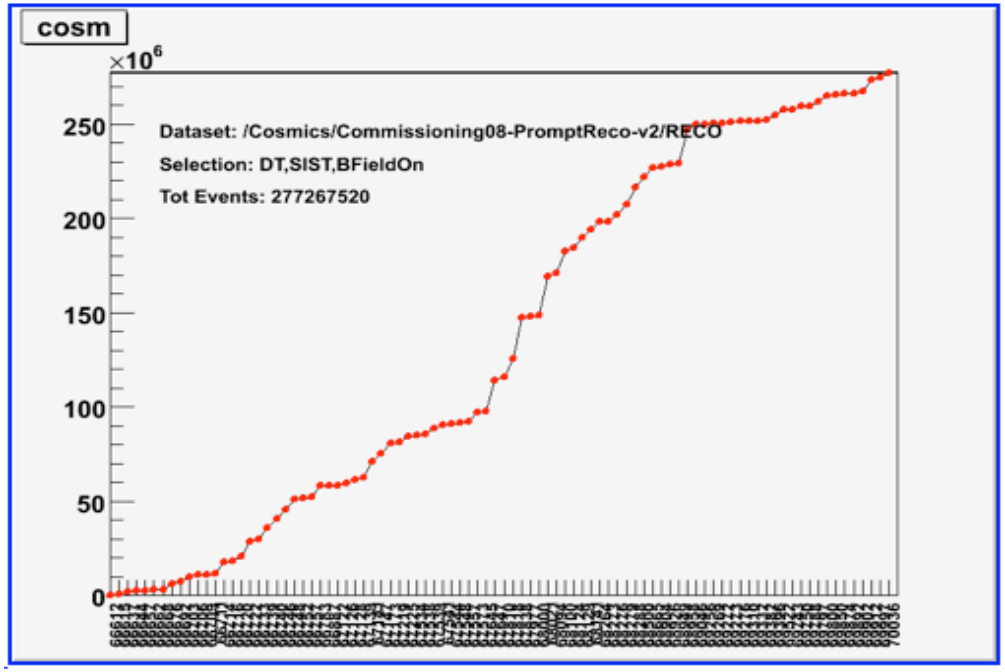
CMS - Computing: Status and Plans

Outline:

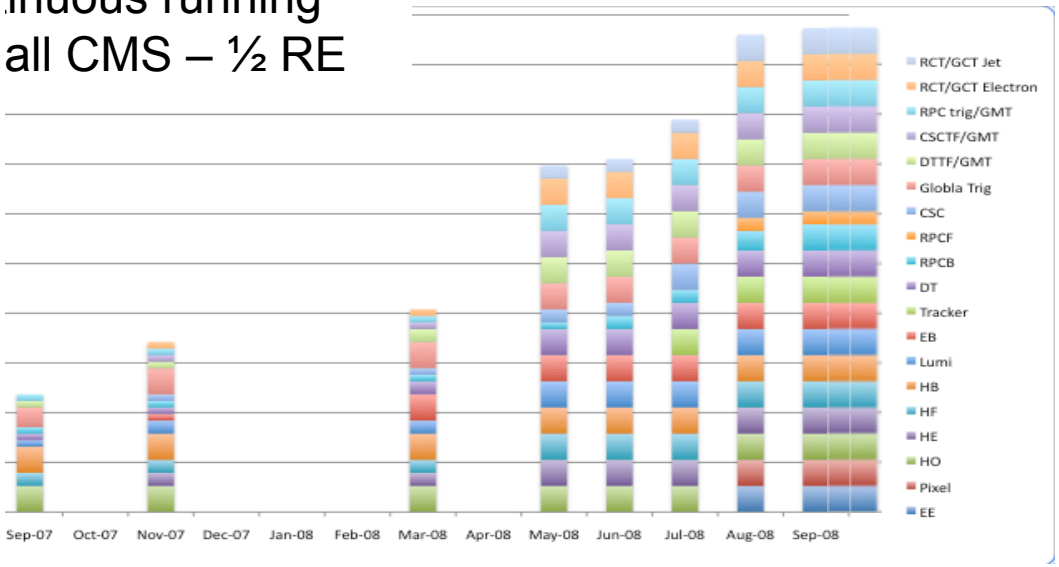
- Global Runs – Craft
- MC production
- CMSSW
- CAF, Tier-1, Tier-2
- PADA
- End-to-end analysis
- Resources for 2009

Matthias Kasemann

CMS Global Runs



inuous running
all CMS – ½ RE



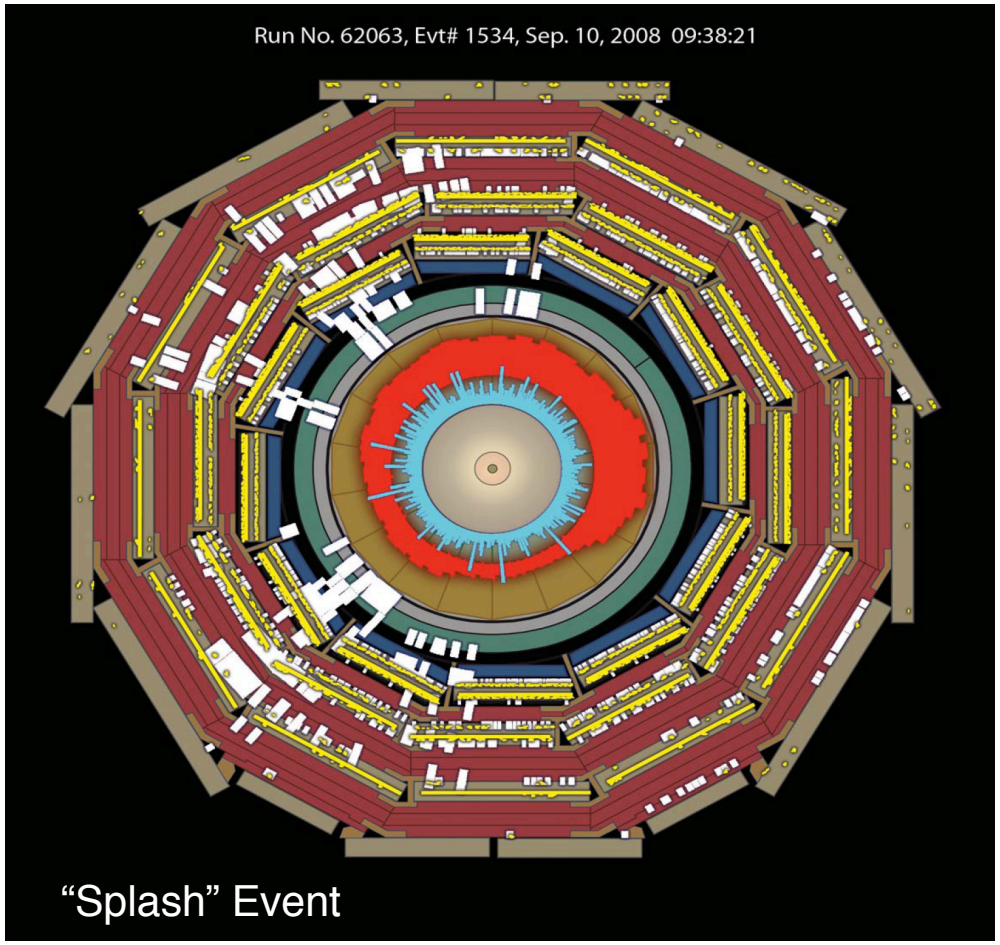
CRUZET4 (Cosmics Run at Zero Tesla)

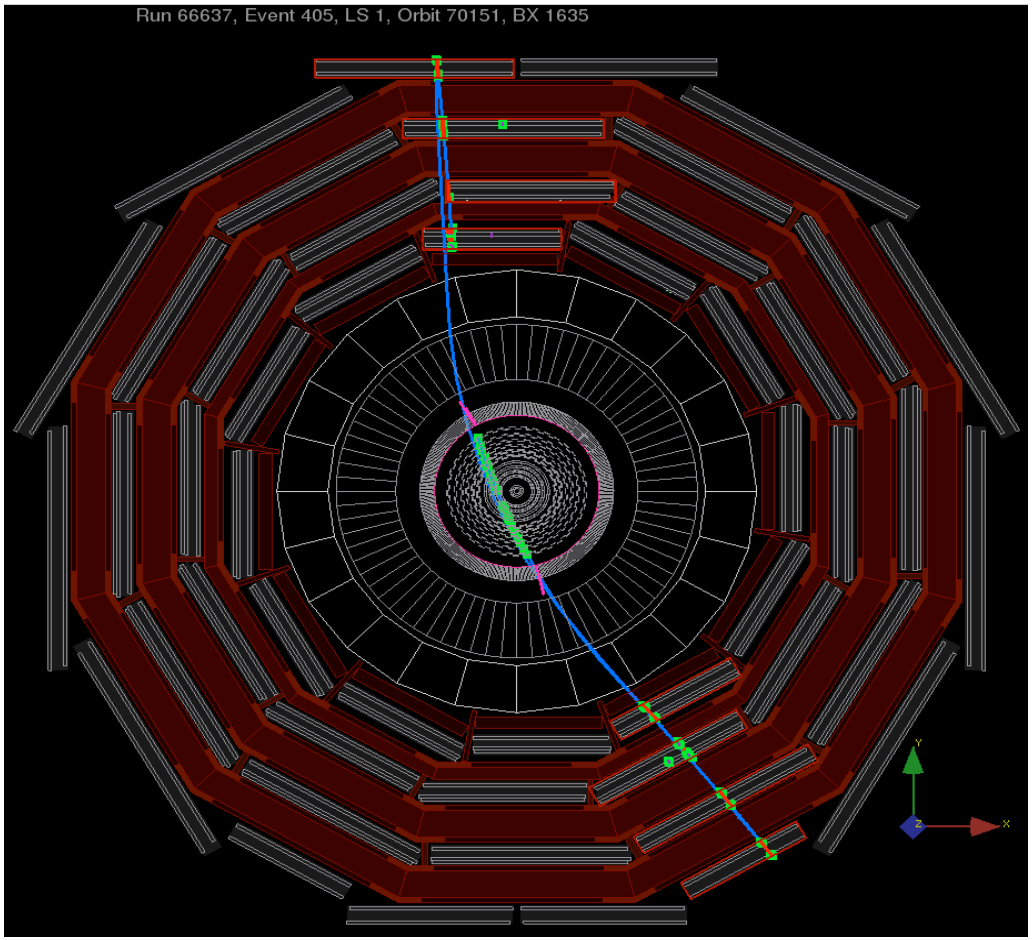
- First Global run with final CMS configuration (including newcomers EE and Pixels) accumulating data more stably. 38 M cosmic triggers logged. A total of ~ 300 million cosmic triggers recorded.

CRAFT (16 October-11 November @3.8T)

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

An Event from 1st Beam & CRAFT

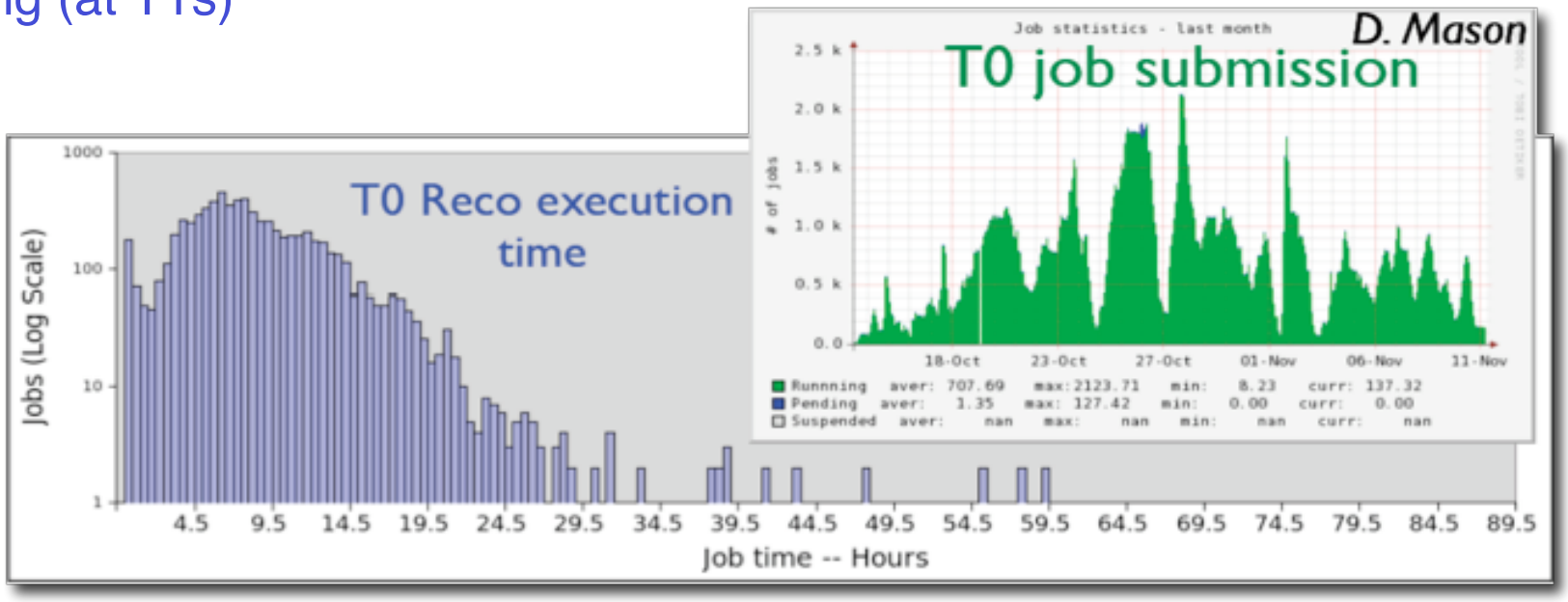




CRAFT Data Handling

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

→ ***Latency: few hours***



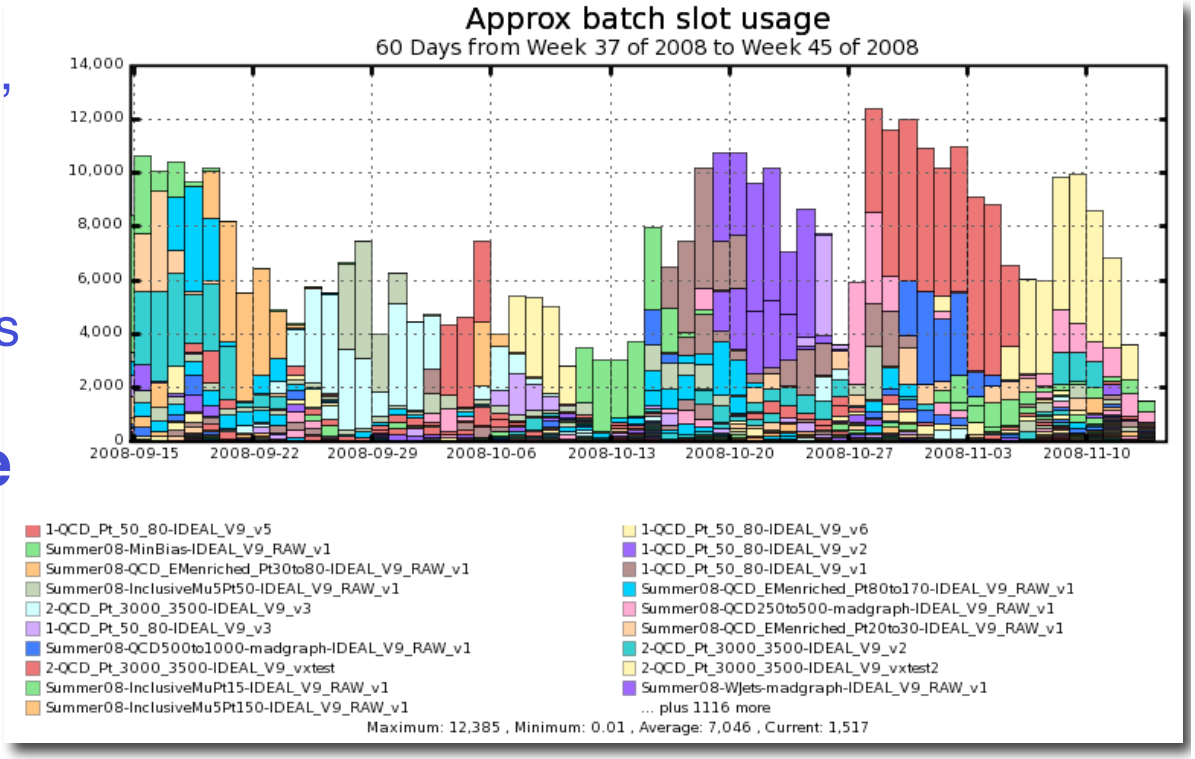
- All CRAFT data have been already transferred at Tier-1s and Tier-2s.
- Data are being analyzed at the CAF and at Tier-2 centers

CMSSW Release Plan

- **CMSSW_2_1_X - August 2008**
  - Originally geared for prompt reconstruction and analysis of 2008 data
  - Used for cosmic runs with field on (CRAFT) and summer MC production with Full Simulation (200M events)
- **CMSSW_2_2_x - November 2008**
  - Re-reconstruction of MC samples (200M) with realistic detector conditions and improved reconstruction algorithms (e.g. Particle Flow)
  - Re-reconstuction of CRAFT data (300M) using improved Conditions Data
  - Production of very large (>500M) MC production with Fast Simulation
- **CMSSW_3_0_x - (timing to be fixed)**
  - Preparation for new round of MC production
  - Preparation for new round of cosmics data-taking with magnet on

Monte Carlo Production

- **Continuous request of MC samples produced to support commissioning and studies for Primary Dataset definitions**
- **Current round of MC production** (started 15.9.)**:**
  - **DPG requests**
    - 132 M events simulated, 110 M reconstructed
  - **Physics requests**
    - 190 M events simulated, 160 M reconstructed
  - **Production is running smoothly**
    - Storage space at Tier-1s will became an issue…
- **Production will continue to run constantly**
  - **Full simulation**
  - **Fast Simulation (500M)**



CAF Resources

- **CAF disk space deployed: 1200 TB**
  - 400 TB used for CRAFT,
  - 300 TB free
- **648 job slots for all registered CAF users**
  - Job queues mostly full
    - 40% Commissioning,
    - 40% AlCa,
    - 20% physics
- **Heavy use of bandwidth but no saturation**
- **Plans:**
  - Address sharing of resources with Tier-0
  - Deploy a dedicated CRAB server for job submission

CAF usage

P. Kreuzer

Disk resource status: main issues

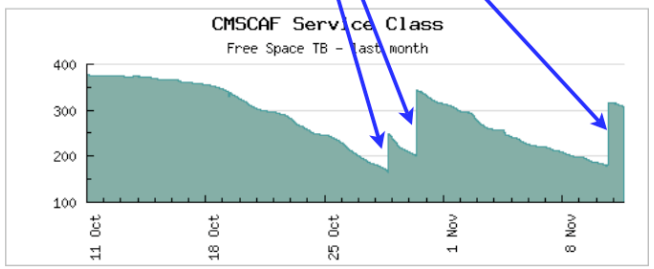
No user-ticket on rfio issues

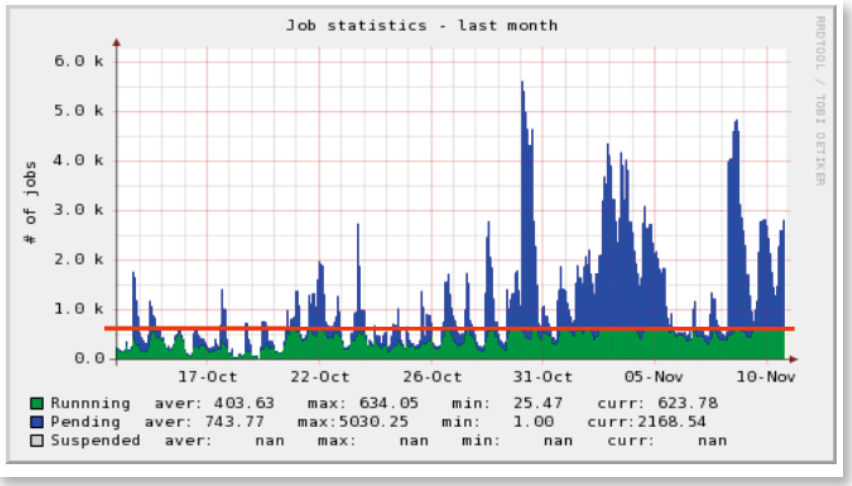
Disk space alarms : received 385TB from IT in « urgent » mode

Near future plans

Disk space deletion procedure between Computing Shift Person (CSP) and CAF Data Managers : based on new DBS tools

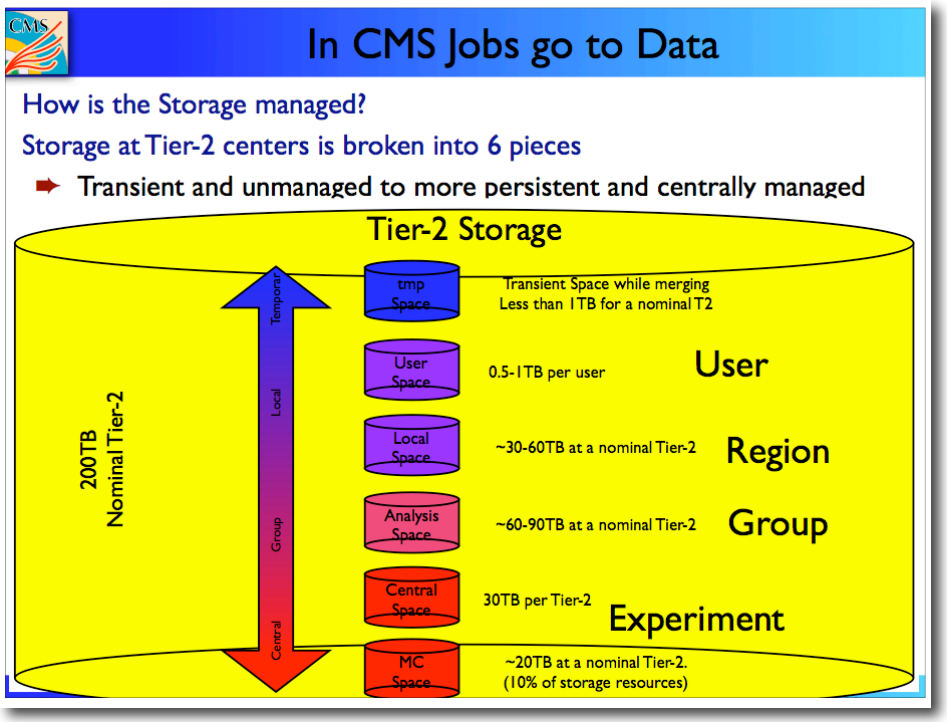
CMSCAFUSER disk (55TB) : will cover CRAB & non-CRAB analysis use-cases to read/write using 2 pools. Then close user-write to CMSCAF



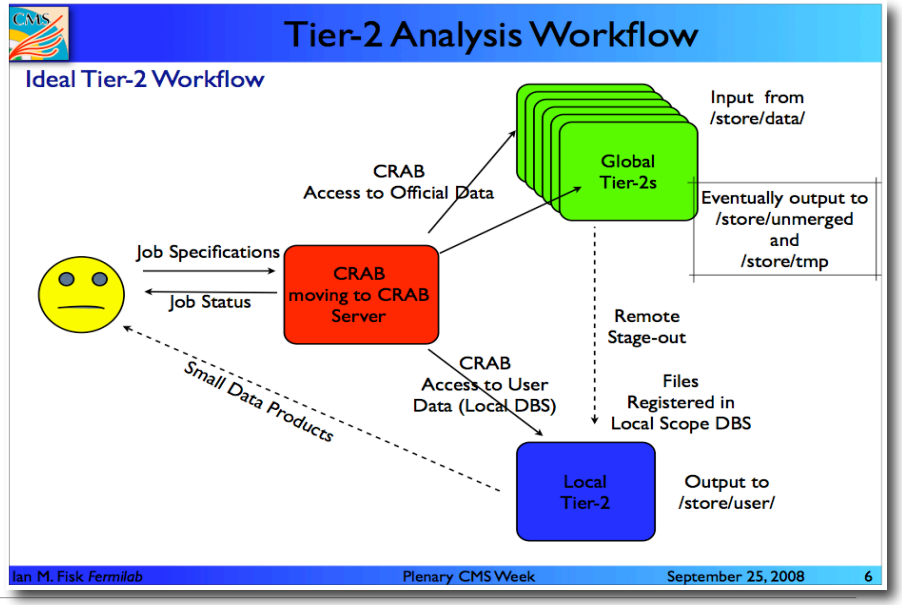


CMS Analysis at Tier-2 centers

- **We coordinate which T2 is hosting which physics analysis**
  (this was a delicate and long process to reach agreement)
- **Tier-2 disk space is divided:**



- **Tier-2 Analysis based on CMS Remote Analysis Builder ("CRAB")**
  - **Input data: mainly T2 local data**
  - **Output for group analysis: Group space**
  - **Output for individual users: assigned user space at one T2**



Tier-1 work

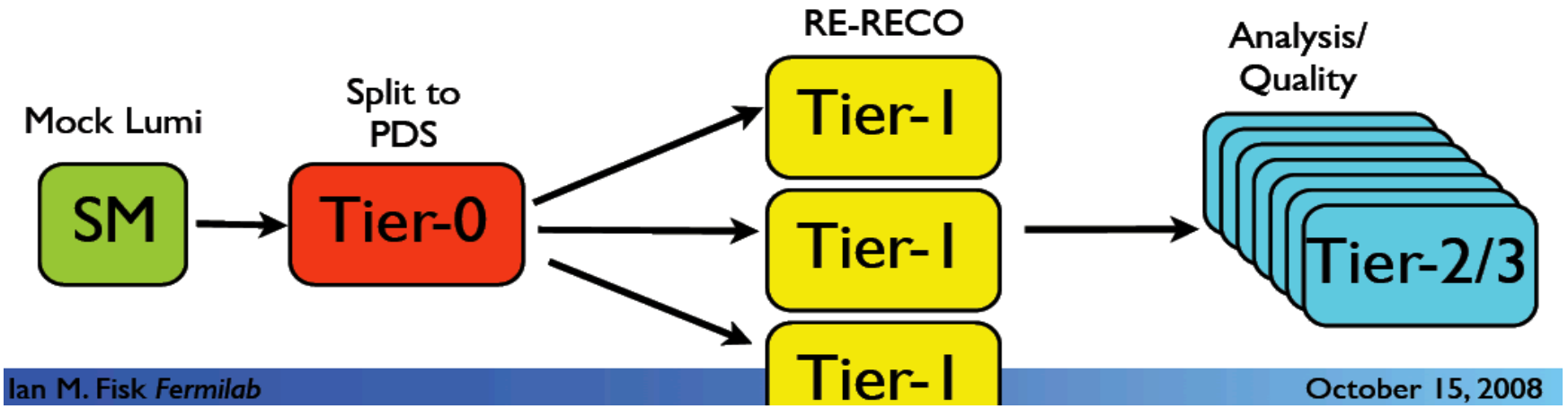
- Dedicated to production activities
  - custodial data
  - Reprocessing, Alignment/Calibration and Skimming
- Will enforce authorization to reserve Tier-1s to the production users
  - We tried but there is currently a problem with SAM tests if a CE is only opened to VOMS groups/roles instead of the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

Work of the PADA Taskforce

- **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:**
    - based on SAM, JobRobot and link status

End-to-end analysis exercise

- 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 is not a "challenge" but an "exercise"
  - 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



CMS Assumptions and Goals for 2009

- **2009 will be the startup year of data taking**
  - **use model parameters as previously defined for '08 ('07) in our original computing model, i.e.**
    - duty cycle, trigger rate, event size, number of re-reconstructions, fraction of analysis based on RECO/RAW

- **We have used the original CMS computing model to review the computing resources needs for 2009, taking into account that it will be the startup year of LHC data taking.**

- **Assuming LHC operation of 0.9×10^7 sec CMS needs the planned resources upgrades at CERN and the Tier-1 and Tier-2 centers for 2009.**

C-RSG review of CMS resources

- The C-RSG overall supported the CMS resource requests and agreed that the CMS computing model is able to cope with first data.
- The C-RSG reviewers modelled the CMS computing model in a simple spreadsheet and achieved overall god agreement.
- The report addresses some specific questions and concerns about the CMS resource requests in the area of T1, T2 storage and T0 CPU.
  - These are important observations, which lead us to carefully check our calculations.
  - As a result of these checks we can confirm that we believe that the parameters and formulas used in the CMS calculation are complete and consistent with the knowledge of the LHC schedule.

Summary

- Data collected in the CMS Global Runs is being analyzed by physicists
- New CMSSW 2.2 release soon
  - 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, …)
- Luminosity-safe analysis exercise planned