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# Follow-Up from Lisbon Workshop



# Introduction

- ❑ Two days devoted to medium term (Run 2-3) and longer term (Run 4) concerns
- ❑ ~140 people registered
- ❑ Aimed for more of a discussion format rather than presentations
  - (Informal) feedback from many said this was useful
    - Some aspects probably needed a bit more preparation to be more successful

# Shorter term & ongoing work (key points only)

# Security, AAA, etc

- ❑ Fully address traceability:
  - Freeze deployment of glexec – keep it supported for the existing use, but no point to expend further effort in deployment
  - Need full traceability solutions and tools:
    - Experiment frameworks
      - Work needed to get VO traceability info into CERN SoC (or to ...)
    - Use of VMs/containers helps
    - Invest in deploying 'big data' tools for managing traceability data
      - SoC capability, appliances?
  - Traceability working group needed?
  - This is a reflection of the trust of VO's now, rather than trying to trust many individuals
- ❑ Incident Response & dealing with threats (against people)
  - Invest in (coordinate in WLCG) better intelligence/trust with other communities, and with vendors
- ❑ Federated IDs: long term goal
  - eduGain etc; develop use cases within AARC2 project
- ❑ Policy work
  - Data, privacy, etc

# Compute

- Lot of discussion of cloud and cloud use
  - Models of how to provision and access commercial clouds are evolving
    - HNSciCloud will explore more aspects
  - Many models of using clouds, containers, VM's
    - (vac, batch queues, & etc., etc.)
    - Probably exposure of experience in GDB is a correct way to proceed for the moment
- Lots of discussion on the use of HPC
  - Useful in certain specific circumstances or as opportunistic resources
  - Significant effort expended in this area, for few % gain in resources
    - Not to be ignored, but can we gain more in other areas for a similar effort???
  - What should our strategy be here – generalise to opportunistic resources more broadly?
- Issues of IP connectivity, lack of storage access, etc. (see these issues in HPC, cloud, etc.)
  - Addressing these fully will actually benefit our entire operation
  - Long standing concern over connectivity and implications at sites

# Data

- ❑ Object Storage
  - multiple motivations
  - scalability (exploiting less meta data) as embedded storage
  - also - nicer/more modern tools
- ❑ Roles of smaller sites (or with little support effort)
  - demo - describe scenarios, ask for supporters, drop rest
  - cataloged cache (eg dpm)
  - proxy cache (eg xroot)
  - Rob (largely non hep specific components , trust?)
  - boinc (no operator, no shared storage)
- ❑ Common questions
  - prove simulation use case
  - analysis at small sites will be compressed
  - estimated impact on T1 (eg wan stageout)
- ❑ Federation of storage, desired by some experiments
  - Prefer to have a single storage endpoint to aggregate resources across several sites
  - Maintain redundancy and replica locality

# Data

## A possible medium term plan

- SRM: progress with decommissioning, apart for tapes
- Data access, upload, download:
  - Consolidate around the xrootd protocol (mainstream)
  - Progress with HTTP support, valuable both in the short and medium/long term
- Data Transfer
  - Investigate possible alternatives to gridFTP (e.g. xrootd like Alice, HTTP)
  - Do not forget that data deletion is as challenging as data transfer

# Info sys, accounting, etc

## □ Information system:

- Too much “by hand” information in too many places – error prone
- Does WLCG need an IS? (my impression is “yes”)
  - But should be focused on as simple as possible for service discovery
  - Benchmark data should be separated
- Suggestion (and work done) to use AGIS for this
  - Needs agreement before we proceed further
  - Alternative is do nothing and let experiments gather info directly from GocDB, OIM etc

## □ Benchmarking: we need

- A real benchmark (HS06 or update) for:
  - Procurement, reporting, expressing requirements, etc
- A fast “calibration” benchmark to run e.g. at start of every pilot
  - Needed for understanding environment
  - Essential for opportunistic resources, or cloud uses
  - Ideal if we could agree a single such fast benchmark for everyone



# Accounting, cont

## □ Accounting

- Work has been done for cloud accounting in EGI
  - Not clear how to publish accounting from commercial clouds or HPC (or non-pledged in general)
  - Wallclock vs CPUtime reporting – not discussed
- We should review formally what each stakeholder needs from accounting
- Experiments, FA's, sites, etc
  - What data should be gathered and reported?
  - Today's accounting system has grown over 10 years – time to review what we want from it and how to manage it
    - Also to manage expectations of the data itself

# Longer term – upgrades & HL-LHC timescale

# Observations

- ❑ Generally lack of preparedness to think about the longer term
  - People tightly focused on immediate concerns and Run 2
- ❑ Probably a lack of clarity over what the situation for Phase 2 upgrades will be:
  - In terms of requirements – what is the real scale of the problem – need better estimates
  - What we can really expect from technology
  - An understanding of the real limitations of the system we have today
- ❑ We should also bear in mind that while we potentially need to instigate *revolutionary* changes in computing models, nevertheless we will have to face an *evolutionary* deployment
- ❑ Concerns over software and efficiency (in all aspects) will be a significant area of work
- ❑ Commonalities may be possible in new tools/services or next generation of existing
- ❑ Propose a number of activities to address some of these aspects

# 1) Definition of the upgrade problem

- Set up a study group to:
  - Establish and update estimates of actual computing requirements for HL-LHC, more realistic than previous estimates:
    - what are the baseline numbers for data volumes/rates, CPU needs, etc.?
  - Look at the long term evolution of computing models and large scale infrastructure
    - Need both visionary “revolutionary” model(s) that challenge assumptions, and “evolutionary” alternatives
  - Explore possible models that address
    - Today’s shortcomings
    - Try to use best of evolving technologies
    - Address expectations of how the environment may evolve
      - Large scale joint procurements, clouds, interaction with other HEP/Astro-P/other sciences
    - Possible convergence of (the next generation of) main toolsets
  - Build a realistic cost model of LHC computing, help to evaluate various models and proposals – this will be a key to guiding direction of solutions

# 2) Software-related activities

## □ Strengthen the HSF –

### ■ “Improve software performance” –

- Need to define what the goals are here
- Need to define metrics for performance:
  - E.g. time to completion vs throughput vs cost
- Continue concurrency forum/HSF activities – but try and promote more
- And other initiatives like reconstruction algorithms etc

### ■ Techlab

- expand as a larger scale facility under HSF umbrella
- Include support tools (profilers, compilers, memory etc)
  - Including support, training, etc
  - openlab can also help here
- Should be collaborative – CERN + other labs

### ■ Technology review

- “PASTA” – reform the activity – make into an ongoing activity, updating report every ~2 years
  - Broad group of interested experts
- Also under HSF umbrella – strongly related to the above activities

# 3) Performance evaluation/“modelling”

- Investigate real-world performance of today’s systems:
  - Why is performance so far from simple estimates of what it should be?
  - Different granularities/scales:
    - Application on a machine
    - Site level: bottlenecks, large-scale performance
      - Different scale sites, different workflows
    - Overall distributed system
      - At which level?
      - Are data models and workflows appropriate?
- Once we have a better handle of actual performance – can we derive some useful models/parameterisations etc?
  - Useful enough to guide choices of computing models – don’t have to be perfect or complete
  - This feeds into any cost models

# 4) Prototyping (demonstrators)

- Some specific prototyping of some of the ideas that arise from the above activities
- For example:
  - Data or storage management
    - Storage federations, caches rather than “SE”
    - Etc.
  - Optimisation of sites with little effort or expertise
    - “Site in a box” appliance, Boinc, vac, etc
    - What about cache, stage-out, etc
  - Others as ideas arise
- Common activity here would help to evolve into common solutions in production eventually

# How to progress – 1

## □ Study group

- Set up now, needs a chair person and experts from each experiment
- Initial tasks
  - to understand likely realistic performance and resource requirements – establish a baseline
  - Look into building a realistic cost model
- Later
  - Look at straw-man models based on better understanding of the above



# Progress – 2

- ❑ Software and technology related
- ❑ Mandate the HSF to :
  - Define metrics of what should be achieved, and how to describe performance (see next)
  - Set up an ongoing Technology Review group
  - Work with CERN techlab team to define what that should look like (and how to expand collaboration)
  - What can be done about long term careers and recognition of software development

# Progress – 3

## □ Performance/modelling

- Small team in IT starting to work on this and consolidate existing efforts
- Define a programme of work to look at current performance and concerns
- Propose to mandate this team (led by Markus Schulz) to engage experts in the experiments and sites
  - Define some initial goals

# Demonstrators

- ❑ This seems to be a natural way to move forward
- ❑ Some could be under the umbrella of the WLCG Operations team
  - Each project would need to define goals and metrics, and engage volunteers/efforts
- ❑ Projects can be both medium term investigations/prototypes
  - E.g. storage federation across sites
- ❑ Or, longer term demonstrators
  - New models

# Summary

## ❑ Medium term

- A lot of work ongoing
  - Including other aspects not discussed in Lisbon (e.g. cost of operations)
- Useful to have (as discussed previously) a technical forum to coordinate all the activities?
  - Coordination: A chairperson, GDB chair, 1 per experiment (senior enough)
  - GDB and operations teams useful mechanisms for discussion/work

## ❑ Longer term

- 3 areas of work proposed
- Should be managed by the MB, also need to work towards a more concrete plan

## ❑ Prototypes/demonstrators

- A useful way to explore ideas and eventually converge on common solutions?

# Questions?