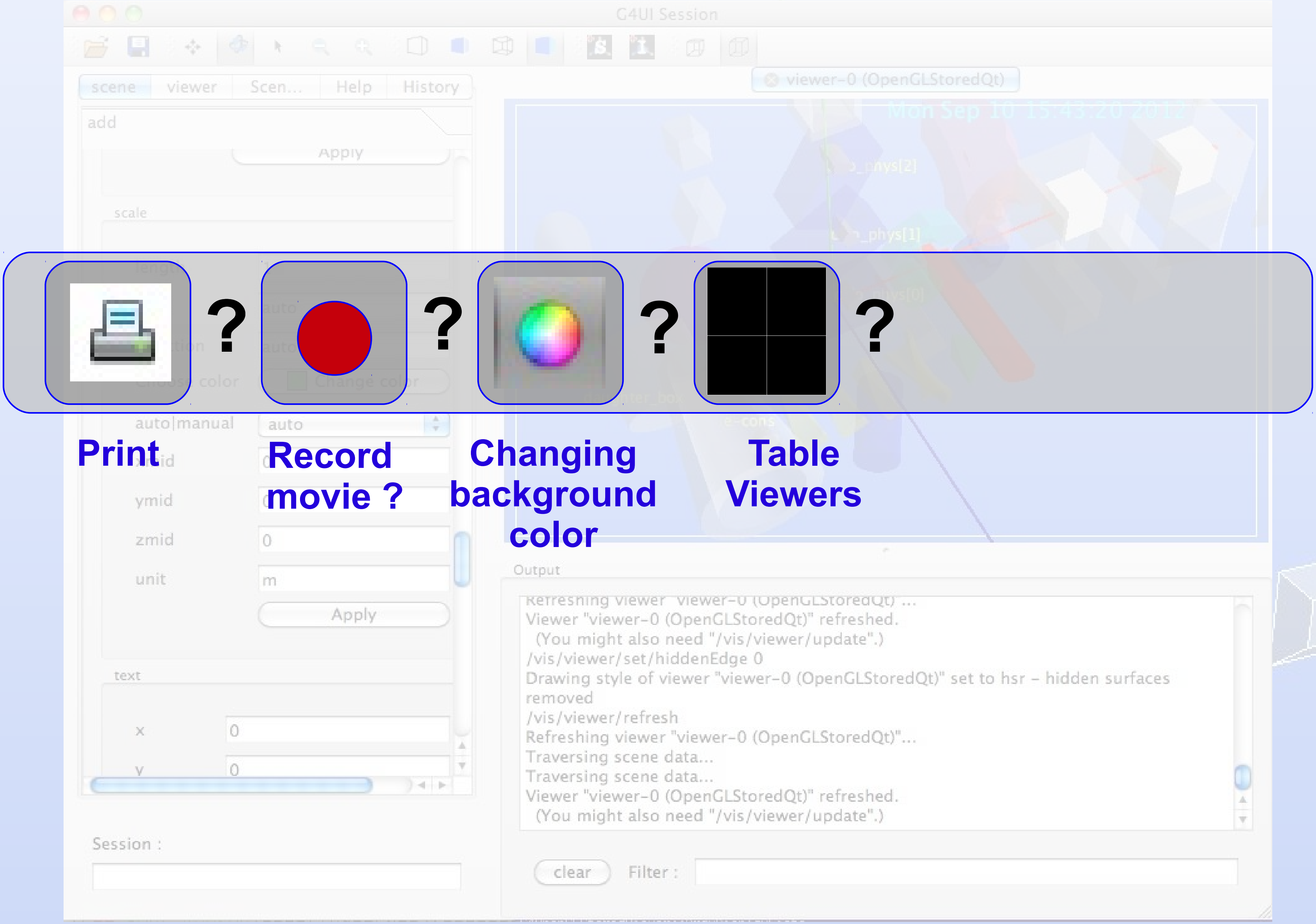
Print

Record movie ?

Changing background color

```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

# Qt Visualisation Driver – What next ? –



```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

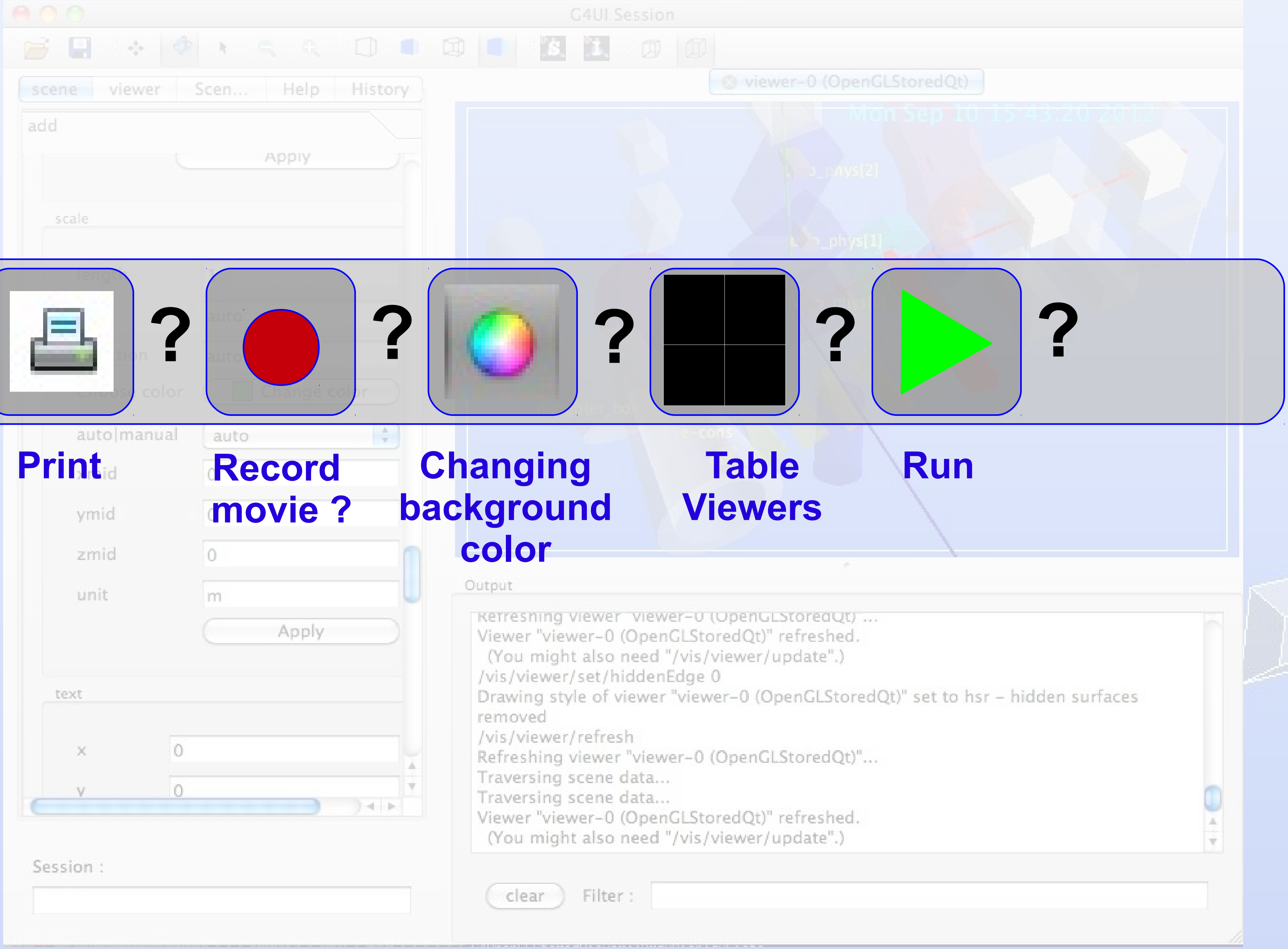
**Print**

**Record movie ?**

**Changing background color**

**Table Viewers**

# Qt Visualisation Driver – What next ? –



auto|manual auto

xmid 0

ymid 0

zmid 0

unit m

text

x 0

y 0

Session :

Filter :

```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

? ? ? ? ?

**Print**

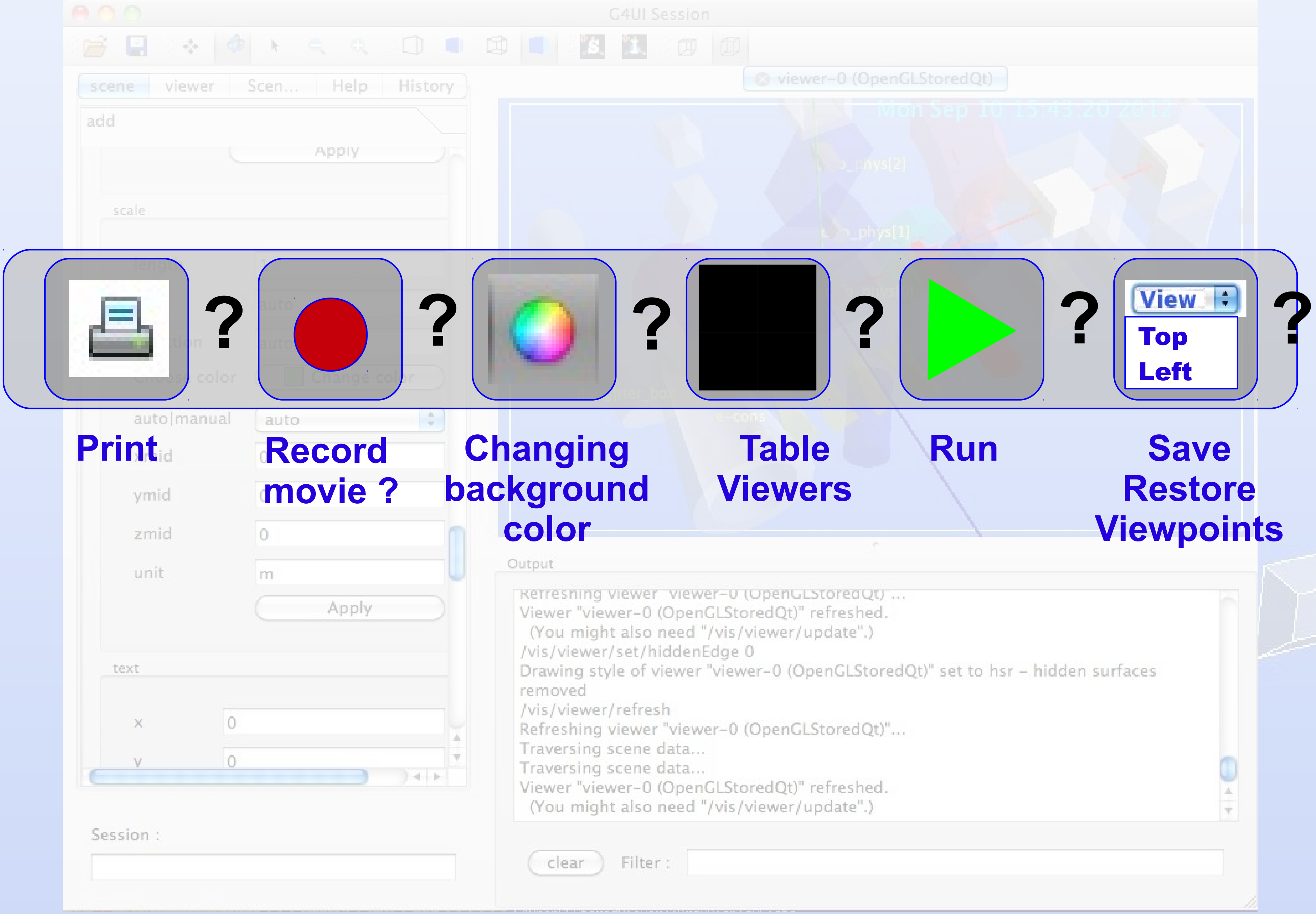
**Record movie ?**

**Changing background color**

**Table Viewers**

**Run**

# Qt Visualisation Driver – What next ? –



```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

**Print**

**Record movie ?**

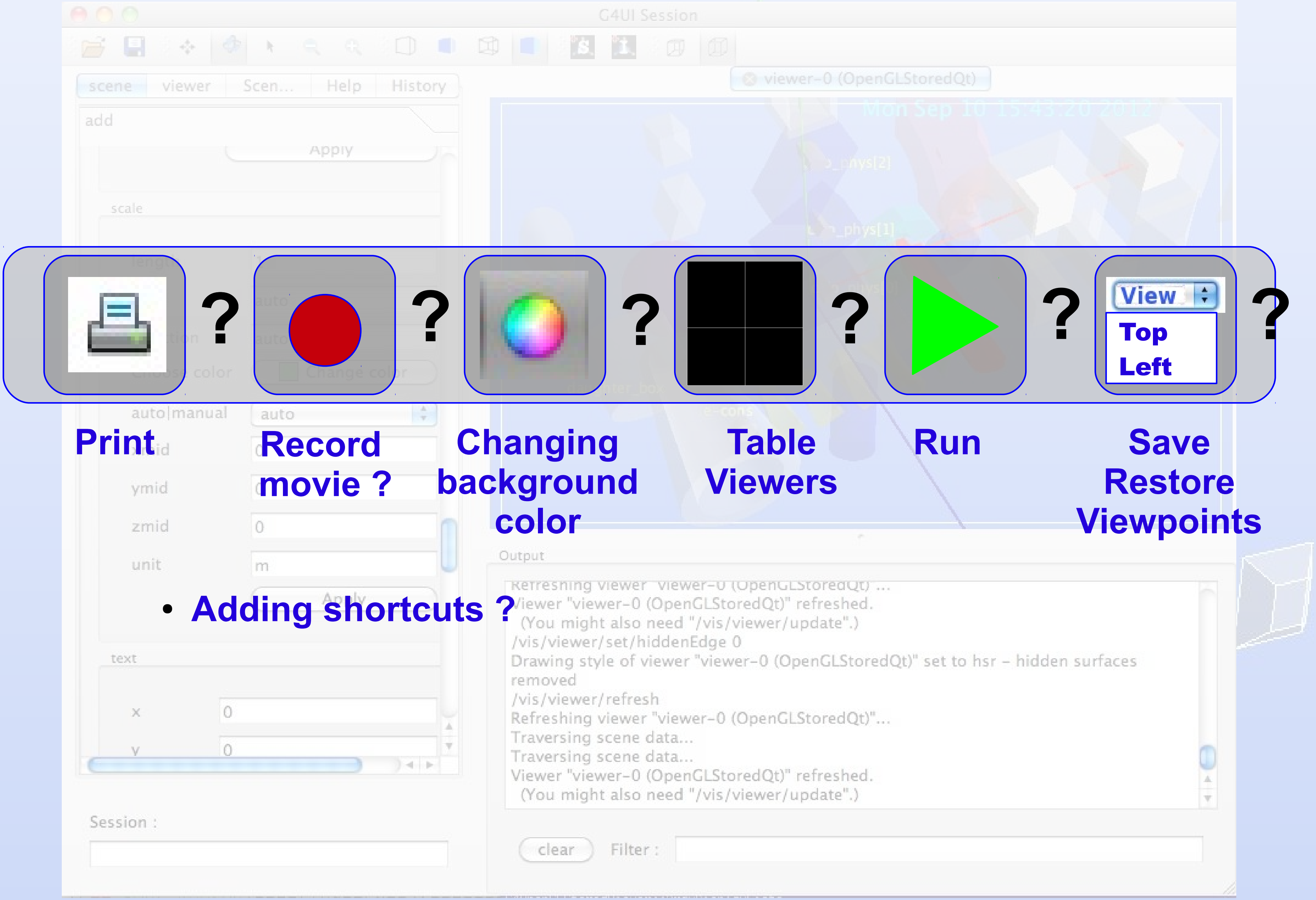
**Changing background color**

**Table Viewers**

**Run**

**Save Restore Viewpoints**

# Qt Visualisation Driver – What next ? –



```
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
/vis/viewer/set/hiddenEdge 0
Drawing style of viewer "viewer-0 (OpenGLStoredQt)" set to hsr - hidden surfaces
removed
/vis/viewer/refresh
Refreshing viewer "viewer-0 (OpenGLStoredQt)"...
Traversing scene data...
Traversing scene data...
Viewer "viewer-0 (OpenGLStoredQt)" refreshed.
  (You might also need "/vis/viewer/update".)
```

**Print**

**Record movie ?**

**Changing background color**

**Table Viewers**

**Run**

**Save Restore Viewpoints**

- **Adding shortcuts ?**

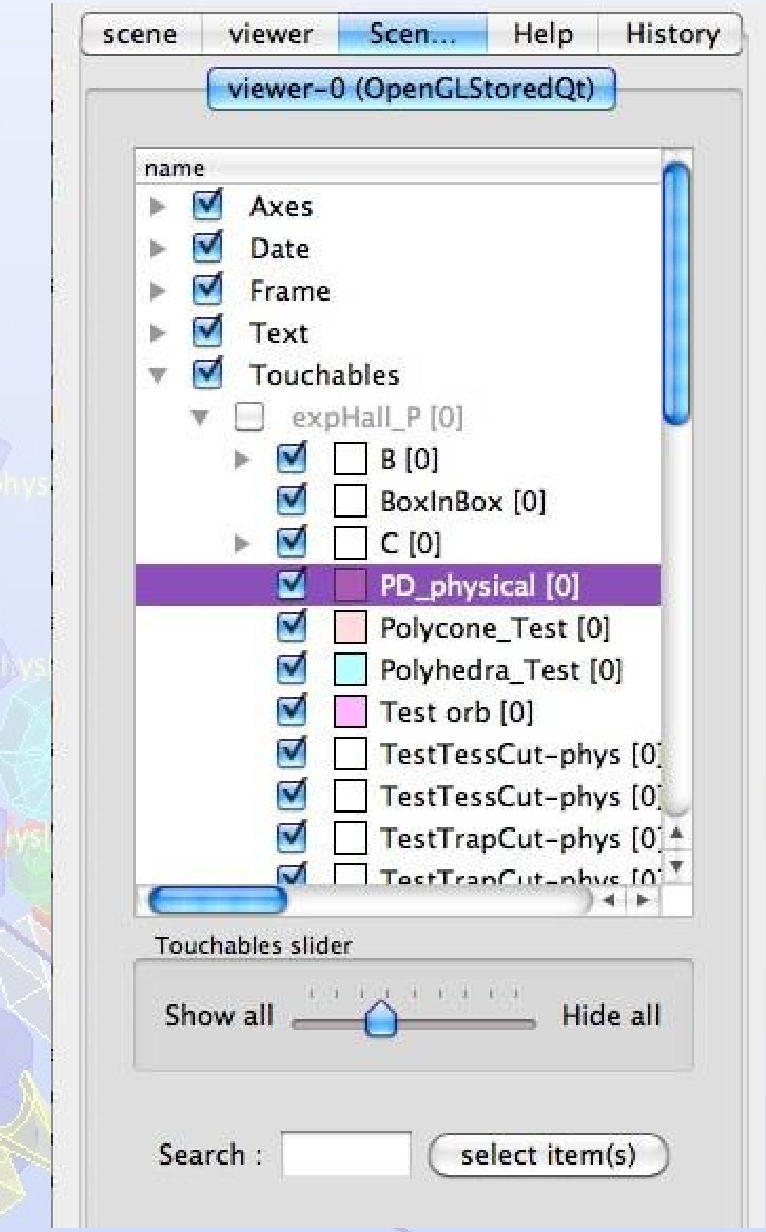
# Qt Visualisation Driver – Inside scene viewer –

⇨ Scene tree only implemented in Store Mode in QT

At creation, one opengl display list in create for each « volume »

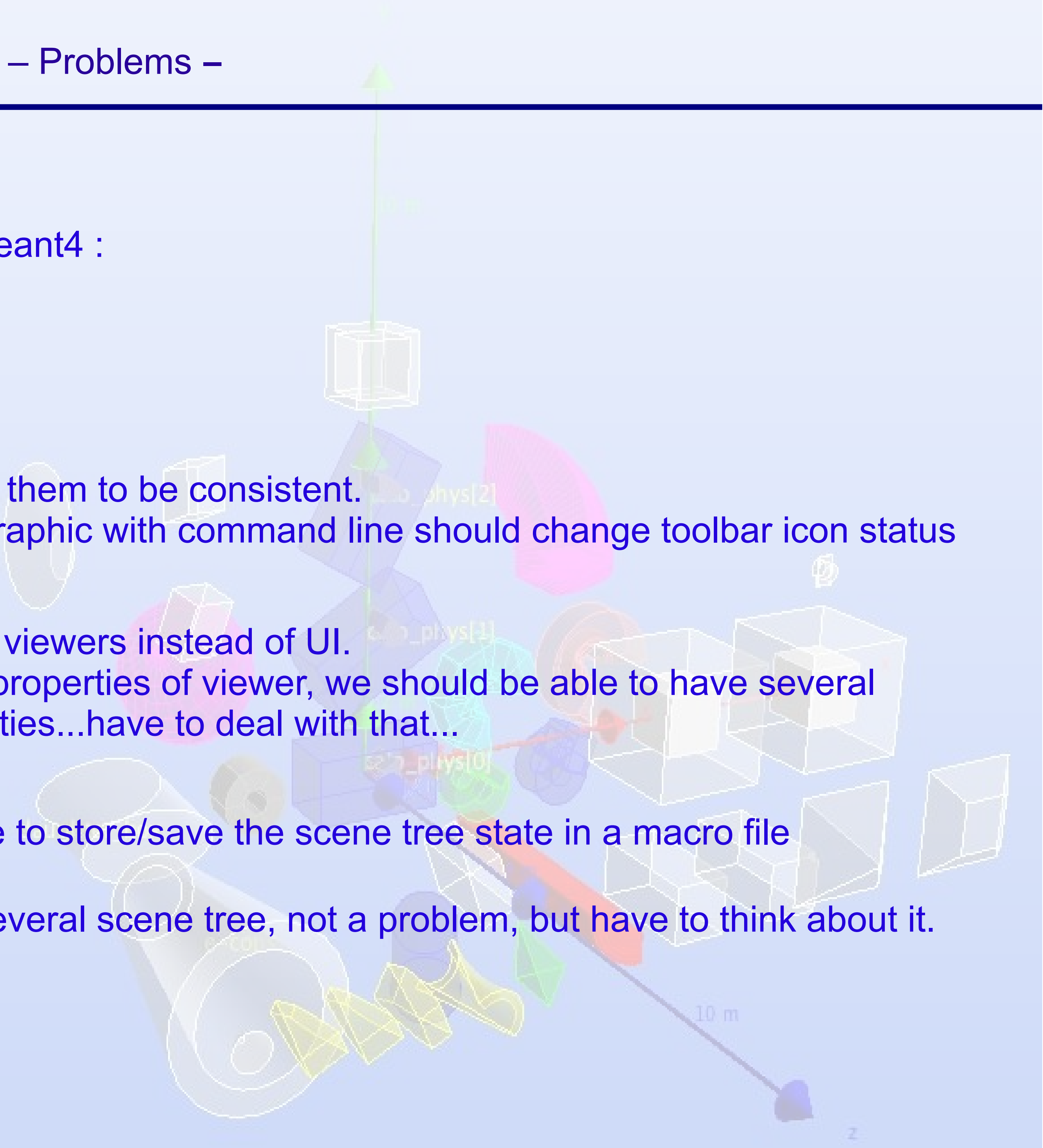
Corresponding entrie is create in scene tree

At run time, before drawing display lists, we ask the scene tree for display status (color, hide, visible)



- ☑ Axes
- ☑ Date
- ☑ Frame
- ☑ Text
- ☑ Touchables
  - □ expHall_P [0]
    - ☑ □ B [0]
    - ☑ □ BoxInBox [0]
    - ☑ □ C [0]
    - ☑ ■ PD_physical [0]
    - ☑ ■ Polycone_Test [0]
    - ☑ ■ Polyhedra_Test [0]
    - ☑ ■ Test orb [0]
    - ☑ □ TestTessCut-phys [0]
    - ☑ □ TestTessCut-phys [0]
    - ☑ □ TestTrapCut-phys [0]
    - ☑ □ TestTrapCut-phys [0]

# Qt Visualisation Driver – Problems –



- Many ways to interact with Geant4 :
  - Command line
  - Shortcuts
  - Context menu
  - Icons

⇨ We have to combine all of them to be consistent.
Changing perspective/orthographic with command line should change toolbar icon status

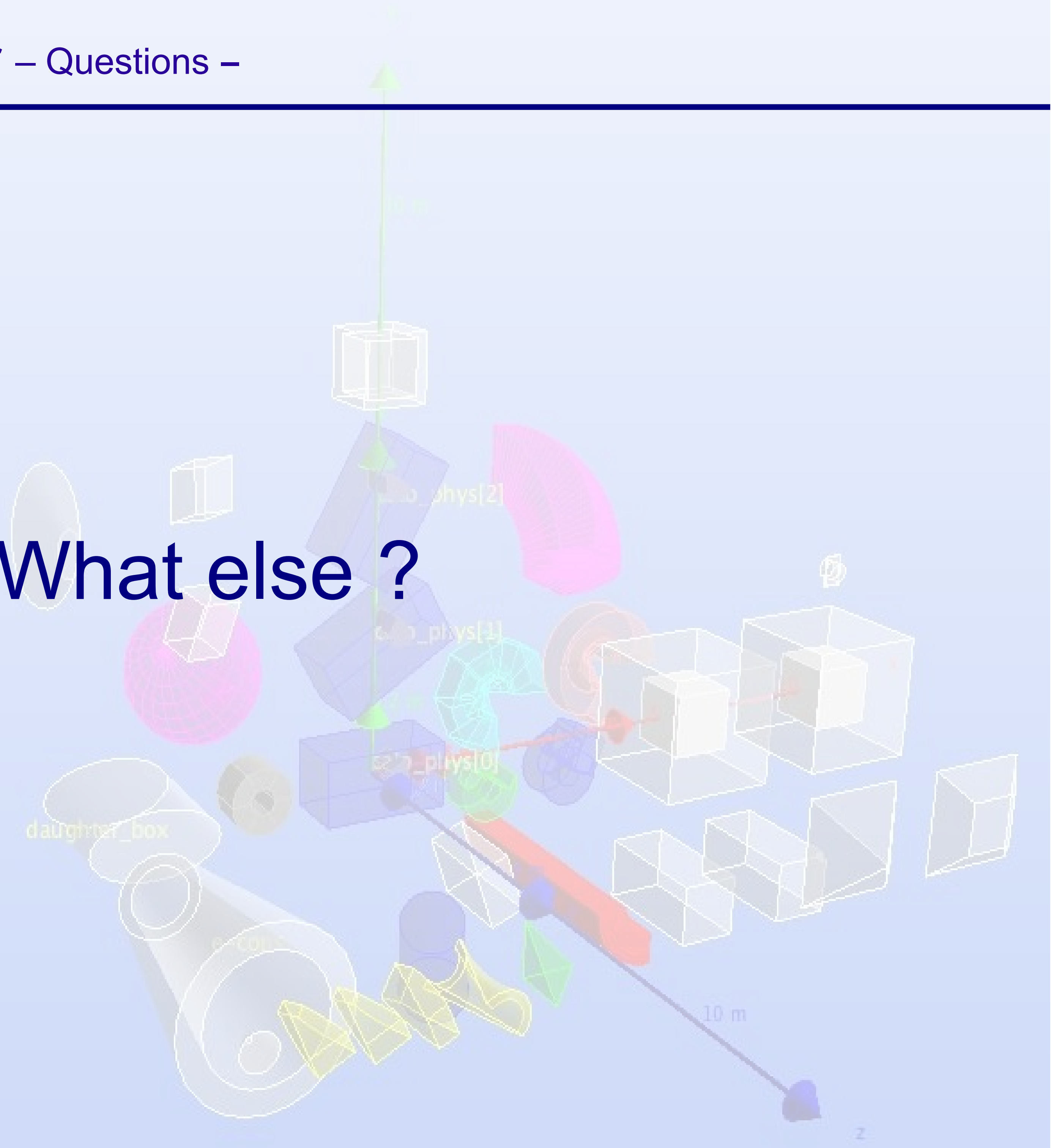
- Some icons should belong to viewers instead of UI.

⇨ wireframe/solid icons are properties of viewer, we should be able to have several viewers with differents properties...have to deal with that...

- A good point will be to be able to store/save the scene tree state in a macro file

- Several viewers will display several scene tree, not a problem, but have to think about it.

# Qt Visualisation Driver – Questions –



## What else ?