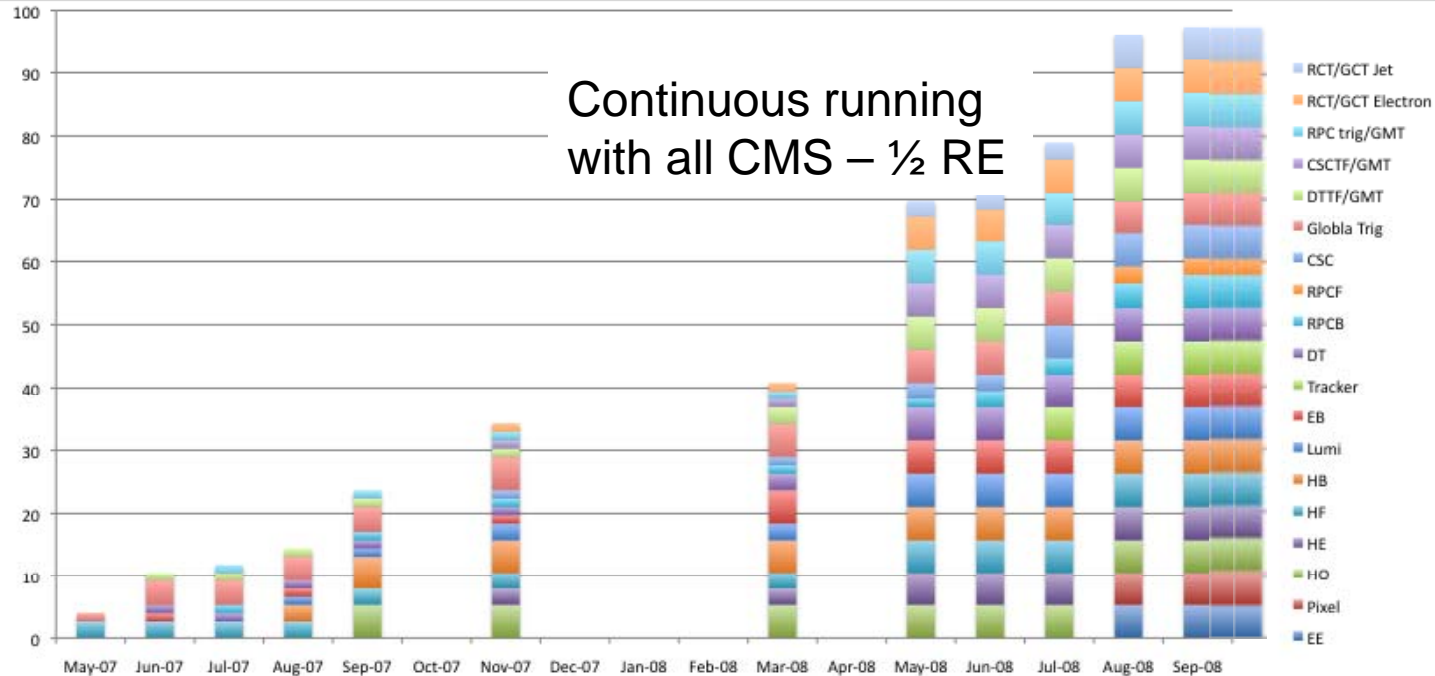


CMS - Plan for shutdown and data-taking preparation

Outline:

- Global Runs – Craft
- MC production
- CMSSW
- CAF, Tier-1, Tier-2
- PADA
- End-to-end analysis

Claudio Grandi



CRUZET4 (Cosmics Run at Zero Tesla)

- First Global run with final CMS configuration (including newcomers EE and Pixels) accumulating data more stably. 38 M cosmic triggers logged. A total of ~ 300 million cosmic triggers recorded.

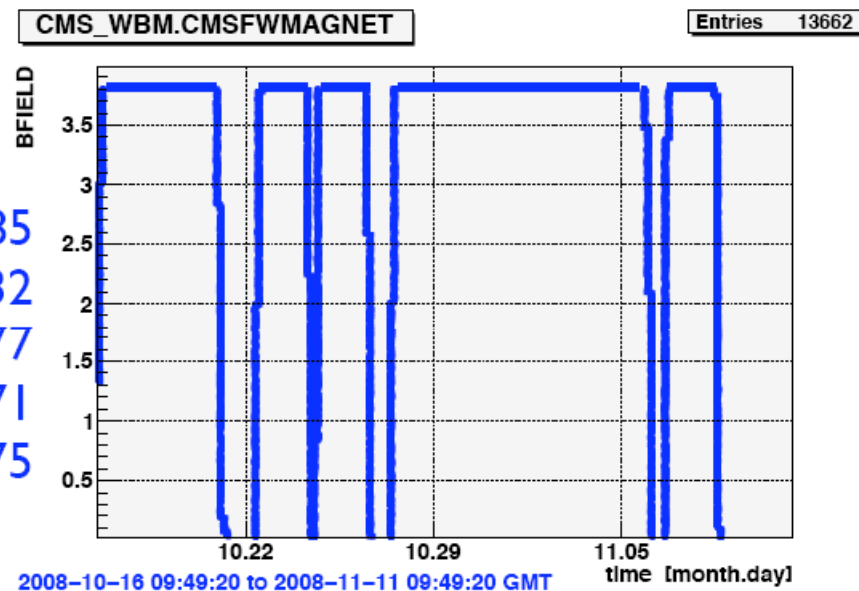
CRAFT (Cosmics Run at Four Tesla)

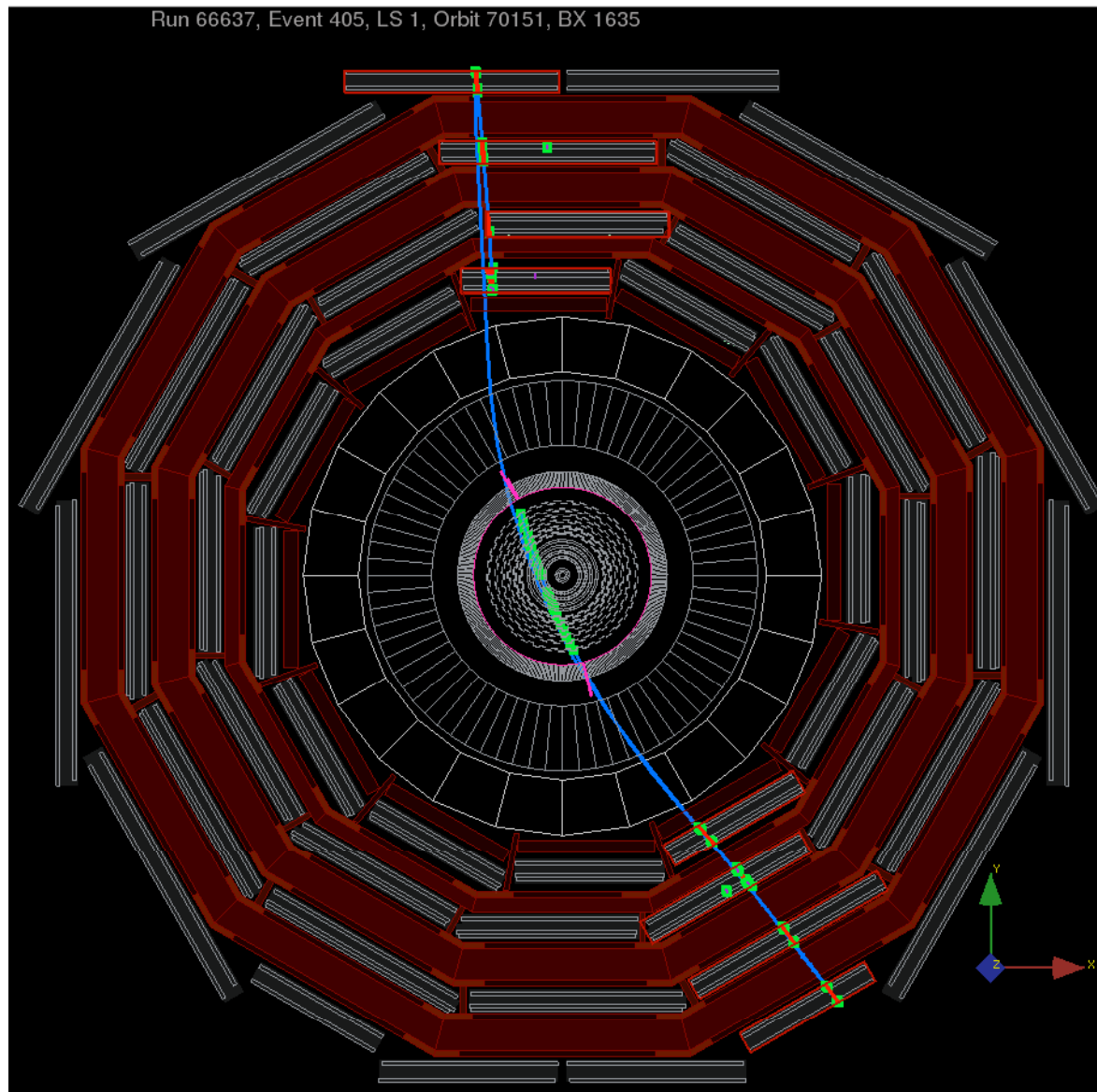
- Global run with final CMS configuration at Operating field (3.8T)
- Around 370 million cosmic triggers recorded.

- CRAFT Cosmic Run At Four *Tesla*
 - From 16/10/2008 @10:04:16 (CMS run 66480) to 11/11/2008 @07:03:25 (CMS run 70675)
 - Average trigger rate ~550Hz
 - Average muon trigger rate ~300 Hz
 - 370 M muon triggers in total
 - **194 M muon triggers with magnetic field and all subdetectors on**

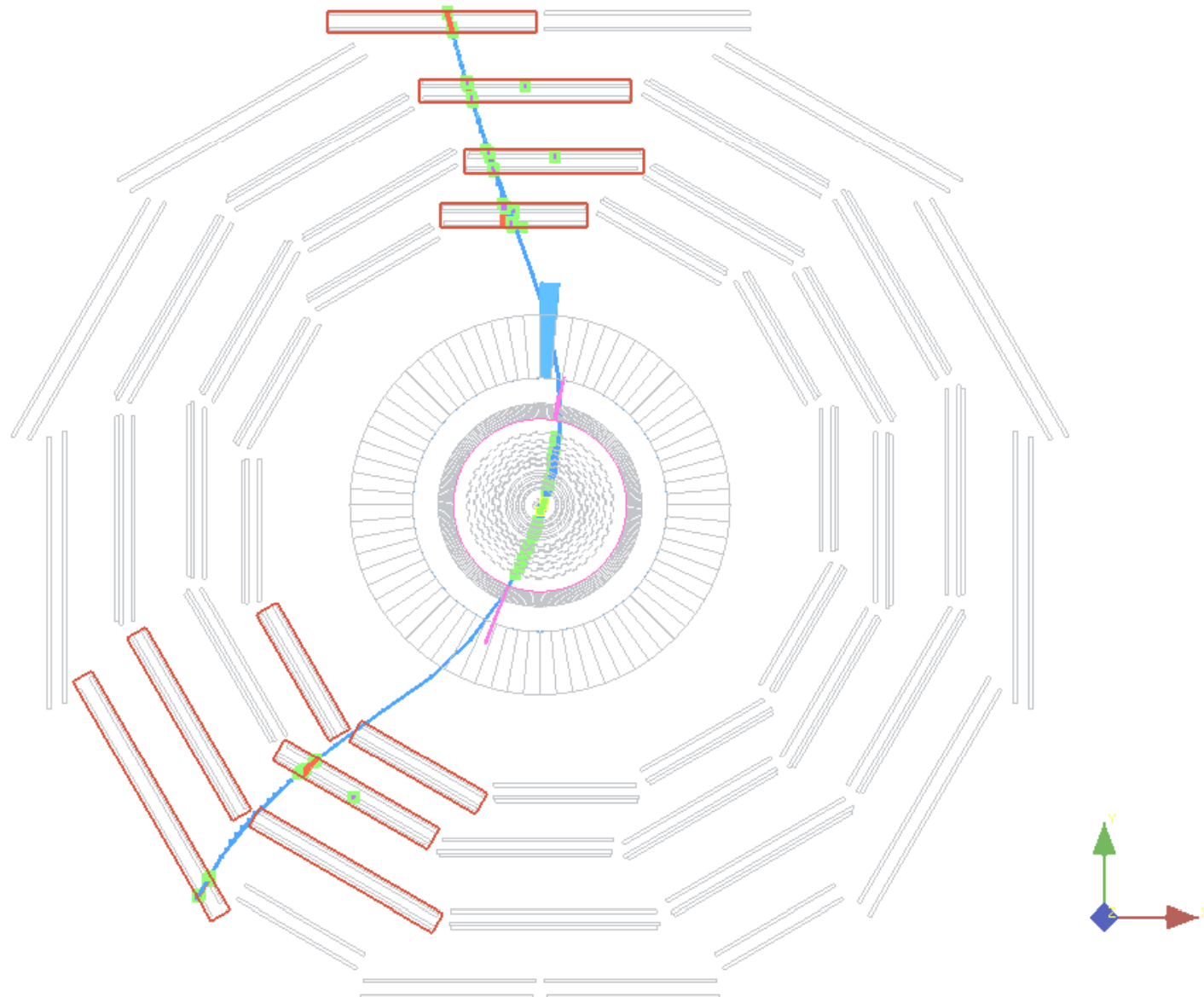
BFieldOff run-ranges:

66893-67085
 67264-67432
 67676-67777
 69536-69671
 70088-70675





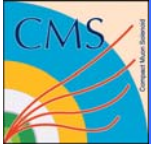
Run 66748, Event 8894786, LS 160, Orbit 167263116, BX 1915



- Repacking (production of RAW) → *Latency: minutes to ~hour*
 - Reconstruction (production of RECO)
 - Harvesting (production of DQM root files)
 - Alignment and Calibration
 - Skimming (at T1s)
- } → *Latency: hours*



- All CRAFT data have been already transferred at Tier-1s and Tier-2s.
- Will need to reprocess all data with a new version of CMSSW (2.2.0) that will be ready in a week
 - Harvesting, AICa, Skims
- A new reprocessing step will be needed when final alignment data will be available (in a couple of weeks)
- **Data are being analyzed at the CAF and at Tier-2**
 - **This will continue in the next months**

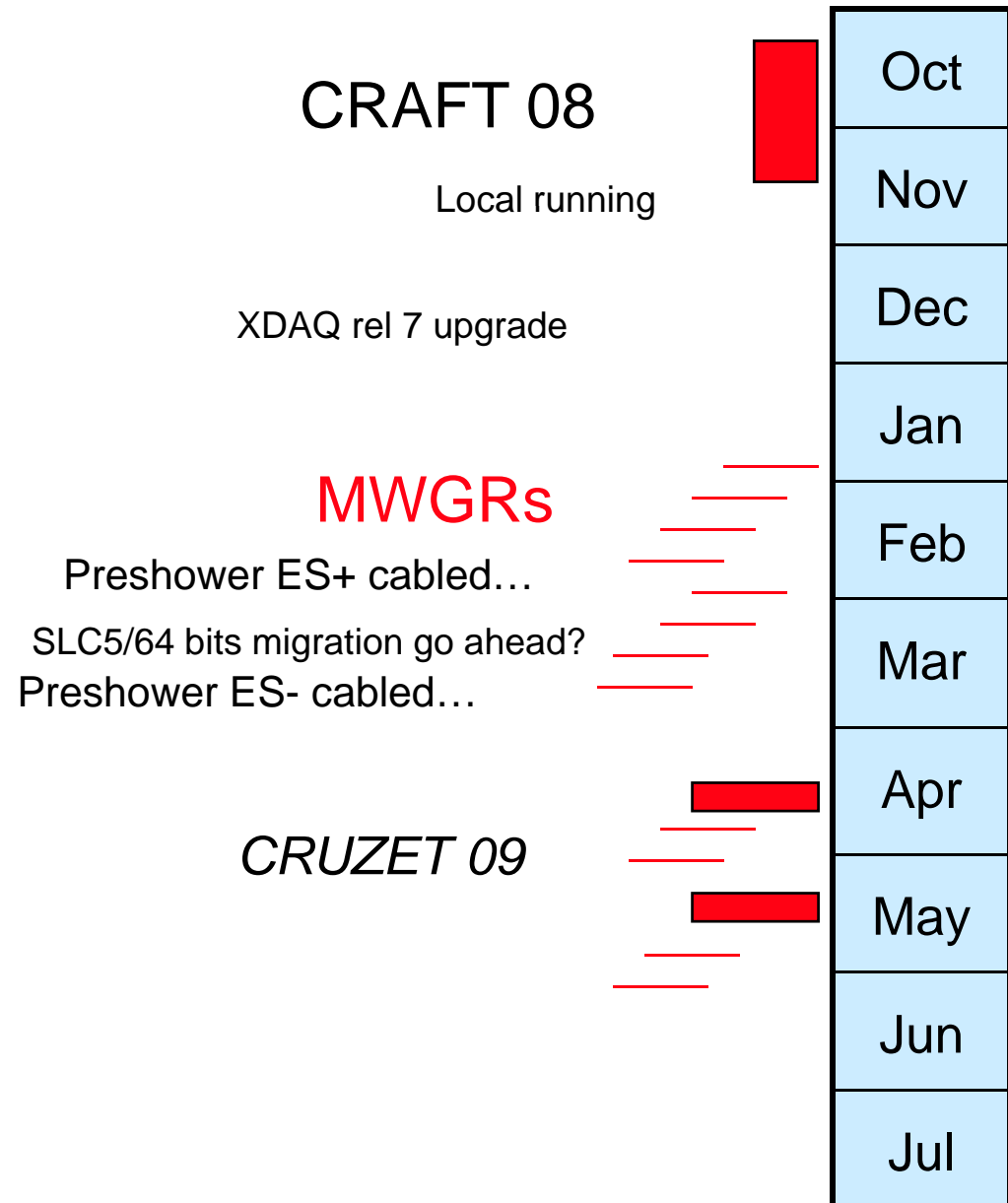


CRAFT – Things to be improved

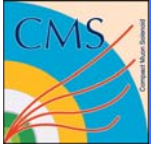


- Optimize Tier-0 workflow
 - include harvesting and AICa in the T0 standard workflow
- Reduce drastically the latency on skims (12 hours)
- Revisit resource usage:
 - Events transferred multiple times as part of different subsamples
 - Reconstruction done twice for some subsamples
- Learn how to handle big files (several tens of GB)
 - Already working with FTS developers

- The detector is being opened in these days
- Work underground will continue until mid-May
- Before the restart of LHC operations there will be another CRUZETGlobal Run



- Continuous request of MC samples produced to support commissioning and studies for Primary Dataset definitions
- DPG requests
 - 131.9 M events produced (GEN-SIM-RAW)
 - 111.3 M events reconstructed
- Physics requests
 - 190.3 M events produced (GEN-SIM-RAW)
 - 158.8 M events reconstructed
- Production is running smoothly
 - **We were able to use > 8000 T2 slots (nominal is ~5600)**
 - But tape space at Tier-1s will become an issue...
- Production will continue to run constantly



Fastsim production

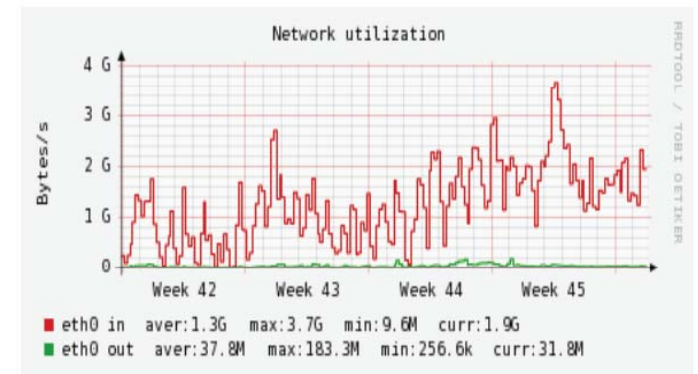
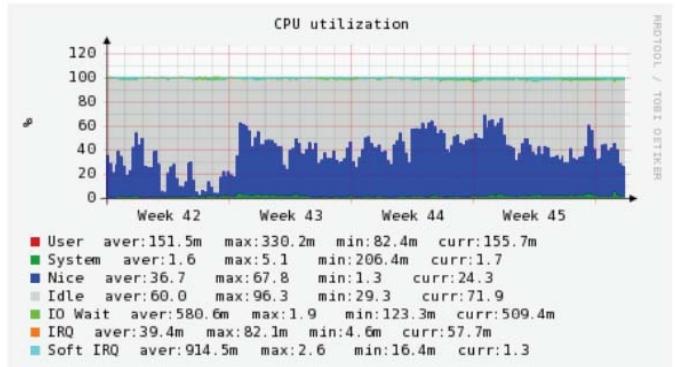
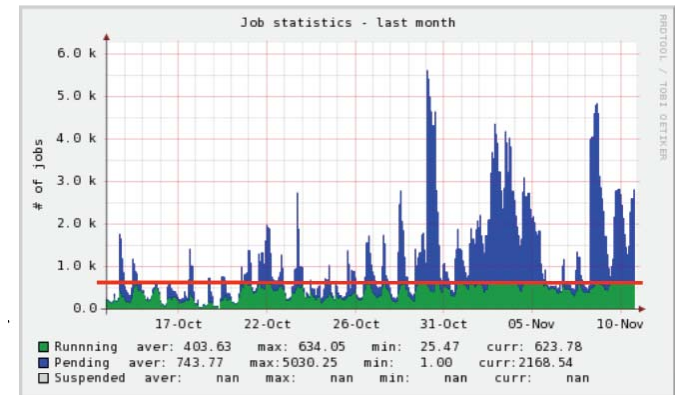


- The new version of the fast simulation software expected with CMSSW 2_2_0 in a week
- After a validation phase a new production round will start
- The plan is to produce 500 M events during December
- CPU needs will not be huge but data transfer and storage will need attention

- CMSSW 2_1_0 in production
 - Over 300 M Monte Carlo events produced
- CMSSW 2_2_0 will be released in a week
 - Improvements in algorithms and tools
 - Re-digitization and re-processing of all data
 - Analysis of CRUZET and CRAFT data
- CMSSW 3_0_0 will be released in Jan/Feb
 - Data format changes allowed
 - New platform/compiler?
 - Several options: SL4/SL5, gcc 3.4.5, 4.1.2, 4.3.2
 - selinux problems understood and fixed as far as it is deployed in the default configuration
 - Stay with 32-bit for the moment

- CAF – Tier-1
 - Detector and trigger performance monitoring and commissioning
 - Controlled Alignment and Calibration activities (AICa)
 - Physics performance monitoring
 - Short latency physics analysis
- CAF – Tier-2
 - Interactive access login facilities for access by all CMS
 - A la lxbatch/lxplus
 - Access only to selected users (all others do analysis at Tier-2s)

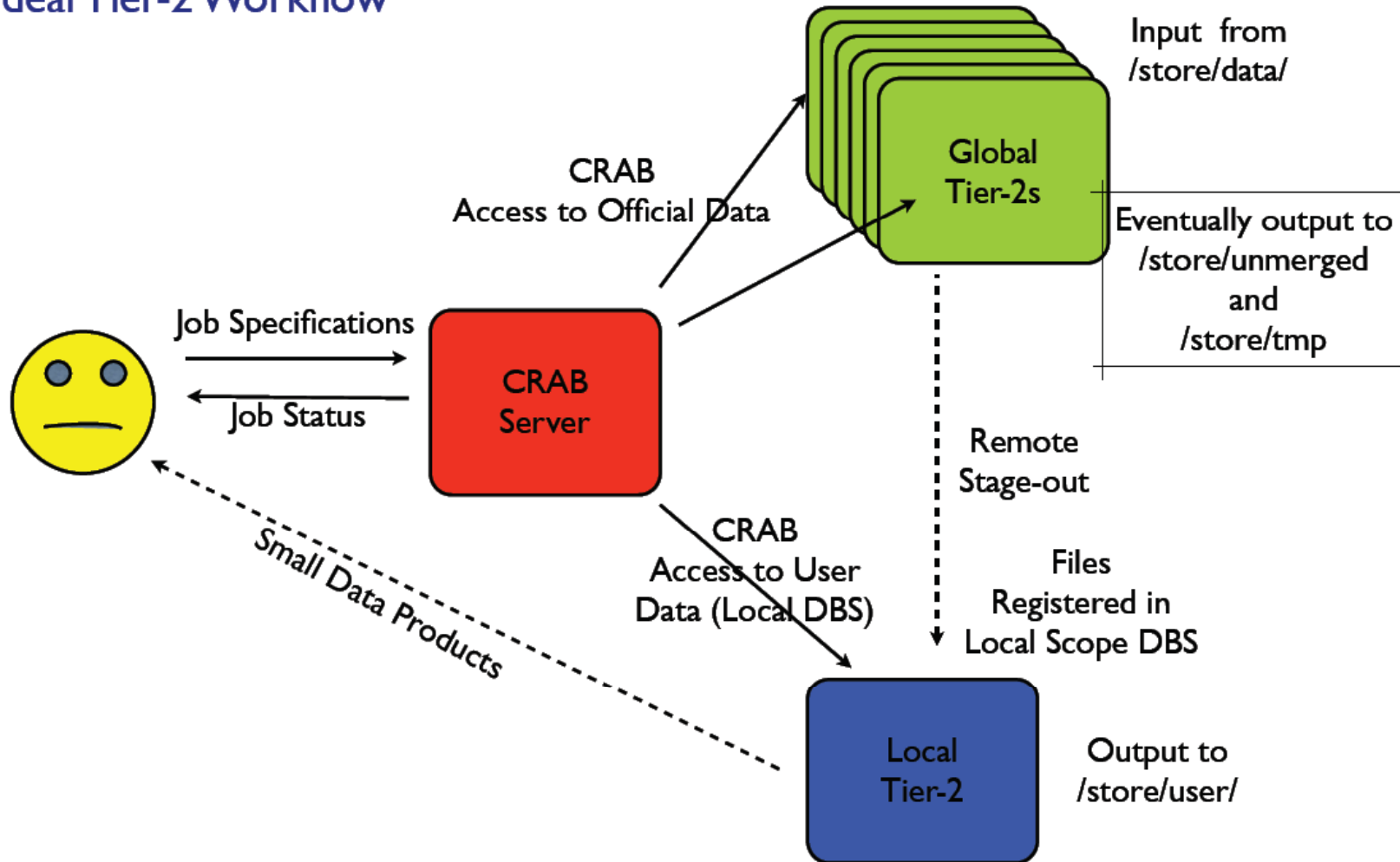
- 1198 TB disk space
 - 398 TB CRAFT; 311 TB free
 - Space deletion based on DBS
- 648 job slots for all registered CAF users + reserved 48 for AICa group
 - Usage: 40% Commissioning, 40% AICa, 20% physics
 - Job slots always full but CPU utilization ~ 40%
- Heavy use of bandwidth but no saturation
- Plans:
 - Analysis of job efficiency per group
 - Deploy short/long queues
 - Address sharing of resources with Tier-0
 - Commission a dedicated CRAB server



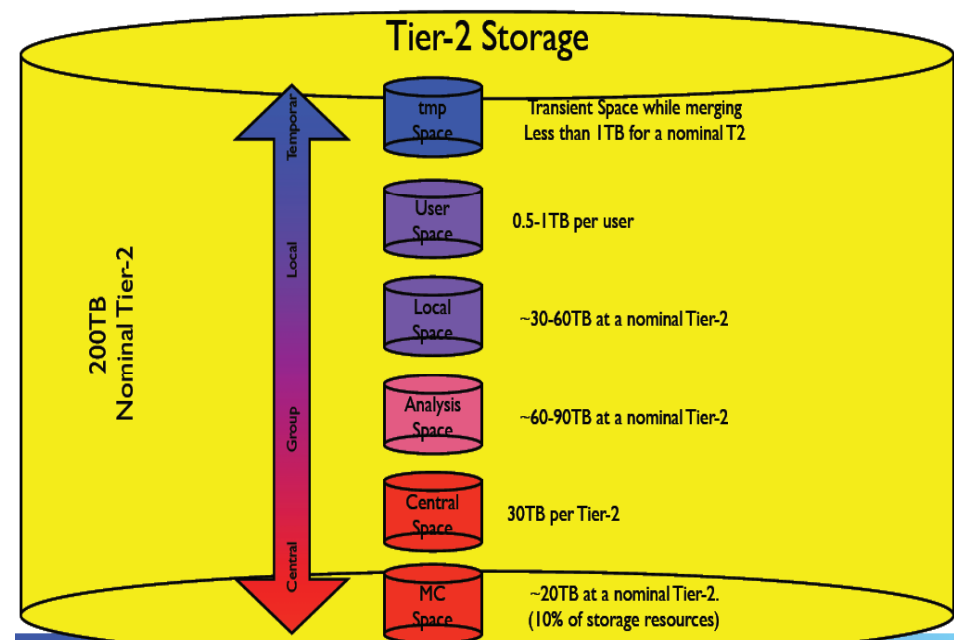
- Dedicated to production activities
 - Data custodial
 - Reprocessing, Alignment/Calibration and Skimming
- Will enforce authorization to reserve Tier-1s to the production users
 - We tried but there is currently a problem with SAM tests if a CE is only opened to VOMS groups/roles instead of the whole VO! Hopefully fixed in a couple of weeks
- Working to improve the handling of data custodial
 - Tape families / space tokens
 - Integration with PhEDEx
- Improvements needed in pre-staging techniques

- Dedicated to MC production and user analysis

Ideal Tier-2 Workflow



- 20 TB as a buffer for MC productions
- Central Space 30TB
 - Intended for RECO samples of Primary Datasets.
 - In 2008 we had expected to be able to store 2 copies of MC and data sample using the identified T2 space
- Physics Group Space 60-90TB
 - Assigned to 1-3 physics groups. Space allocated by physics data manager. The site data manager still approves the request, but only to ensure the group is below quota
- Local Storage Space 30TB-60TB
 - Controlled by the local storage manager. Intended to benefit the geographically associated community

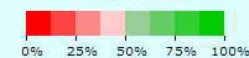


- Campaigns dedicated to the improvement of specific aspects of CMS computing and offline. Main achievements:
 - Data consistency
 - Verification of information in the various data management components (PhEDEX, DBS, etc...)
 - Use of multi-thread techniques in job submission clients
 - BossLite (used in both CRAB and Production Agent) improved by almost an order of magnitude the scalability and stability of the tools
 - Deployment of the CRAB server
 - For user analysis on the Grid and on the CAF
 - Monitoring
 - Site commissioning

CMS GridMap – Visualizing SAM Site Availability



CMS Site Availability, 04 Nov 2008 (whole day).
Size of site rectangles is based on pledged Disk and CPU ([info](#)).



- The evaluation of the global site status relies on daily rules to be satisfied for the Tier-1 and Tier-2 sites:

Daily Rules for Tier-1 sites
daily SAM availability $\geq 90\%$
daily JR-MM efficiency $\geq 95\%$
having commissioned the downlink with the Tier-0
having ≥ 10 commissioned downlinks to Tier-2 sites
having ≥ 4 commissioned downlinks/uplinks to other Tier-1 sites

Daily Rules for Tier-2 sites
daily SAM availability $\geq 80\%$
daily JR-MM efficiency $\geq 90\%$
having a commissioned uplink with at least 1 Tier-1
having a commissioned downlink with ≥ 2 Tier-1 sites

(for Tier-2s: failing metrics on weekends do not count)

- The global status is determined as follows:
 - **COMMISSIONED:** *daily rules satisfied during the last 2 days, or during the last day and at least 5 days in the last 7*
 - **WARNING:** *daily rules not satisfied in the last day but satisfied during at least 5 days in the last 7*
 - **UNCOMMISSIONED:** *daily rules satisfied for less than 5 days in the last 7*
- The rules allow a site to recover fast from **WARNING** state and recommission relatively easily. It is enforced a reasonable level of site stability over the long term (~70%).

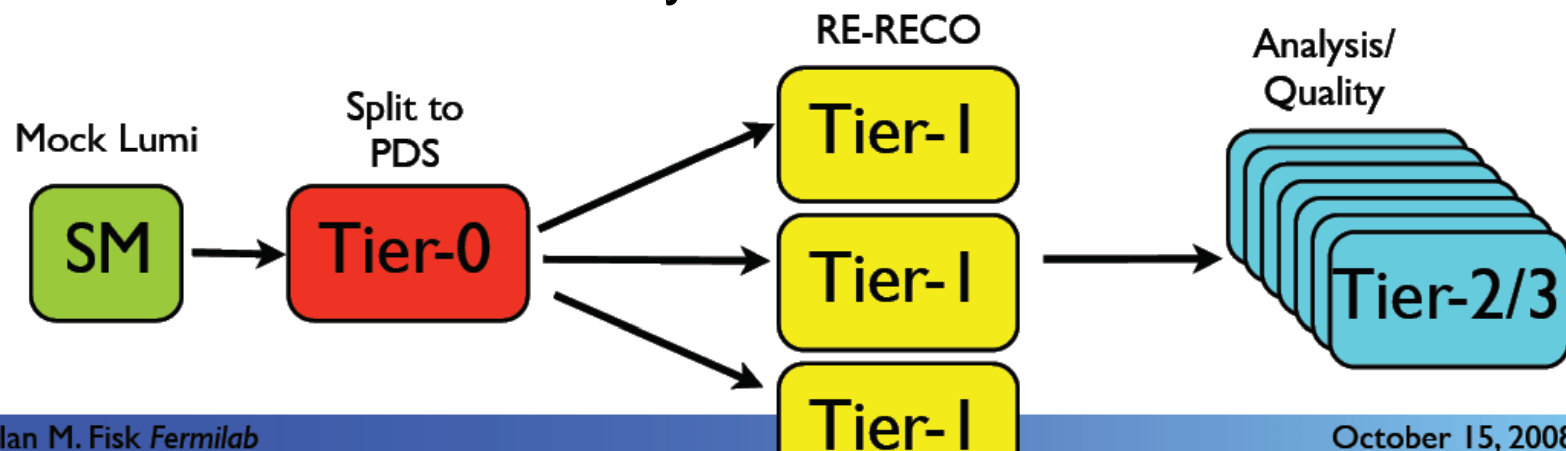
- All daily metrics monitored for all Tier-1s → SC status 100% evaluated

		FNAL														
Daily Metric		○	○	○	E	○	○	○	○	○	E	E	○	○	E	E
		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Job Robot JR-MM		○	○	○	E	○	○	○	○	○	E	E	○	○	E	E
SAM Availability		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
T1_DownlinkT0		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
T1_DownlinksUplinksT1s		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
T1_UplinksT2s		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		05/09/2008	06/09/2008	07/09/2008	08/09/2008	09/09/2008	10/09/2008	11/09/2008	12/09/2008	13/09/2008	14/09/2008	15/09/2008	16/09/2008	17/09/2008	18/09/2008	19/09/2008
Daily Rules for Tier-1 sites																
	daily SAM availability ≥ 90%															
	daily JR-MM efficiency ≥ 95%															
	having commissioned the downlink with the Tier-0															
	having ≥ 10 commissioned downlinks to Tier-2 sites															
	having ≥ 4 commissioned downlinks/uplinks to other Tier-1 sites															
Site Comm. Status		C	W	W	W	C	U	U								

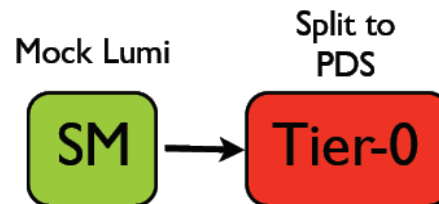
← JR failures
To be understood

- **Now tuning the tool to optimize the results**

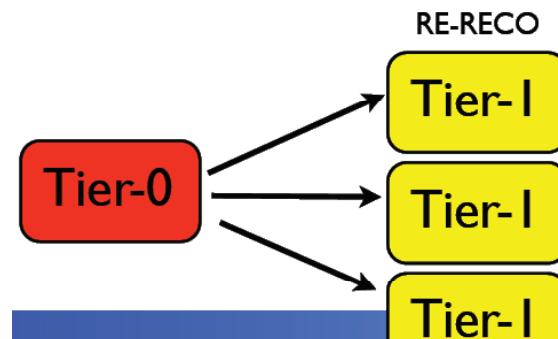
- In the next months CMS will do an exercise to verify that luminosity, conditions, and quality information are consistently handled through the Tier-0 to the Tier-1s and Tier-2s and Tier-3s
 - This proposal is not a “challenge”
 - It’s not a scale test and it’s not dependent on a time window
 - We should run through all of the tiers and workflows until we’ve convinced ourselves we handle the lumi and quality information consistently



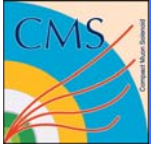
- Produce a sample of events with mocked up luminosity information, produce the RAW data and divide into Primary Datasets



- Transfer to Tier-1s, re-reconstruct by Luminosity Section and verify that all events have been processed



- Transfer to Tier-2s and analyze with CRAB per luminosity section.
 - Verify CRAB can split by luminosity information and calculate the luminosity available in the processed files
 - Verify CRAB can eliminate from the calculation failed jobs.
- Check Data Bookkeeping
 - Demonstrate the ability to select on lumi information and select on conditions information in the data discovery.
 - Demonstrate the ability to create and use Analysis Datasets
 - Provide the ability to eliminate duplicate events if running over more than one PDS?



Summary



- Data collected in the CMS Global Runs is being analyzed by physicists
- New CMSSW 2.2 release in a week
 - Reprocessing and analysis of all data
- CMSSW 3.0 in Jan/Feb with new OS/compiler (32bit)
- MC prod continues (standard + 500 M fast simulation)
- CAF/Tier-0/Tier-1/Tier2 infrastructure defined
 - Monitoring tools, commissioning policies, ...
- Upgrades in CMS tools (CRAB, PA, PhEDEx, ...)
- Lumi analysis exercise
- New Global run before LHC startup