Status Of The LCG Generator Services Subproject

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LCG Generator: Work Packages and Resources

Subproject of LCG Simulation, activities steered by MC4LHC

- **WP1: GENERATOR LIBRARY**
- **WP2: STORAGE, EVENT INTERFACES AND PARTICLE SERVICES (INTERPLAYS)**
- **WP3: COMMON EVENT FILES, EVENT DATA BASE**
- **WP4: TUNING AND VALIDATION OF EVENT GENERATORS**

→ Resources for the overall coordination (0.3 FTE) allocated by CMS: P.Bartalini

→ Resources for WP1 and WP3 (1.25 FTE) allocated by Russian LCG Team: A.Sherstnev (MSU) and S. Makarychev (ITEP) spent 3 months at CERN, V.Oujinski (JINR) and I.Seluzhenkov (ITEP) are now joining.
→ Existing UK-GRID activities in the WP4 domain might be exported in LCG Generator.
→ ATLAS traditionally does contribute to WP2.
→Italian participation is anticipated: LCG inclusion of some 2nd priority packages (WP1, WP3) .
→Spanish groups has expressed interest to contribute to the subprojects (F. Matorras)

LCG Generator Servises Milestones

- **WP1: GENSER Beta (released on schedule: end of September 2003)**
  - **Currently being tested by experiments (CMS, ATALS, ALICE)**
  - **New librarian I.Seluzhenkov (now at CERN), S. Makarychev still active from remote**
- **WP1: First C++ Generator in GENSER (12/2003)**
  - **Feasibility study for Sherpa inclusion (F.Krauss)**
- **WP2: Agreement on formats for common samples (12/2003)**
  - **October and November LCG Generator meetings dedicated to this topic**
- **WP1: COMPHEP, ALPGEN, EVTGEN and LHAPDF in GENSER (12/2003)**
- **WP3: MCDB in production in the LCG environment (1-2/2004)**
  - **LCG Contact person: A. Sherstnev**
- **WP3: Proposal for event production environment (3/2004)**
- **WP4: Proposal for validation framework (6/2004)**
  - **V.Oujinski already active in this area**

WP1:Generator Library Requirements

Quick releases decoupled from large library releases
→ Most of the versions released by the authors have to be installed, old versions have to be maintained as long as they are required by the end users
→ Maintenance for all LCG supported platforms
→ Top priority: HERWIG, HIJING, ISAJET and PYTHIA.
→ 2nd priority: ALPGEN, COMPHEP, DPMJET, EVTGEN, GRACE, LHAPDF, MADGRAPH, MCDB, NEXUS, PHOJET, PHOTOS, SFM & TAUOLA
→New large C++ generators: Herwig++, Pythia 7, Sherpa, ThePeg etc.

The Generator Repository (GENSER)

- CVS repository, AFS public distribution.
- SCRAM - release, configuration, and building tool for librarians and end users.
  - Binary distribution is also provided.
- Automatically generated directory structure (from original MC code).
  - Some complex packages maintained externally
- Test/Validation software (provided by the authors and by the users).
  - Installed in the «Example» and «Test» modules.
- Code development for WP3, WP4 → New Modules

Subpackage versions currently installed in the LCG environment

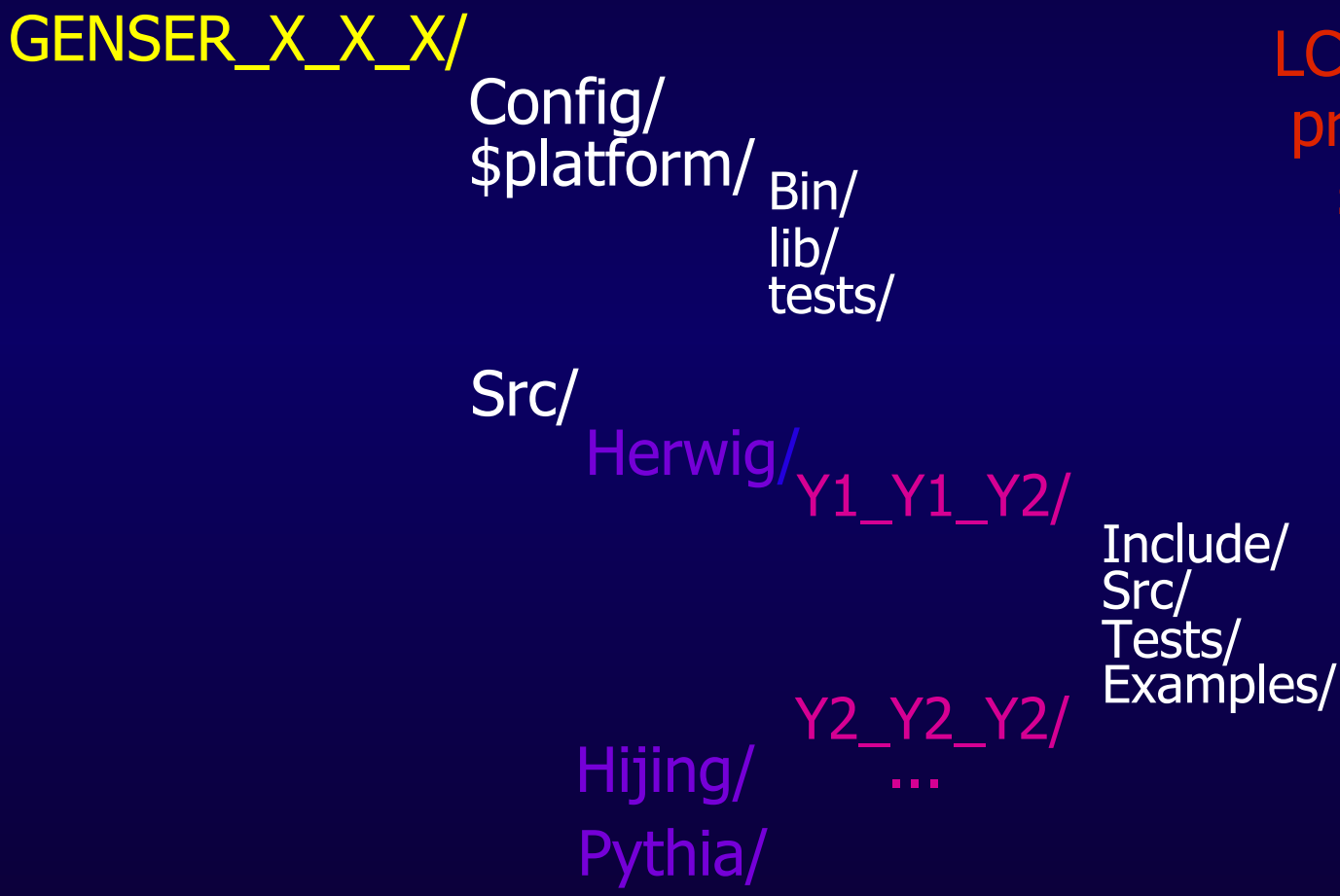
Package versions pursued for inclusion have been indicated by the contact persons in MC projects and/or by the volunteered beta testers. Further versions and test code can be installed easily.

1) **HERWIG** (contact person: P. Richardson): 6.500, 6.503, 6.504
   - Examples from http: //epwww.rl.ac.uk/theory/seymour/herwig/herwig65.html
2) **PYTHIA** (contact person: T. Sjöstrand): 6.205, 6.217, 6.220
   - Examples from http: //www.thep.lu.se/~torbjorn/Pythia.html
3) **HIJING** (contact person: X.-N. Wang): 1.36, 1.37, 1.383
   - No examples available for the time being
4) **ISAJET** (contact person still to be suggested by the authors): 7.67, (7.69)
   - Examples available in the ISAJET distribution
5) **Sherpa** (contact person: F. Krauss): 1.0
   - Examples from http: //www.physik.tu-dresden.de/~krauss/hep/index.html
6) **MCDB** (contact person: A.Sherstnev): software of the CMS release
   - Examples for authors available in CMS MCDB

GENSER: Progress Report

- GENSER was the first repository in the Simulation project
- Inclusion of the Top priority packages has been achieved
  - Convenient «compact» distribution.
  - Installed software are available for the Red Hat 7.3 platform.
  - MC structure just reorganised using macros, end users can patch the code.
  - Safe Double Versioning are applied (FullPackage/Subpackage)
- GENSER BETA release are available from the end of september 2003
  - Documentation: http://lcgapp.cern.ch/project/simu/generator
  - GENSER is distributed publicly in /afs/cern.ch/sw/lcg/app/releases/GENSER
  - Currently tested by ATLAS, ALICE, and CMS
    - first user feedbacks (from G. Stavropolous, F. Moortgat, A.Moersch).
  - Package versions agreed by contact persons in MC projects and/or by the volunteered beta testers.
    - Simple procedure to include additional versions and bug fixes.

GENSER structure: Double versioning system



LCG policy on project code structure

WP2: Storage, Event Interfaces And Particle Services

- The MC truth Interface
  - Partonic event files: XMLHEP proposal (LHA I compliant)
  - HepMC
    - **Problems with duplication of versions.**
    - **Evaluate CLHEP 1.9**
- Persistency
  - Candidates: XMLHEP (parton level), POOL(HepMC) (particle level)
- The modularisation
  - Basic idea in ThePEG, Pythia 7, Herwig++, Sherpa.
    What are the dependencies ? Inner interfaces?
  - EvtGen: how to reuse the Fermilab experience ?
    How to avoid duplication of versions ?

WP3: Common Event Files, Monte-Carlo Events Data Base

- Motivations
  - Some physics processes (the most difficult for generation) should be prepared by experts or MC generators authors.
  - Sharing the same generator events does simplify the comparisons and save time/CPU resources
- There is a product fulfilling such requirements: MCDB (developed for CMS by Lev Dudko (MSU))
  - http: //cmsdoc.cern.ch/cms/generators/mcdb
- MCDB has interfaces of 2 different types
  - Web interface: a web site with simple access to the available event samples with relative bookkeeping (users can dawnload the files, authors/experts can upload new files).
  - handy programming interface: automatic finding/interfacing required event samples by user to softaware at a local machine once some basic parameters have been set.
- It would be desirable to study how to extend this model to the new ME+PS packages: storage of particle files

WP4: Tuning And Validation Of Event Generators

MC-Tester: New Validation Tool (Piotr Golonka et al.)

- Useful librarian tool: comparision of releases of MC generators
- Dibugging tool for MC generators and event record formats.

JetWeb: New Fitting/Tuning Tool

- Based on HERA HZTOOL package – updated to include Minimum Bias data, Tevatron Jets, etc. (J.M.Butterworth and S.Butterworth, Comp. Phys. Comm. Vol 153/2 164-178 (2003), hep-ph/0210404)
- Web page: http: //jetweb.hep.ucl.ac.uk
- Database of data, MC and comparisons, Web interface allows access to DB and submission of jobs to generate MC plots

Good starting point for the LCG-Generator Validation working package: JetWeb authors are interested to use GENSER in JetWeb

MC4LHC Recommendations

- The goals of LCG generator (WP1, WP2, WP3, WP4), the defined milestones, the current GENSER structure and the future plans have been approved.
- The LCG participation in the MC4LHC workshop has been appreciated. LCG Generator is contributing to advertise the new MC projects and is providing a constant forum for discussions on the generator related software.
- It is recommended to improve the collaboration with the MC authors, identifying the contact persons to monitor the inclusion of the existing packages in the LCG environment.
- The turn over and the possible loss of well trained people (for instance the librarian) can represent a big problem as all the experiments will soon rely on GENSER. Long term support to LCG Generator members has to be guaranteed by LCG.
- LCG Generator: a new multidisciplinary field ?
  - Working on the border between TH/EP/IT

Organisational Issues

Web page:

http: //lcgapp.cern.ch/project/simu/generator

-- links to relevant documents and to CVS repository

CDS Agenda Home > Project > LCH Computing Project > Physics Generators

-- minutes of meetings, slides of presentations

Applications area mailing list:

project-lcg-simu@cern.ch

Meetings:

-- Kick off meeting in June (mini-workshop);

-- During MC4LHC workshop (in July);

-- Last Thursday of the month at 5 PM in 32-1-A24 (VRVS connection in Desert or in Island room)

-- September meeting → The GENSER beta release;

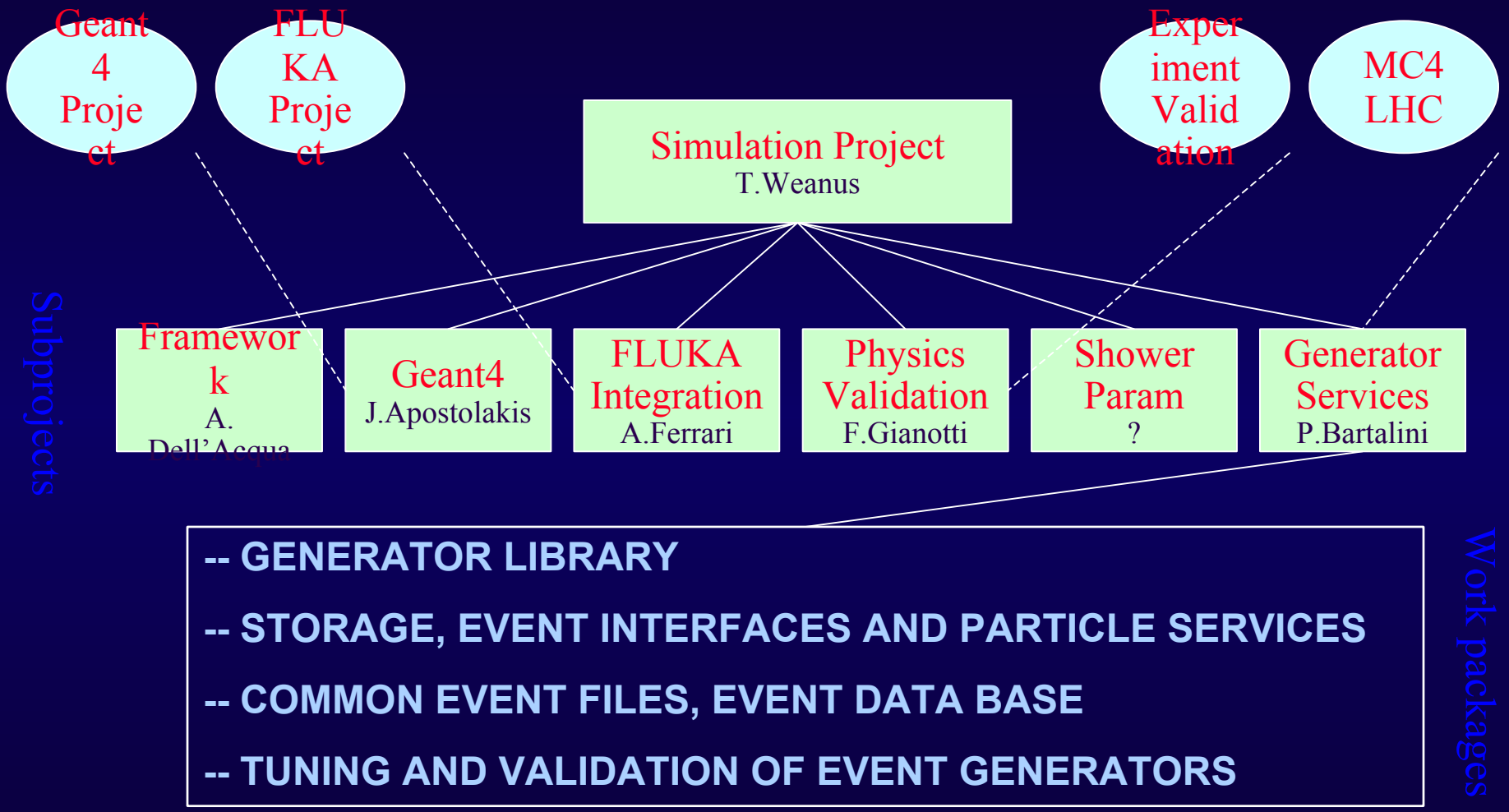
-- October meeting → XMLHEP standard for MCDB;

Next Meetings

- Persistency for the common event files → 11/27/2003.
  - Get the requirements from the LHC experiments!
  - Evaluate impact on existing projects (MCDB).
- Inclusion of 2nd priority packages in LCG.
- Creation of MC user data base.

Backup

Simulation project in LCG-APP



MC generator RTAG report: http://lcgapp.cern.ch/project/simu/generator/MCGenRtag.doc

Kik-off Meeting of LCG Generator (MiniWorkshop)

(20 June 2003)

17:00	Introduction (Paolo Bartalini)
17:10	GENSER, the generator repository in LCG (Alexandre Sherstnev)
17:25	Parton Shower MC's (Stefan Gieseke)
17:50	Event Simulation Tools in ALICE (Andreas Morsch)
18:15	LHCb event generators status (Witek Pokorski)
18:40	CMS event generators status (Albert De Roeck)
19:05	---long coffe- / short dinner- break---
20:10	Generator support in ATLAS (Ian Hinchliffe)
20:35	HepMC Event Record - Status (Matt Dobbs)
21:00	The requirements from TH (discussion) (tba)
21:25	The MCDB project (Alexandre Cherstnev)
21:40	JetWeb (Ben Waugh)
22:05	The LCG Generator subproject - organizational issues (Paolo Bartalini)

2nd LCG Generator Meeting

(31 July 2003)

17:00 Introduction (Paolo Bartalini)

17:05 Tutorial on LCG tools (Alberto Aimar)

17:45 Status of GENSER (Sergey Makarychev)

18:00 XMLHEP (Alexander Sherstnev)

18:15 Status of the C++ Event Generator Packages (Alberto Ribon)

18:30 Decay Tables (Peter Z Skands)

18:45 Status of CLHEP split (Mark Fischler)

3rd LCG Generator Meeting

(25 September 2003)

17:00 Status of the LCG generator project and feedbacks from the MC4LHC steering group (Paolo Bartalini)

17:20 The beta release of the LCG generator repository (GENSER) (Sergey Makarychev)

17:55 ATLAS user feedbacks on the GENSER beta pre-release (Georgios Stavropoulos)

4th LCG Generator Meeting

(16 October 2003)

17:00 Introduction (Paolo Bartalini)

17:10 MC-TESTER (Piotr Golonka)

17:45 Using XML in the High Energy Physics (Alexander Kruykov)

18:20 XMLHEP: proposal for a structure of partonic events files (Alexandre Sherstnev)

Are the MC packages inside or outside the LCG generator repository ?

- **There are two possibilities for the MC generator packages.**
  1) **To fully store the MC generator code in GENSER defining the corresponding sub-package.**
  2) **To install the MC generator as external software packages in the LCG environment and to store in GENSER just tests suites and other related code (examples etc.).**

Just a technical issue!

For each MC package an ad-hoc solution should be found taking into account the user requirements

GENSER as a development environment

If agreed, MC authors could use the GENSER CVS repository for the development of the MC generators code.

- **Solution rejected for most of the well assessed Fortran packages.**
- **It should apply in particular to new projects.**
- **MCDB already migrated in GENSER**
- **Feasability study for the inclusion of Sherpa will start soon.**

Advantages:

- **MC generators authors would have a convenient environment for development (SPI Tools).**
- **Coding compliance to LCG policies would be guaranteed.**
- **Release, Feedbacks and bug fixes would speed up.**

Workshop on MC's for the LHC (MC4LHC), CERN, 7 july - 2 august 2003

- **Web page**
  http://mlm.home.cern.ch/mlm/mcwshop03/mcwshop.html
- **Seminars from program authors; working groups etc.**

1. **Matrix element generators (the 4 weeks)**
2. **N(N)LO tools (7-12 july)**
3. **Tools for electroweak physics (the 4 weeks)**
4. **Parton Distribution Functions (weeks 3 and 4)**
5. **MC's for new physics (9-16 july)**
6. **Heavy quark and tau decay packages (22-29 july)**
7. **Minimum bias, Underlying event, and MC tunings (27 july - 2 august)**
8. **Tools for Heavy Ion Physics (8-11 july)**
9. **CLHEP and related tools (14-16 july)**
10. **Herwig++, Pythia++ (21-25 july)**

Between Two Worlds

- Small TH groups
- Old/Huge Fortran packages still in development
- Cannot spend all the time to give user support

- Large Experiments
- C++ Frameworks
- Challenging requirements