

# Software & Computing for SLHC

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## ▶ Executive summary

- ▶ Progress in Software and computing critical for success of upgrade programme
- ▶ The issues are complex and require significant discussion
  - ▶ Still more questions than answers
- ▶ Many interesting areas for R&D, and a concerted effort needs to start now
- ▶ Need to identify interested parties, organise a dedicated workshop rather soon

## ▶ Some short-term requirements

- ▶ Scheme for SLHC development w / o impact on mainstream CMS offline software
- ▶ Tools and resources for large-scale simulation studies of feasibility
- ▶ R&D programme to examine / reduce the resource reqts for SLHC studies

## ▶ Longer-term requirements

- ▶ Resources and support for TDR-scale studies
- ▶ Studies of how software & computing model might evolve into the SLHC era

# Current Status

- ▶ Code development
  - ▶ A substantial code base for upgrade studies is taking shape
  - ▶ Development (naturally) somewhat ad hoc; many different groups involved
  - ▶ There are presumably projects of which SW&C groups know nothing
- ▶ Use of resources
  - ▶ Small-scale production attempt earlier in the year for track trigger studies
  - ▶ Many technical issues uncovered, solved in an ad hoc way
  - ▶ Insufficient effort & resources to meet demand for centrally produced samples
- ▶ Software versions
  - ▶ Most development (that I know of) against CMSSW 2\_2\_6
    - ▶ Historically tied to the 'blessed' fast simulation version
  - ▶ Some code developed against CMSSW 3, back-ported
  - ▶ We are under pressure to move globally to a recent CMSSW 3 version
    - ▶ CMSSW 2\_2\_X will by default be unavailable on Grid resources from January

# Interaction with Baseline Software

- ▶ The issue
  - ▶ How to carry out substantial *new* development against the CMSSW base
  - ▶ Tension with next year's requirements for stability, change control, robustness
- ▶ A more 'closely-coupled' approach?
  - ▶ Pro: we benefit from stability and performance of recent CMSSW versions
  - ▶ Pro: when bugs are found, they can be fixed in the mainstream code
  - ▶ Con: cannot break mainstream code, delay releases, make rapid / arbitrary changes to baseline code
  - ▶ Con: conflicting requirements may result in duplication of effort
- ▶ Software versions:
  - ▶ My view: the move to CMSSW 3 is now overdue and urgent
    - ▶ The effort this will cost is significant; but it also costs effort to stay with v2
    - ▶ Move to 3\_x\_x will allow use of large-scale production framework
  - ▶ We benefit from significant functional changes, e.g. to mixing module
  - ▶ Request from offline coordination is that we move by the end of 2009

# Resource Issues

- ▶ The 'computing' side:
  - ▶ SLHC studies will require increasing amounts of computing & storage resource
  - ▶ Those resources must be in place to support the programme
  - ▶ An 'upgrade group' (in computing terms) has been approved
    - ▶ We will be seeking commitment of resource (e.g. from FNAL) against this
- ▶ The 'software' side:
  - ▶ Most urgent problem is large memory requirement for simulation
    - ▶ Some progress expected with the move to CMSSW 3, but still a key issue
  - ▶ Impractical to demand large-scale specialised resources in the long term
  - ▶ Solution will require more than gradual optimisation, a step change is required
- ▶ Proposal for discussion:
  - ▶ Identify group to profile & understand memory / CPU use of SLHC code
  - ▶ Determine which *algorithmic* changes (in modules or framework) could help
  - ▶ Collaborate with performance & framework experts on a development plan
    - ▶ Though we cannot expect radical changes overnight

# Next Steps

## ▶ Organisation

- ▶ Continue process of setting up an 'Upgrade software & computing group'
- ▶ We will be contacting each approved upgrade R&D project to discuss
- ▶ Hold a dedicated workshop in the coming weeks
  - ▶ At December CMS week? Possibly too crowded - January a possibility?

## ▶ Resources

- ▶ Implement the new upgrades group in the DMWM systems
- ▶ Obtain substantive commitments of resource against this (before end of 2009)

## ▶ Development

- ▶ Discuss our development strategy against the stable CMSSW base
- ▶ Agree the timescale & plan for the move to CMSSW 3
- ▶ Discuss our large-scale production requirements for the coming months
  - ▶ Such that we can provide input to the overall offline & computing planning
- ▶ Discuss how to begin concrete R&D on memory requirements for simulation
  - ▶ There are currently no approved upgrade R&D projects in software & computing!