

# *G4/ui-vis on Qt6*



G4 Catania 2024 workshop

# Qt5 to Qt6

- A pain!
- “As usual”, sigh, a major release of Qt breaks a lot of things in the API. Qt6 does not make exception.
- The Qt5/QGLWidget is changed to Qt6/QOpenGLWidget with clearly a lot of internal changes.
- A priori, small changes to compile G4/ui-vis, but at run time vis/OGLI and vis/OGLS explode on all platforms (macOS, Linux, Windows).

# *Two main sources of problems*

- The number one problem is that Qt6/QOpenGLWidget is more strict in the fact to have all OpenGL code executed within the “`paintGL()`” method, and that all “viewer refresh”, not triggered by expose/resize events, be requested by using the “`update()`” method (as it is documented).
- Another problem was that some GUI manipulations were done from the `paintGL()` method, whilst the signal/slot mechanism should be used for this. It confused the Qt6 event treatment and it induced various crashes on all platforms.

# Corrections

- I do not enter in the details of modifications, but restoring the Qt, **now more strict**, policies on how to handle events and where to place OpenGL code fixes things on the three platforms.
- Also the G4UIQt and G4OpenGLQt viewers code were crowded with a lot of “fixes”, done when passing from Qt3 to Qt4 to Qt5, that were no more needed; I did some cleanup here.
- The overall logic in G4UIQt and the viewers is now more simple and clearer (I think).

- We thought to be “saved”, but MT reserved a nasty surprise seen on Linux: a “/run/beamOn induces a dead-lock”. Seen first with Vtk, but existing also with OGLI/OGLS.
- ... and a dead-lock, a priori, not happening on macOS and Windows.
- But it appeared to be in fact also on macOS and Windows if pushing to do a hundred /run/beamOn from a /control/loop.
- It took a lot of time to understand the point and have a fix, and finally **John came with a convincing** solution during summer.

# *TSG, Inventor and Qt6.*

- In TSG/GL-ES, no problem with the new Qt6/ QOpenGLWidget since all the OpenGL calls were already done in paintGL().
- TSG/ZB, since using only a basic QWidget, it was ok.
- Vtk: beside the “MT /run/beamOn” problem, it went fine (tested only on macOS and Linux for me).
- Inventor: more sporty since it needed to use a SoQt built on Qt6: still “work in progress around an overall cmake build”. Here I took this “Qt6 opportunity” to propose some changes in order to be able to create/handle multiple viewers, especially in the G4UI main tab widget. Nice to be able to do that!

# Conclusions

- I would say that we have a workable situation now that could be deployed.
- But hard to test fully all drivers interactively on the three platforms... (And I worked mainly with basic/B1!).
- Ah yes, we had also changes in most drivers to handle a “/run/beamOn” done in the vis.mac at startup.
- Else, these problems swallowed all my time this year, I had no time to address my “TSG improvement todo list!”.