Follow up of strategy discussion with LHCC

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Timeline

- ❑ CWP – end 2017
- ❑ LHCC Strategy document – May 2018
  - ▪ CERN-LHCC-2018-019
- ❑ Review of HL-LHC computing strategy – Spring 2019 (tbc)
- ❑ TDR for HL-LHC computing – 2022/3
  - ▪ In conjunction with ATLAS/CMS computing TDRs (tbd)
- ❑ 2026 – HL-LHC

Review of HL-LHC Computing preparations

- ❑ As discussed in last LHCC
  - ▪ Should consider a review of the strategy
- ❑ We think a review will be extremely useful in a broader context:
- ❑ HL-LHC startup is ~2026/7 (optimistically)
  - ▪ TDR for computing in 2020 is perhaps not ideal – 6/7 years away from the need

- ➔ Have a serious review of the strategy in early 2019, a TDR slightly later (2022-3??), in concert with experiment computing TDR's (tbd).

- ➔ Use the review and (updated?) strategy to validate resourced projects with FA's
  - ➔ But do not wait for this – start key activities now

A Review straw-man

- ❑ Scope: (tbd)
  - ▪ Comment on the appropriateness of the strategies to achieve an affordable and optimised computing model to maximize physics output for HL-LHC;
  - ▪ Are the ongoing work and proposed strategies realistic; and are there missing topics or opportunities?
  - ▪ Are the assumptions correct?
- ❑ It would also be useful to bring in all aspects of the problem of HL-LHC computing that need to all be contributing to the overall solution including aspects that don't traditionally regard themselves as "WLCG" like simulation and reconstruction. This would give a coherent overall picture.
- ❑ Needs 2-3 days
- ❑ High-level reviewers
- ➔ Needs some lead-time: likely timescale is thus early 2019

Review structure

- □ <u>Some introduction</u> - overview of scale of the challenge, physics drivers, trigger rates, MC fraction etc. Experiment physics coordinator?

Each of the following should give prospects for improvement - performance factor, reduction factor, etc.

- □ <u>Reconstruction</u>
  - ▪ Improvements and prospects over coming 5 years - general view someone from common reconstruction activity
  - ▪ Experiment specific contributions and plans - ATLAS, CMS
- □ <u>Simulation</u>
  - ▪ Speed up of GEANT4 (vectorisation, parallelisation, re-engineering for performance, etc.) - Geant team
  - ▪ Fast simulation - Geant team
  - ▪ Explain plans for the evolution of GEANT
  - ▪ Full chain MC - ATLAS and CMS specific contributions
- □ <u>Software performance</u> and prospects in general - EP-SFT leading HSF activity, plus appropriate experts
  - ▪ portability (heterogenous architectures), I/O performance, EDM, etc
  - ▪ ROOT team should explain how they will help optimize I/O performance - what are plans?
  - ▪ Common activities (HSF) - parallelism, vectorisation, etc - how this will be managed
  - ▪ ATLAS and CMS - outlook for re-engineering core software?

- □ <u>Prospects for reduction of data volumes</u> - needs experiment specific contributions and plans
  - ▪ up-front/online processing (like LHCb plan to do in Run 3)
  - ▪ data formats - nanoAOD etc
  - ▪ use of virtual data
  - ▪ full chain MC
  - ▪ optimization of number of replicas - caching rather than storing, etc.
- □ <u>Analysis evolution</u> - who?
  - ▪ ROOT - what are future plans for analysis
  - ▪ Experiment outlook - what do they see as analysis needs - is ROOT sufficient?
  - ▪ Organized, local, cloud-based, etc. - Relative merits and costs
- □ <u>Infrastructures</u> - who? - Data-lake project + Rucio + experiments?
  - ▪ Data management ideas (data lake/DM project goals) - how much can be common
  - ▪ Workflow management - highly organized to allow use of tape vs disk
  - ▪ prospects for commonality - e.g. move of "~Rucio" into common layers, common workflows?
  - ▪ Hardware evolution outlook
  - ▪ Cost models?
  - ▪ Use of HPC (infrastructure level - software portability dealt with above)
- □ <u>Event generators</u> - someone very high-level (e.g. Ian Butterworth)
  - ▪ what are plans to re-engineer the code and support NLO, NNLO efficiently?
- □ Other topics?

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