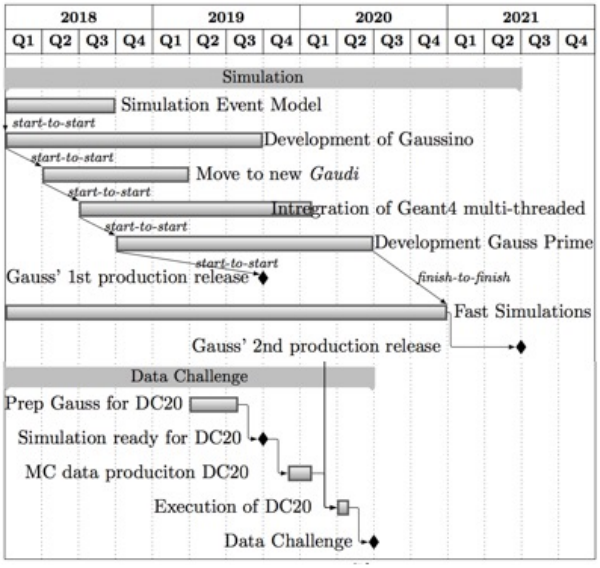
Extract of Gantt chart from TDR

- Simulation Schedule in Computing Upgrade TDR:



Various activities need to be carried out and fit in more then one of the main topic listed above. In particular while the overall architecture of Gaussino and Gauss has been defined, activities like the repackaging of different components or the move to the new Gaudi concerns both. For this reason in the activities listed below sometimes it is indicated in which context they fit in.

Minimal generator phase in Gaussino and its migration to HepMC 3

Lead group	Simulation
Participating groups	Simulation
Description	The generator phase of Gauss has been ported in its minimal implementation in Gauss, i.e. all interfaces and at least one implementation of each tool (cut, PV smearing, production engine). It has been tested and used for a first implementation of random number in the new Gaudi in a MT environment, although further investigation would be helpful. In addition the code has been migrated to a more recent HepMC 3 version that is advertised as thread safe and with a smaller memory footprint. Nevertheless HepMC 3 is not completely commissioned for production quality and evolution should be followed. Generator tests should also be put in place. First implementation exists and running.
Required FTE	0.3
Available FTE	0.2
Deadline	2018
Dependencies	This depend on
People currently involved	Dominik
New effort required?	Helpful for generator testings and monitoring
Link to documentation	Computing TDR, Dominik presentation at last A&S

Repackaging of libraries to factorise out experiment indendent parts

Lead group	Simulation
Participating groups	Simulation, Core software, and all other to smaller extent
Description	In order to have a minimal fully functional Gaussino it is necessary to repackage out into some 'GaudiExtension' common packages that are really not LHCb specific, They are for example ParticlePropertySvc, DetectorDescription (right now), Basic Event Model classes. These packages are currently in LHCb but they should be moved out of the repository and build either together with the Gaussino project (when used by others then LHCb) or with LHCb for us in order to have a
Required FTE	0.2
Available FTE	0.1
Deadline	December 2018
Dependencies	
People currently involved	Dominik, Gloria
New effort required?	Yes from Core Software
Link to documentation	

Gauss built on top of Gaussino

Lead group	Simulation
Participating groups	Simulation, Core Software
Description	Gauss will depend on Gaussino with additional configuration packages to specify the setting for example of Pythia8 or Geant4 and other package with for example additional generators as weill as the final Gauss() configurable. For this we need the Gauss project to have a different build strategy and load the sources from both the Gaussino and Gauss GitLab repository. This activity is specifically to setup up the structure and the minimal Gauss extension for a full simulation, i.e. Pythia8 + G4. The generator and simulation phase can be done separately
Required FTE	0.6
Available FTE	0.3
Deadline	March 2018
Dependencies	This requires a Gaussino with both generator and Geant4 implementation.
People currently involved	Dominik, Gloria
New effort required?	Yes, from core software
Link to documentation	

Geant4 Multithreading with Gaudi future in Gaussino

Lead group	Simulation
Participating groups	Simulation, Core software
Description	The MT implementation of Geant4 needs to marry the Gaudi choices in particular since the event loop and thread handling should be steered by Gaudi. The idea being that it is

	Gaussino that controls the Geant4 threads. In addition to exploring the multi-threaded interplay and verifying which implementation is more optimal one needs to rewrite all of the Gauss G4 User classes to match the G4 MT interfaces, and removed all double inheritance GiGa mechanisms since it it not usable in the G4 MT version. Hence all of the GiGa Run Manager, Event Manager, Run/Event/Tracking/Stepping actions need to be modified to different extents. This task does not cover specific physics processes of detectors (e.g. RICH) nor the geometry that are separate activities
Required FTE	0.6
Available FTE	0.6
Deadline	December 2018
Dependencies	Gaudi
People currently involved	Dominik
New effort required?	
Link to documentation	

Geometry translation from LHCb to Geant4

Lead group	Simulation
Participating groups	Simulation, Core software
Description	The LHCb geometry is passed to Geant4 internal classes. This is done via a dedicated service that select which part of the geometry has to be simulated. With the move to DD4Hep as geometry format for the upgrade detector the service will need to be rewritten. A new generic interface should be implemented in Gaussino as well as a generic implementation based on DD4Hep. We need to understand if we should use DD4Hep plugins for selecting the volume to pass but also find an alternative way to inform Geant4 to which volumes to attach a given sensitive detector / magnetic field manager in order to allow to add or remove them at run time. The new service should allow to simulate all misalignment of the detector. The support of the geometry of the current detector is seen as a separate activity
Required FTE	0.6
Available FTE	0
Deadline	December 2018
Dependencies	Gaudi
People currently involved	
New effort required?	Yes
Link to documentation	

Support of Current Detector Geometry in future Gauss

Lead group	Simulation
Participating groups	Simulation, Core software
Description	The LHCb geometry is passed to Geant4 internal classes. With the move to DD4Hep as geometry format for the upgrade detector we need to ensure that the geometry of the current detector for each year can be simulated with the new Gauss. The favoured solution

	at the moment is to make use of GDML by saving with the current Gauss all different detector configurations (with the correct Velo position) and load it via DD4Hep. An issue are the sensitive detectors and magnetic filed manager that are intended to be treated separately. One has to verify the DD4Hep use of GDML, create GDML for all different configurations, implement a repository and a way to load the correct one at run time.
Required FTE	0.4
Available FTE	0
Deadline	March 2019
Dependencies	DD4Hep in Gaussino
People currently involved	
New effort required?	Yes
Link to documentation	

Gaussino minimal simulation phase

Lead group	Simulation
Participating groups	Simulation, Core software
Description	Once all elements above are available in Gaussino (MT, rewrite of GiGa, geometry) they have to be combined together to provide a fully functional version of the Geant4 simulation with a clear framework
Required FTE	0.2
Available FTE	0.2
Deadline	March 2019
Dependencies	See description
People currently involved	Dominik
New effort required?	No
Link to documentation	

Migration of to and implementation in Gauss based on Gaussino

Lead group	Simulation
Participating groups	Simulation
Description	We will need to port EvtGen itself to use HepMC 3 and to the new Gaudi/Gauss. In addition we want to repackage EvtGen to use the central repository in HepForge rather then our own copy. The mechanism we have to do so for Delphes and to some extent Geant4 where we can apply our patches to the external releases should be adopted
Required FTE	0.6
Available FTE	0.6 to be verified
Deadline	February 2016
Dependencies	This requires a generator version of Gauss built on top of Gaussino
People currently involved	
New effort required?	Under discussion
Link to documentation	

Simulation Event Model

Lead group	Simulation
Participating groups	All
Description	HepMC3 will not be part of the LHCb event model but all MCParticle/MCVertex , MC(XXHIts). etc. need to be ported to the new AoS or SoA structure. At the moment the SoA structure is the chosen solution. The simulation objects and containers need to evolve during the processing and the whole system need to be tested. In addition the possibility of having a common part between Particle and MCParticle need to be investigated as well as the best way of connecting MCParticles and MCVertices
Required FTE	0.4
Available FTE	0.1
Deadline	October 2018
Dependencies	Baseline Event Model
People currently involved	Paul, Dominik
New effort required?	
Link to documentation	

Improve passing conditions to simulation

Lead group	Simulation
Participating groups	Computing, Simulation
Description	Currently the way of passing some conditions to simulation (field map, velo motor position) is via a global tag even if they have very little differences. Part of the reason is to propagate them transparently to the successive applications. A better way of doing so via the DDDB configurable and querying the MC samples should be investigated. This should be easy to use in production.
Required FTE	
Available FTE	
Deadline	
Dependencies	
People currently involved	Marco Cl., Gloria
New effort required?	
Link to documentation	

Port all generators to new Gaudi and - December 2020

Restructuring of Gauss configurable to support all options in a simpler & safer way - December 2019

Delphes fully functional in current Gauss

Porting Delphes to future Gauss

Delphes configuration and procedures for different year (look-up tables for tracking)

PIDCalib integration in fast sim (DELPHES and production environment for RICHLess options)

Infrastructure for specific detector replacement of Geant4 by fastSim in Gauss/Gaussino

Calorimeter frozen showers

Calorimeter ML

-- GloriaCorti - 2018-05-08

This topic: LHCb > SimulationActivities
Topic revision: r4 - 2018-06-09 - VladimirGligorov