
Generator Services planning meeting

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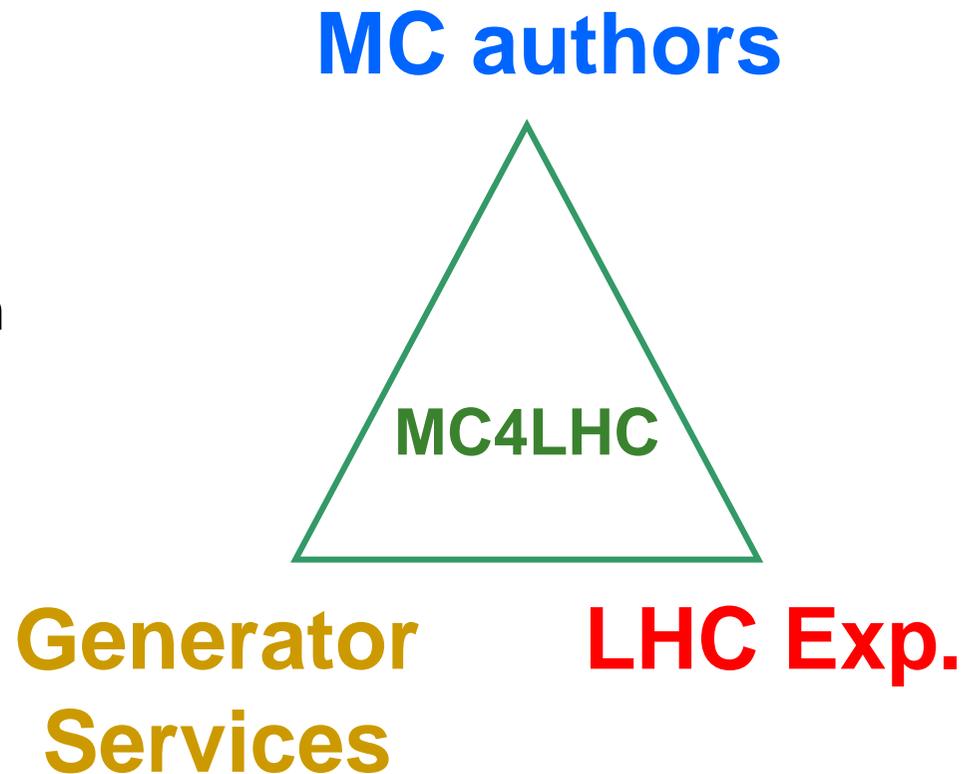
20.10.2006

Outline

- Introduction
 - Review of the Mandate
 - Tasks
 - Proposed changes
 - Proposed Milestones
 - Manpower
 - Meetings
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Introduction

- change of Project Leader
- main goals
 - involve all stakeholders in the planning
 - improve communication
 - introduce technical changes to improve the flexibility of Generator Services



The present meeting

- project planning and progress monitoring meeting
 - decision taking
 - composition
 - representatives of all stakeholders
 - suggestions welcome concerning other participants
 - minutes
 - circulate first privately and then post on the web
 - will serve as the main project planning document
 - frequency of meetings: every 6 months
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Original Mandate (RTAG recommendations)

1. Well-maintained common repositories of MC code
 2. Common interface for events to OO code and the use of “universal” particle tables
 - The choices have converged to HepMC and possibly HepPDT
 3. Common event files for special purposes
 4. The development of a common validation tool/test suite, in collaboration with the Tevatron experiments
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Mandate discussion (1 / 4)

- to provide repository of validated Monte Carlo generators of interest to the LHC experiments
 - list of supported generators shall be provided by the LHC experiments
 - to provide libraries for all supported platforms
 - list of supported platforms shall be provided by LCG Architects Forum
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Mandate discussion(2/4)

- OO event record needed to interface to MC simulation toolkits
 - HepMC already chosen by ATLAS, LHCb and CMS
 - support needed to be moved to LCG
 - HepPDT still under discussion
 - agreement on the general idea
 - several points (decay information, etc) difficult to handle properly
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Mandate discussion(3/4)

- simulation of some events is resource consuming
 - database to share those events was thought to be a good idea
 - standards needed for event format and meta-information concerning generation
 - contents of the MC database shall be driven by experiments requests
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Mandate discussion(4/4)

- vital to have validation of the generators code
 - set of basic tests shall be performed before each release
 - the outcome shall be transmitted to the authors
 - more sophisticated physics validation could also be envisaged
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Review of the mandate

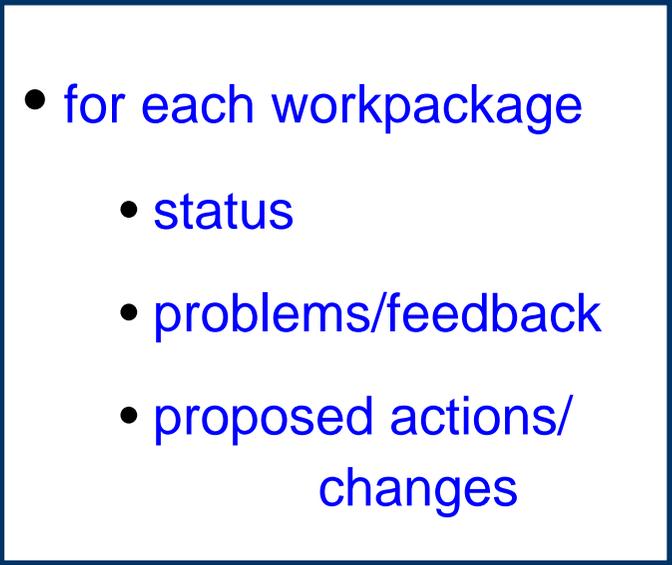
- based on the feedback from the experiments and from the authors, the project should continue under its original mandate
 - priorities should be re-discussed and agreed upon
 - the scope can be refined taking into account the experience so far
 - additional tasks can be proposed
 - the project needs transparent planning and improved communication
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Roles and expectations

Stakeholder	Role	Expectations
Authors	Develop and test generator code	Level 1 user-support and porting to different platforms will be off-loaded LHC experiments requirements will be gathered and prioritized Will get validation and feedback from users
Experiments	Run generators and check physics Provide requirements, submit bug reports	Will get prompt releases of all used generators on all LCG supported platforms Will get validated generators
Generator Services	Consolidate requirements, deliver prompt releases, provide Level 1 support, validation and porting, manage project plan	Will get requirements and bug reports from experiments Will get responses to feedback and requests
MC4LHC	Monitor Generator Services Organize MC4LHC workshops	Will get coordinated development of MC generators for LHC

Proposed project work packages

- generator libraries repository [GENSER]
- testing and validation of generators [VALIDATION]
- first level support [SUPPORT]
- event record and particle properties [HEPMC]
- event database [MCDB]

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- for each workpackage
 - status
 - problems/feedback
 - proposed actions/
changes

Generator libraries repository

- generators are collected in GENSER package
 - used by the experiments
 - ~ 90 generators and versions available on 3 platforms
 - list of generators needs to be reviewed and prioritized
 - modularity needs to be improved
 - multiple versions of generators usually not required by single experiment
 - quick new releases of individual generators are often required by experiments
 - build system (SCRAM) constraining the project in particular concerning inclusion of new C++ generators
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Proposal for new GENSER structure

- move away from SCRAM
 - move away from monolithic GENSER library
 - use native build methods/systems provided by the generators' authors
 - avoid any modification of the original directory structure of the generators
 - if any adaptation needed communicate to authors
 - release generators independently following closely the releases from the authors
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New GENSER structure (1/3)

`/afs/cern.ch/sw/lcg/external/MCGenerators`

`/SHERPA`

`/HERWIG++`

`/HERWIG`

`/Pythia`

`/PYTHIA8`

`.....`

`/tarFiles/..`

`/distribution/..`

original tar files downloaded from
the authors web pages

created LCG tar files with
sources and binaries

- generators released in 'lcg/external' in MCGenerators directory
 - **NO GENSER_X_Y_Z directory there**
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New GENSER structure (2/3)

- for each package we have version directories

SHERPA/SHERPA-MC-1.0.8

 /SHERPA-MC-X.Y.Z

 /....

Pythia/6.406

Pythia/6.500

...

- for each version we have source directory and platform directories

SHERPA/SHERPA-MC-1.0.8/src/.....(original source tree)

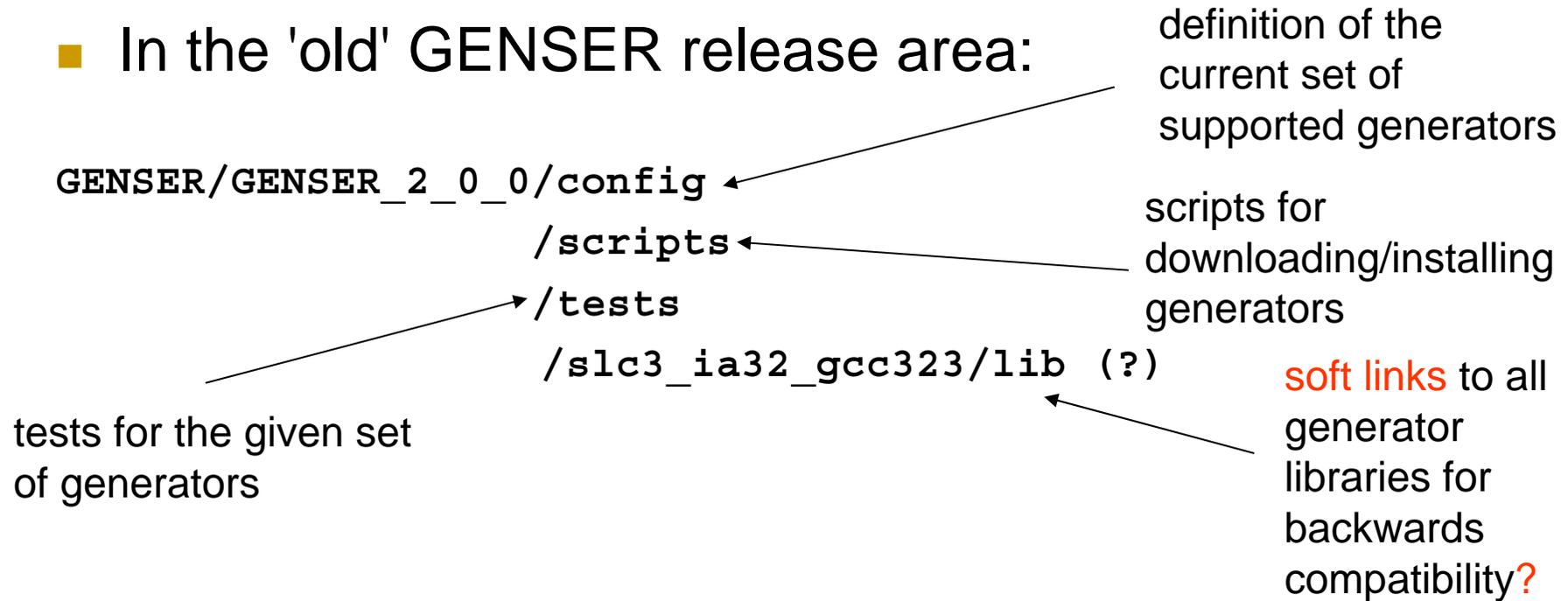
SHERPA/SHERPA-MC-1.0.8/slc3_ia32_gcc323/lib/...

SHERPA/SHERPA-MC-1.0.8/slc3_ia32_gcc323/include/...

...

New GENSER structure (3/3)

- In the 'old' GENSER release area:



- **IMPORTANT: no generators code here**
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Generators list review (1/2)

pythia 6_227	herwig 6_508	jimmy 4_1	hydjet 1_0
pythia 6_227.2	herwig 6_508.2	jimmy 4_2	hydjet 1_1
pythia 6_323	herwig 6_510	jimmy 4_2.2	hepmc 1_27_02
pythia 6_323.2	herwig 6_510.2	phojet 1_10	hepmc 2_00_00
pythia 6_326	isajet 7_69	toprex 409	pythia8 041
pythia 6_326.2	isajet 7_69.2	toprex 421	pythia8 053
pythia 6_327	isajet 7_71	tauola 27	pythia8 060
pythia 6_327.2	isajet 7_71.2	tauola 27.121	pythia8 060s
pythia 6_400	isajet 7_74	tauola 27.121.2	ThePEG 2006_01_31
pythia 6_400.2	isajet 7_74.2	cascade 1_2_10	ThePEG 1_0
pythia 6_402	photos 209	charybdis 1_001	Herwig++ 2_0beta2
pythia 6_402.2	photos 209.2	charybdis 1_002	Herwig++ 2_0_0
pythia 6_403	photos 215	charybdis 1_003	helac 0_1_0
pythia 6_403.2	photos 215.2	feynhiggs 2_2_10	alpgen 2_0_5
pythia 6_404	evtgenlhc 1_2	feynhiggs 2_3_1	alpgen 2_0_6
pythia 6_404.2	evtgenlhc 1_3	feynhiggs 2_3_2	madgraph 3_2
pythia 6_405	glauber_xs 1_0	feynhiggs 2_4_1	mcatnlo 2_3_1
pythia 6_405.2	hijing 1_383	stagen 1_07	mcatnlo 3_1_0
pythia 6_406	hijing 1_383.2	lhapdf 4_2	MCatNLO 3_2_0
pythia 6_406.2	hijing 1_383b	lhapdf 4_2.1	comphep 4.2.p1
herwig 6_507	hijing 1_383b.2	lhapdf 5_0_0	comphep 4.4.0
herwig 6_507.2	hijing 1_383bs.2	lhapdf 5_1	tests 1_01
		lhapdf 5_2_1	tests 1_02
		lhapdf 5_2_2	sherpa 1.0.5
		pyquen 1_0	sherpa 1.0.6
		pyquen 1_1	sherpa 1.0.8

Generator list review (2/2)

- the present list of supported generators is large
 - proposal to review the list
 - prioritization is needed
 - two levels of priority could be introduced
 - high priority
 - normal priority
 - issues with high priority generators would be addressed before the ones with normal priority generators
 - **expecting input from experiments**
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GENSER release cycle

- proposal of two concurrent release cycles
 - 'continuous' releases of individual generators following availability from the authors
 - in external/MCGenerators
 - global releases of tested and validated sets of generators with complete documentation twice(?) a year
 - labeled as GENSER_2_X_Y
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GENSER CVS

- no need for GENSER CVS to contain (duplicate) source of all supported generators
 - it will contain
 - tests
 - eventual LHC-specific patches for different generators
 - management scripts
 - dedicated CVS can be offered to individual generators
 - HepForge plays that role
 - mirror HepForge CVS at CERN?
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Generators testing and validation

- ❑ see list of performed tests on next page
 - information not easily accessible
 - ❑ web page with description of tests and links to output (histograms, etc) is proposed
 - ❑ requirements needed from experiments and authors for other specific tests
 - list of tests should be circulated and agreed upon
 - ❑ eventually new package dedicated to validation
 - GENVAL/GENVAL_1_0_0
 - ❑ JetWeb/CEDAR collaboration needs to be rediscussed (use of HZTOOL, Rivet, etc)
 - suggestions welcome
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Current GENSER tests (1/2)

pythia 1	Cross section of Z + jet with lower Q_t cut 20 GeV
pythia 2	Fraction of events from Z + jet (Z \rightarrow all leptons) with 2 detectable electrons or muons and 2 jets.
pythia 3	Same as pythia 1,2 (using HepMC/PythiaWrapper.h and event
pythia 4	analyzers from libtests*, see ../include/ANNHEPMC/)
pythia 5-26	Cross section of single W $^{\pm}$ production is calculated using various proton PDF sets via LHAPDF library.
photos 1	Fraction of events Z' \rightarrow e $^+$ e $^-$ with at least one detectable gamma as simulated by PYTHIA with QED corr. on (no photos in fact)
photos 2	Fraction of events Z' \rightarrow e $^+$ e $^-$ with at least one detectable gamma as simulated by PYTHIA(QED off) + PHOTOS
herwig 1	Cross section of Z + jet (Z \rightarrow all leptons)
herwig 2	Fraction of events from Z + jet (Z \rightarrow all leptons) with 2 detectable electrons or muons and 2 jets.
herwig 3	Same as 1,2 above but with Z \rightarrow e, μ
herwig 4	and using HepMC. (see ./herwig_hepmc.cc)
herwig 5-26	Cross section of single W $^{\pm}$ production is calculated using various proton PDF sets via LHAPDF library.
Herwig++ 1	Cross section of the default process as run with LHC.in In the version 2_0_0 the default process is qq2gZ2ff (note that it was different in earlier versions)
isajet 1-24	cross section of single W production (Drell-Yan) at LHC for different PDF sets of lhpdf (same as pythia-lhpdf)

Current GENSER tests(2/2)

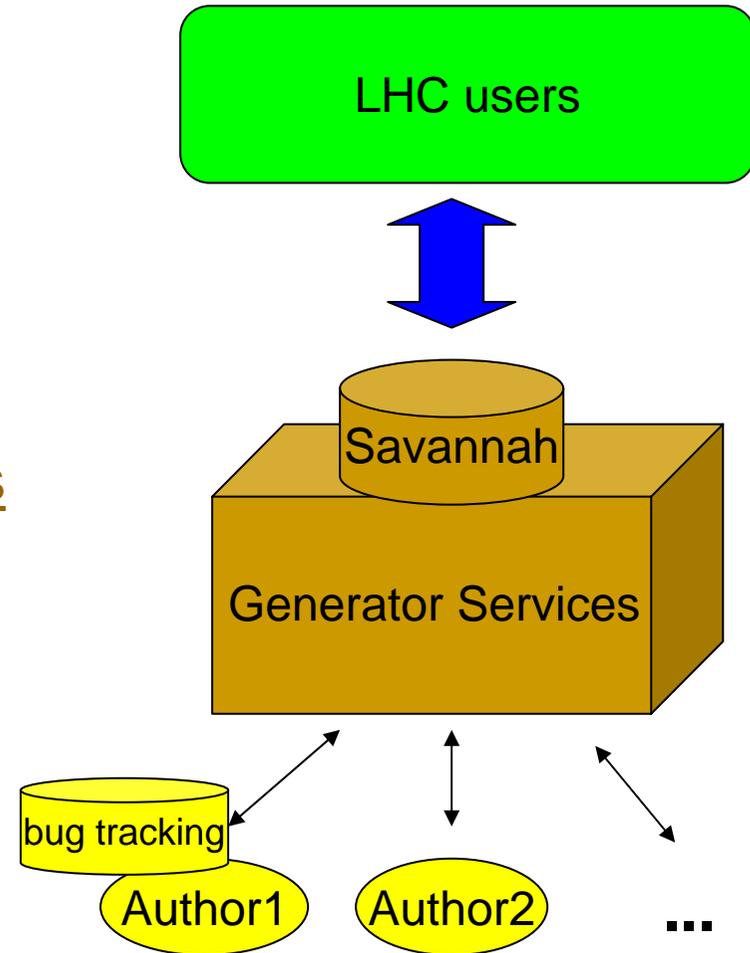
evtgenlhc 1	In Dalitz decay: average invariant mass of particles 1 and 2
evtgenlhc 2	In Dalitz decay: average invariant mass of particles 2 and 3
lhpdf 1-20	PDF sets values with self-explanatory comments
lhpdf 21-40	PDF sets values obtained using lhaglu with self-explanatory comments
tauola 1	$E(\pi^{+-} + K^{+-} + A_1^{+-}) / E(\text{TAU})$ ratio in $f + \bar{f} \rightarrow Z_0 + W^{+-}$ with $Z_0 \rightarrow \tau^+ \tau^-$ and $W^{+-} \rightarrow \tau^{+/-} \nu_{\tau}$ with TAU decayed BY PYTHIA (no tauola)
tauola 2	$E(\pi^{+-} + K^{+-} + A_1^{+-}) / E(\text{TAU})$ as above TAU decayed by TAUOLA
pythia8 1	Do the same as pythia tests 1 and 2. Note that for new
pythia8 2	versions one could need to change the code of the test since now part of parameters are set in Fortran part of pythia.
pyquen 1	Mean mult. in QCD jets events simulated by PYTHIA (no PYQUEN)
pyquen 2	Mean $ \text{Eta} $ in QCD jets events simulated by PYTHIA (no PYQUEN)
pyquen 3	Mean Pt in QCD jets events simulated by PYTHIA (no PYQUEN)
pyquen 4	Mean mult. in QCD jets events simulated by PYTHIA - PYQUEN
pyquen 5	Mean $ \text{Eta} $ in QCD jets events simulated by PYTHIA - PYQUEN
pyquen 6	Mean Pt in QCD jets events simulated by PYTHIA - PYQUEN
toprex 1	cross section of the tW-channel single top production
alpgen 1	Cross section of Z + 2jets with lower Pt cut 20 GeV
alpgen 2	Fraction of events from Z + 2jets (Z \rightarrow electrons) with 2 detectable electrons and 2 jets. (alpgen + pythia)

Event record and particle properties

- HepMC has been adopted by LCG Generator Services
 - requirements from experiments are collected and transmitted to the maintainer (L.Garren)
 - new releases are made with appropriate changes
 - converged to a single version
 - no more in CLHEP
 - latest version standalone (independent of CLHEP)
 - HepPDT needs further discussion
 - initial interest from CMS
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First level support and communication (1/3)

- so far insufficient
- new Generator Services Savannah portal
 - <http://savannah.cern.ch/projects/genser/>
 - experiments are encouraged to report all the problems there
 - Generator Services team will provide 1-level support



First level support and communication (2/3)

- Generator Services will filter reports from experiments
 - only those which cannot be handled by Generator Services will be forwarded to the authors
 - relevant bug reports will be forwarded with no delay
 - dedicated Savannah portals can be offered to individual generators
 - will facilitate bug tracking
 - will eliminate multiple reports (emails) concerning the same problem
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First level support and communication

(3/3)

- web page requires improvement
 - <http://lcgapp.cern.ch/project/simu/generator/>
 - first changes implemented
 - list of available generators with links
 - information about validation and testing needs to be added
 - proposal of organization of tutorials on specific Monte Carlo generators
 - done by the authors
 - addressed to individual experiments
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Events database (1/2)

- MCDB ready to use
 - <http://mcdb.cern.ch>
 - LCG MCDB developed as successor of CMS MCDB
 - Features: Web interface, database, search engine, CASTOR as native storage, Grid compatible
 - CMS is migrating to LCG MCDB
 - development of HepML started by MCDB in collaboration with CEDAR
 - standard format for metadata and physics information
 - important part of standard API to collaboration software
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Events database (2/2)

- little interest in MCDB expressed so far from other experiments
 - new developments in MCDB (motivated by ATLAS feedback)
 - presentation before the end of the year
 - HepML needs further development to be used in MCDB
 - re-evaluate the interest from ATLAS and other experiments
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Proposed milestones

GENSER_1	27/10/2006	revise the list of supported generators
GENSER_2	20/12/2006	move the supported generators to the new structure (including SHERPA)
GENSER_3	30/04/2007	include new versions of supported generators
VALIDATION_1	20/11/2006	prepare a list of test/validation
VALIDATION_2	30/04/2007	implement new tests
SUPPORT_1	01/11/2006	setup Savannah portal for Generator Services and advertise it to experiments
MCDB_1	30/11/2006	complete the MCDB documentation
MCDB_2	22/12/2006	present new development in MCDB to experiments and get concrete feedback concerning the use of MCDB
HEPMC_1	22/12/2006	HepMC2 testing and feedback from experiments

Manpower

- W.Pokorski - 0.5FTE (0.7FTE in the initial phase)
 - Project Leader, GENSER, validation
 - until end 2006:
 - M.Kirsanov + O.Zenin (1FTE*2.5 months)
 - GENSER, validation
 - L.Dudko + S.Belov + A.Klimov (1FTE*4.8 months)
 - MCDB, HepML
 - L.Garren (FERMILAB contribution)
 - HepMC, HepPDT
 - **Planning for next year should reflect agreed priorities**
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Meetings

- continuation of the Generator Services monthly meetings
 - ~21 November
 - report on new GENSER structure
 - ...
 - ~19 December
 - report on MCDB - discussion with experiments
 - ...
 - next planning meeting in ~ 6 months
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Summary

- mandate reviewed
 - project work packages revisited
 - GENSER
 - Validation
 - HepMC/HepPDT
 - User support
 - MCDB
 - experiments should provide
 - list of required generators (high/normal priority)
 - list of tests/validation
 - feedback on MCDB
 - authors should provide
 - list of tests/validation
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