



# Updates on CMake, Modularization, and Data

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# CMake Updates for 10.5

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- Mostly bug fixes and preparation for modularization, apart from:
  - *Allow builds against C++17 (requires client CMake > 3.8)*
  - *Full support for CMake's builtin symbol export to simplify Windows DLL builds (requires client CMake > 3.4)*
  - *Support for "auto" TLS model, leaving decision to compiler*
  - ***MT builds on Windows***

# Pending CMake Updates for 10.5

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- Migration of always on/off preprocessor symbols to compile time configured header
  - G4MULTITHREADED, G4VERBOSE, G4\_STORE\_TRAJECTORY, G4USE\_STD11
    - *If your code uses these, ensure it includes G4Types.hh*
- Updates for OpenInventor/Qt drivers (TBD this week)
- Extend use of "usage requirements" to ease consumption of externals (zlib, expat, Qt etc)

# Primary CMake Tasks for 10.X/11.0

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- Full rollout of modularization system
  - *Most work complete, will happen immediately after December release*
  - *No immediate impact of your code or CMake scripts*
  - *Further migration of -D flags to #defines in headers*
- Integration of G4Py builds
- Update to minimum version of CMake required

# Modularization Tasks for 10.X/11.0

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- Propose that modularization is timetabled as follows:
  1. *Analysis, UI/Vis, Persistency due to external dependencies*
  2. *Split Processes into EM + Hadronic to reduce sizes*
  3. *Core categories Global/Run/Geometry etc*
  4. *More detailed look at Processes, Models, Physics Lists*
- **Should not be afraid of moving code or merging/splitting categories! Git migration will assist this.**

# Data Library Survey

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- Current usage of data libraries (e.g. G4EMLOW) has several issues:
  - **Usability:** *full usage requires setting of 10 environment variables, some of which are mandatory*
  - **Versioning:** *not always clear, or checked, which data library versions (10 of them) are compatible with a given version of Geant4*
  - **Performance:** *Use of many small files can cause issues, likely others*
- **Survey of patterns of usage carried out with WG Coordinators: results attached on Indico**

# Thoughts on Data Library Survey...

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- For usage by developers/users consider a *layered configuration*:
  - *Default path, override by UI command, override by single "GEANT4\_DATA\_PATH" envvar?*
- Could we model the libraries as C++ objects?
  - *Abstract out connection to environment/filesystem/file format*
- Should we maintain the libraries in Git?
  - *Easier updates, version tracking and release management*

# Summary

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- **Minor updates to CMake system for 10.5**
- **Major task for 10.X/11.0 is modularization**
  - *Initial categories will be Analysis/UI/Vis/Persistency*
  - *Let's discuss this over the next few days in parallels or over coffee*
- **Data Library improvements ongoing**
  - *Very useful results from survey of usage*
  - *Should continue discussion: layered config, C++ models, Git management*