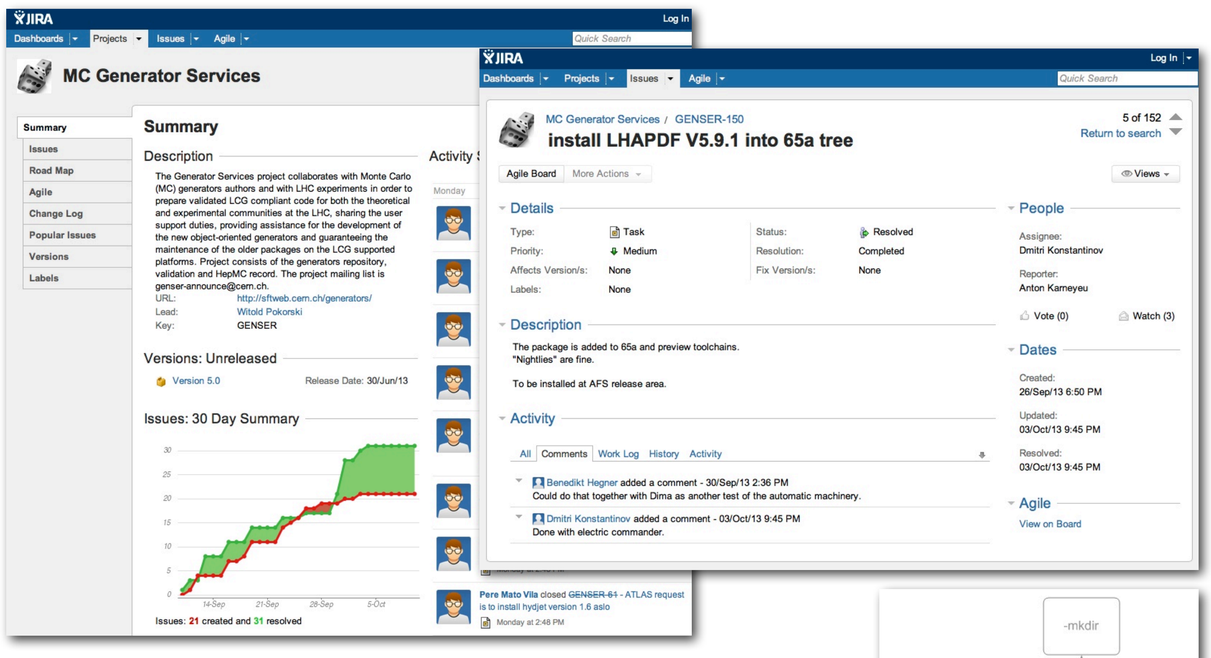
Status and new developments of the Generator Services

Benedikt Hegner[1], Anton Karneyeu[2], Mikhail Kirsanov[2], Dmitri Konstantinov[3], Kirill Lugovskiy[3], Pere Mato[1], Witold Pokorski[1]
[1] CERN, Geneva, Switzerland; [3] IHEP, Protvino, Russia; [2] INR, Moscow, Russia

The **Generator Services** project (**GENSER)** provides ready-to-use Monte-Carlo generators libraries for the LHC experiments. In this we discuss the recent developments in the build machinery, which allowed to fully automatize the process of the installation. The new system is based on CMake and integrates entirely with the 'LCG external software' infrastructure, providing all the external packages needed by the LHC experiments.

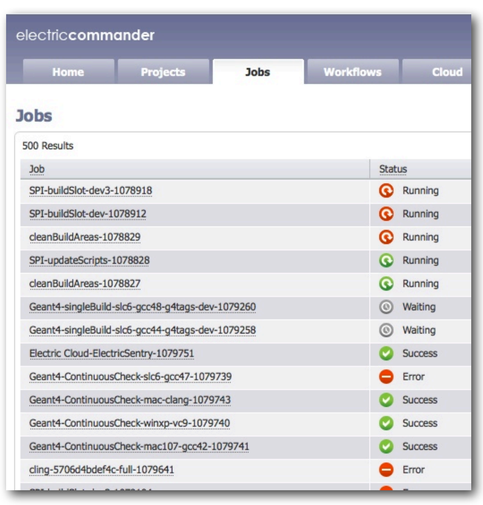
GENSER deliverables

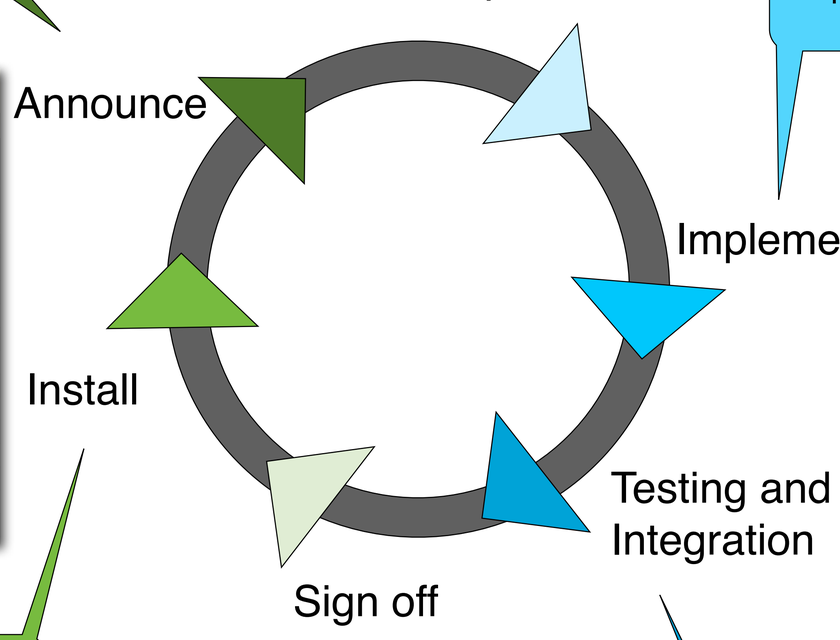
- Installed, ready to use MC generators libraries on network files system (e.g. AFS) for a number of platforms
- Binary tarfiles for the distribution to the remote sites
- Source tarfiles for building the generators from scratch
- Libraries installed on CernVM file system (CVMFS)
- So far 32 generators: lhapdf, pythia6, thepeg, herwig, herwig++, tauola++, pythia8, agile, photos++, photos, rivet, sherpa, hepanalysis, mctester, hijing, startlight, herwig, crmc, jimmy, tauola, hydjet++, alpgen, baurmc, madgraph5, professor, ...



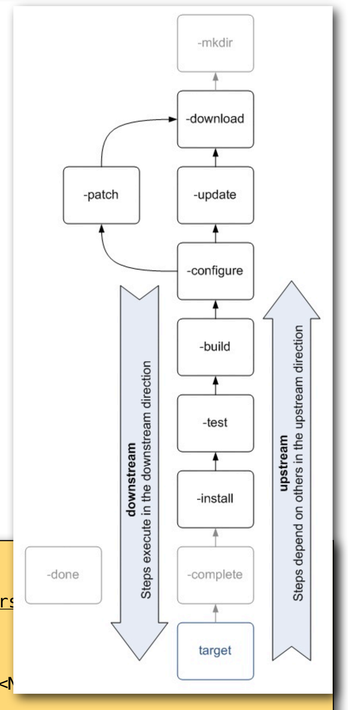
- Typically installation requests for new generators or new versions come from the MC authors or the LHC experiments.
- JIRA is used to track the requests and their progress.

- Announcement email sent to the users
- Web page will be updated with latest generators automatically





- We use CMake ExternalProject module
- It allows to define custom targets to drive download, update, patch, configure, build, install and test any external package
- Generates Makefile driving the whole build process
  - A simple `make -jN` will be sufficient to build all generators to all the externals (~120 packages) in 1-2 hours
- SVN used as repository for configuration and build files to ensure control and reproducibility



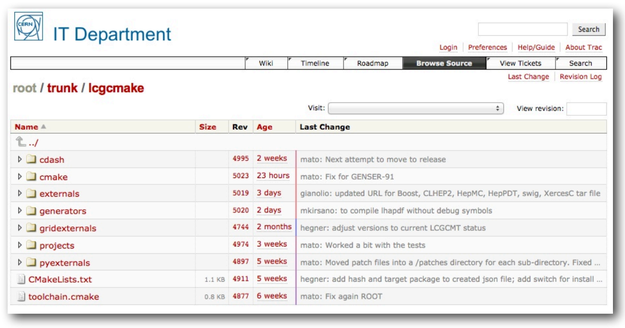

```
LCGPackage_Add(
  evtgen
  URL http://cern.ch/service-spi/external/tarFiles/MCGenerators
      <evtgen_<NATIVE_VERSION>_tag>.tar.gz
  CONFIGURE_COMMAND ./configure --prefix=<INSTALL_DIR>
                                --hepmcdir=${HepMC_home}
                                --pythiadir=<pythia8-<evtgen_<N
                                --photosdir=${photos++_home}
                                --tauoladir=<tauola++-<evtgen_<NATIVE_VERSION>_tauola++>
  BUILD_COMMAND ${MAKE} -j1 "${evtgen-build-options}"
  INSTALL_COMMAND make install
          COMMAND ${CMAKE_COMMAND} -E create_symlink sources/evt.pdl evt.pdl
          COMMAND ${CMAKE_COMMAND} -E create_symlink sources/DECAY_2010.DEC DECAY.DEC
  BUILD_IN_SOURCE 1
  DEPENDS HepMC pythia8 photos++ tauola++
)
```

```
LCG_add_test(evtgen_test1
    COMMAND evtgen/tests/evtgen_test1 ${evtgen_home}/share/DECAY_2010.DEC
            ${evtgen_home}/share/evt.pdl
            ${CMAKE_CURRENT_SOURCE_DIR}/evtgen/tests/DDALITZ.DEC 10000
    BINARY_DIR evtgen/tests
    SOURCE_DIR evtgen/tests
    BUILD evtgen_test1
    BUILD_OPTIONS -DCMAKE_MODULE_PATH=${cmaketools_home}/modules
                  -DROOTSYS=${ROOT_home}
                  -DEVTGEN_ROOT_DIR=${evtgen_home}
                  -DPYTHIA8_ROOT_DIR=${pythia8_home}
                  -DPHOTOSPP_ROOT_DIR=${photos++_home}
                  -DTAUOLAPP_ROOT_DIR=${tauola++_home}
                  -DHEPMC_ROOT_DIR=${HepMC_home}
    ENVIRONMENT ${library_path}=${evtgen_home}/lib:${photos++_home}/lib:
                ${pythia8_home}/lib:${HepMC_home}/lib:${ROOT_home}/lib:
                $ENV{${library_path}}
                PYTHIA8DATA=${pythia8_home}/xmldoc)
```

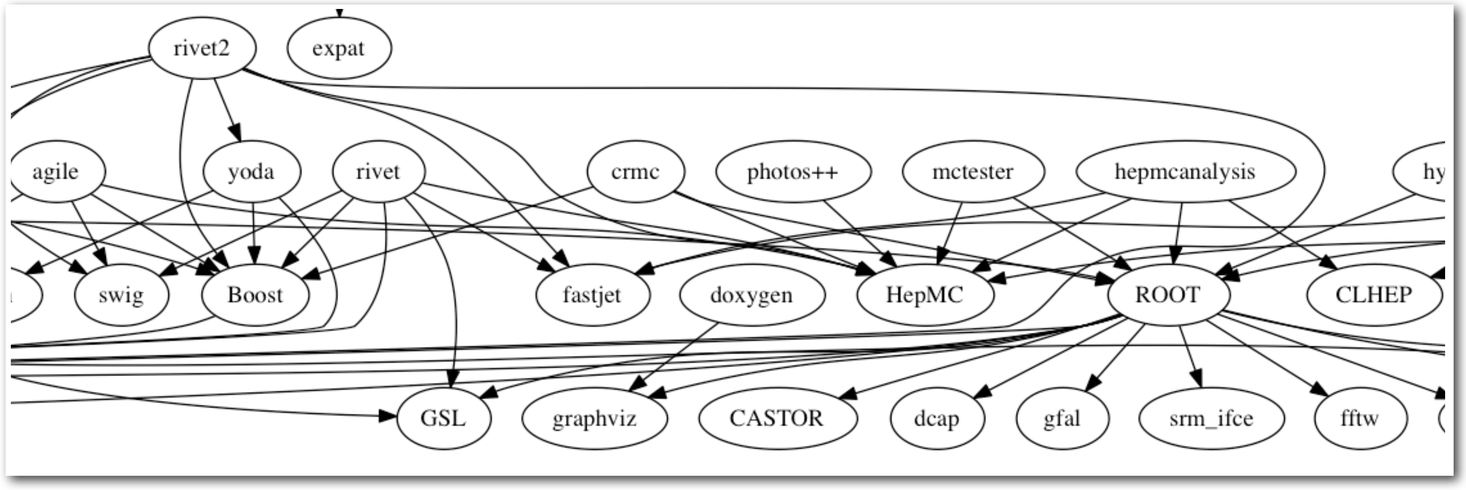
- Electric Commander procedures automate the whole installation process
- It allows to build the generators and install them in the release area using a **single click** of a button

- Inspection of the build and test results
- Final approval for the release.
- Releases are grouped in LCG_xyz configurations, defining a complete set of all depending external packages

- The entire software stack (MC generators and external software packages) is checked out automatically from SVN and build every day
- The build status is monitored by CDash
- Test are run automatically after the build using CTest.

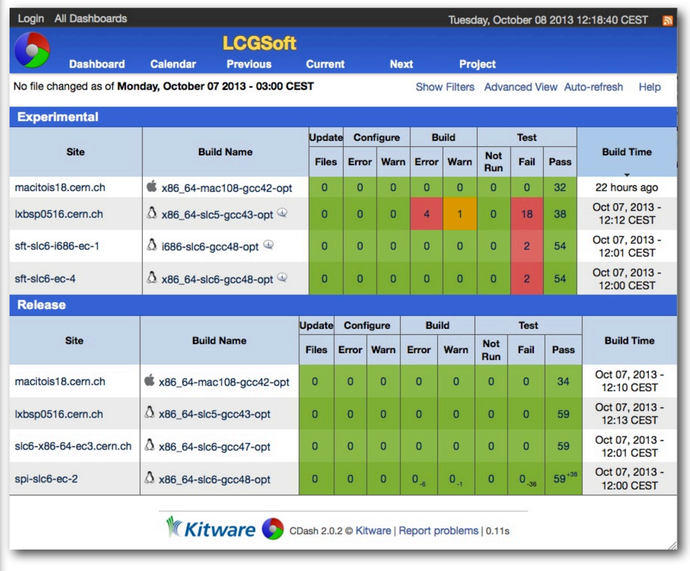



```
LCG_external_package(hepmcanalysis     3.4.14        ${MCGENPATH}/hepmcanalysis)
LCG_external_package(mctester          1.25.0        ${MCGENPATH}/mctester      )
LCG_external_package(hijing            1.383bs.2     ${MCGENPATH}/hijing        )
LCG_external_package(starlight         r43           ${MCGENPATH}/starlight     )

LCG_external_package(herwig            6.520.2       ${MCGENPATH}/herwig        )
LCG_external_package(herwig            6.521.2       ${MCGENPATH}/herwig        )

LCG_external_package(crmc              1.0           ${MCGENPATH}/crmc          )
LCG_external_package(cython            0.19.1        ${MCGENPATH}/cython        )
LCG_external_package(yamlcpp           0.3.0         ${MCGENPATH}/yamlcpp       )
LCG_external_package(yoda              1.0.3         ${MCGENPATH}/yoda          )
LCG_external_package(hydjet            1.6           ${MCGENPATH}/hydjet author=1_6 )
LCG_external_package(hydjet            1.8           ${MCGENPATH}/hydjet author=1_8 )
```



Portion of the DAG of the package dependencies

Name	Status	Time
agile_orig_test1	Passed	2s 430ms
evtgen-1.1.0_test1	Passed	9s 640ms
evtgen-1.2.0_test1	Passed	9s 640ms
hydjet_test1	Passed	21s 510ms
jhu_orig_test_C	Passed	510ms
jhu_orig_test_F	Passed	510ms
jhu_orig_test_JHUGen	Passed	49s 190ms
lhapdf6_orig_testpdf	Passed	10s 810ms
lhapdf_build	Passed	3s 560ms
lhapdf_orig_testCC1	Passed	1m 36s 670ms
lhapdf_orig_testCC3	Passed	710ms
lhapdf_orig_testCC4	Passed	2s 190ms
photospp-build	Passed	7s 400ms
photospp_orig_test1	Passed	510ms
photospp_orig_test2	Passed	540ms
photospp_test1	Passed	4s 350ms
photospp_test2	Passed	4s 750ms
pyquen_test1	Passed	12s 880ms
pythia6-test1	Passed	4s 570ms
pythia8-build	Passed	31s 180ms
pythia8-genser_test3	Passed	35s 630ms
pythia8-genser_test4	Passed	36s 140ms
pythia8-orig_test1	Passed	3s 730ms
rivet_orig_test1	Passed	1s 650ms
sherpa_orig_test1	Passed	51s 780ms
starlight_orig_test1	Passed	9s 760ms
tauolapp-build	Passed	7s 410ms
tauolapp_orig_test1	Passed	510ms
tauolapp_orig_test2	Passed	1m 30s 240ms
tauolapp_orig_test3	Passed	510ms
tauolapp_test1	Passed	53s 870ms
test-test	Passed	510ms



CHEP2013: October 14 - 18, 2013 in Amsterdam, The Netherlands