



# CMS Activities before data

Ian Fisk  
September 15, 2006



# Coarse Schedule

CMS will begin CSA06 on October 1st

- ➡ Computing Software and Analysis Challenge 2006

Challenge is schedule to end on November 13th

Monte Carlo Production will slow during the challenge itself and will increase immediately after the challenge

- ➡ Summer production was 25M events per month, challenge production is scoped for 10M.

There is another factor of two needed in scale 2007

- ➡ Spring is expected to be a combination of
  - MC Production for physics work
  - Development responding to issues encountered in CSA06
  - Scaling improvements



# CSA06 Schedule

We are about two weeks from the official start of CSA06

- ➡ It's a staged start-up
- ➡ Oct 2 we begin with reconstruction at the Tier-0 center
  - Goal is 40Hz for 20 hours per day continuous
  - Tier-0 farm is dedicated, but CASTOR, FTS, and SRM interface shared
    - 15MB/s ASGC, 25MB/s CNAF, 50MB/s FNAL, 25MB/s GridKa, 25MB/s IN2P3, 10MB/s PIC, 10MB/s RAL
    - Data rate expectations to Tier-I centers, with 20 samples we can adjust at the 5% level
- ➡ Oct 9 the Tier-0 will be calibration samples and calibration activities will begin at CERN
  - Updates to the database and distribution to Tier-I centers using Frontier
  - The calibration samples will be subscribed to some Tier-I centers for archiving
    - Back fill with Minbias to hit the 40Hz goals



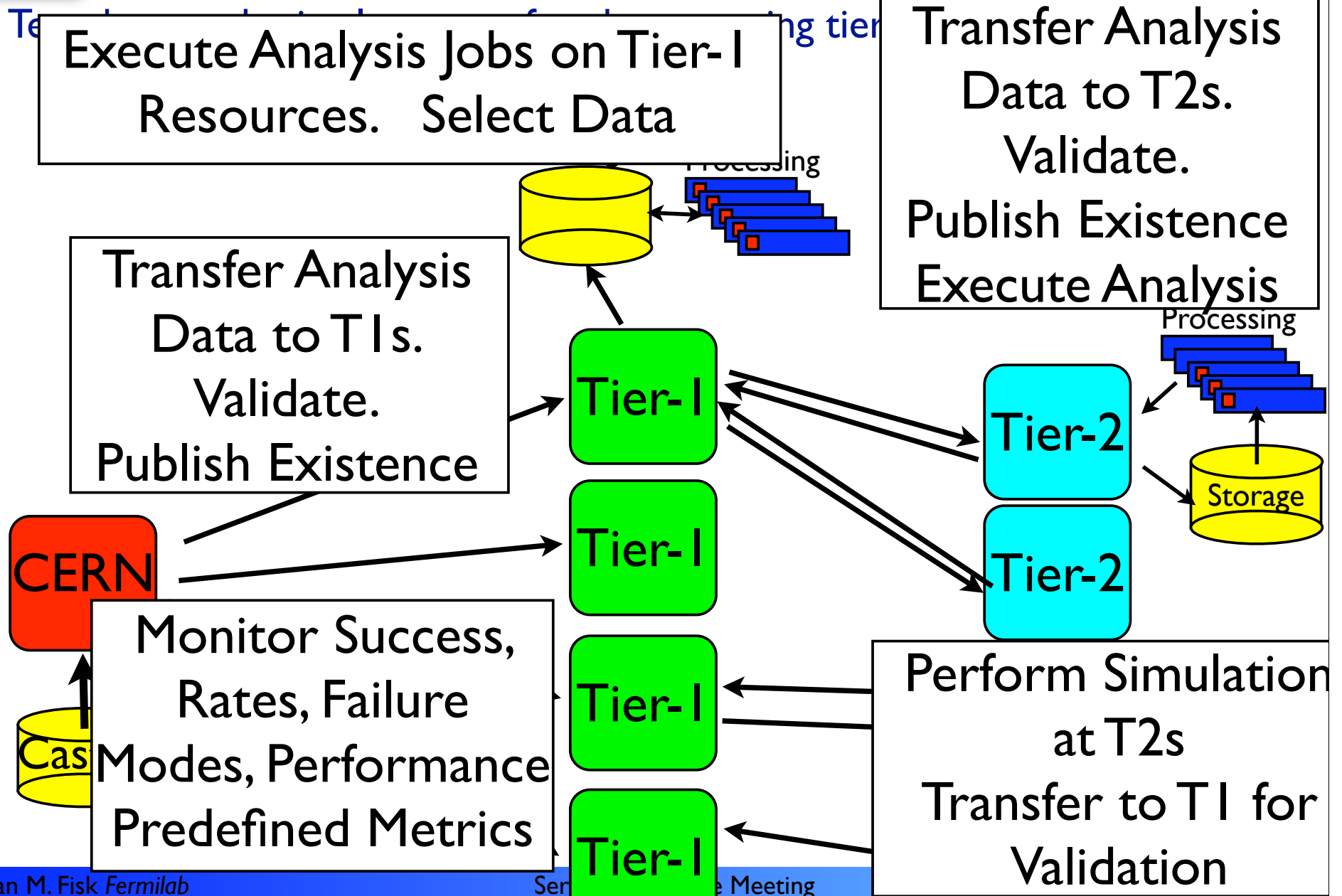
# CSA06 Schedule

Cont.

- ➡ Oct 9. Skim jobs start at Tier-1 centers
  - Skims transferred to Tier-2 centers
  - We expect skims to be submitted to Tier-1 centers through grid interfaces and use the shared grid resources
  - Results will be transferred to Tier-2 sites using FTS driven transfers managed by PhEDEx
- ➡ Oct 16
  - Tier-2 analysis jobs commence on data resident at Tier-2 centers
  - Analysis jobs submitted through grid interfaces
- ➡ November 6 the Tier-1 centers should expect to see re-reconstruction jobs submitted
  - Grid Interfaces for re-reconstruction jobs at Tier-1 (central submission)
    - Demonstration the application of new calibration constants from Frontier
- ➡ November 13 CSA06 Ends



# CSA06 Workflows





# Expectations of Computing Tiers (T0)

Tier-0 workflow is expected to reconstruct events at

- ➡ Take separated input from the pre-challenge steps
  - The large minimum bias samples will be divided, the HLT soup sample will be split into streams, other samples will be assigned to Tier-I centers as complete samples
- ➡ 40Hz
- ➡ Apply calibration constants based on a job configuration input
  - Idea is to apply miscalibration to demonstrate the success of a later re-reconstruction at Tier-I centers
- ➡ Inject the resulting events into DBS and PhEDEx
  - Tier-0 workflow ends when the samples are ready to be transferred to Tier-I centers



# Expectations of Tier-I Centers (IO)

The Tier-I centers are expected to accept the incoming data samples at the rate anticipated as 25% of the 2008 pledges

- ➡ Goal is to archive the samples for 30 days
  - The baseline is this data is intended to end up on storage on tape
    - A couple of the Tier-I sites are not in a position to store on tape during CSA06. In these cases the data will be storage to disk and should remain for the 30 day period
    - At the end of the challenge there are signal and calibration samples that will likely be maintained for analysis activities (not the half of the data which is minimum bias)

The Tier-I centers are expected to transfer datasets subscribed to Tier-2 centers

- ➡ At the beginning of the challenge we will subscribe complete minimum bias sub-samples and signal samples
- ➡ As re-reconstructed data and official skims are available they can be subscribed to sites

Outside the scope of CSA06 we will be performing roughly 10M events per month of simulation which will be archived at Tier-I centers

- ➡ Lower priority transfer activity than CSA06 transfers



# Expectations of Tier-I centers (Processing)

The Tier-I centers are expected to demonstrate the functionality of event re-reconstruction and data selection of served data

- ➔ We expect both of these activities to be performed by Prod\_Agent submitted jobs
- From the standpoint of the Tier-I centers the service requirements for these processing jobs are similar to the current job robot and simulation requirements
  - Software will be installed
  - Data needs to be accessible to local applications from mass storage
  - Grid interfaces need to function reliably
  - Prioritization should be increased on the batch resources for users who come in with the CMS production role
- Re-Reconstruction and skimming jobs will be submitted by teams of folks similar to the current production teams

We will be looking to measure job efficiency, mass storage IO, job rate

- ➔ Goal is 200MB/s out of mass storage per Tier-I, 90% job efficiency





# Expectations of Computing Tiers (T2)

Tier-2 centers are expected to receive datasets from Tier-1 centers

- ➡ In the computing model the Tier-2 disk space is intended to be frequently refreshed if need be and function as a cache of data for the processing resources at Tier-2 centers
- With a 25% scaling we would aim for between 10MB/s and 100MB/s sustained transfers
- We will rely on sites and regional representatives to make sure new subscription requests are made for Tier-2 sites
  - Process involving interaction with PhEDEx operations people

Tier-2 centers are expected to accept CRAB analysis jobs from users through the grid interfaces

- ➡ Again we will be looking for job rate, job efficiency, and rate of IO to storage



# Activities for 2007

CMS needs to be at production scale services in 2008

- ➔ Assuming we cannot easily more than double the scale each year, we should be able to demonstrate 25% of the expected 2008 scale in this year and be able to reach 50% scale early in 2007

Service	2008 Goal	2006 Goal	%
Network Transfers between T0-T1	600MB/s	150MB/s	25%
Network Transfers between T1-T2	50-500 MB/s	10-100 MB/s	20%
Job Submission to Tier-1s	50k jobs/d	12k jobs/d	25%
Job Submissions to Tier-2s	150k jobs/d	40k jobs/d	25%
MC Simulation	1.5 $10^9$ events/year	25M per month	25%



# Spring 2007

The goal next year is to achieve another factor of two in scaling

- ➡ Processing grows to peaks of 100k jobs per day
- ➡ Aggregate rate from CERN to Tier-1 tape archive should reach 300MB/s
- ➡ Rates from Tier-1 to Tier-2 centers should reach 20MB/s for least connected Tier-2s to 200MB/s for best connected tier-2s.
- ➡ IO rates from mass storage to local applications
  - 400MB/s for a nominal Tier-1 center
  - 100MB/s for a nominal Tier-2 center
- ➡ Goal is to reach above 95% for 2007 for job submission
  - Was 90% for 2006
- ➡ Simulation should reach 50M events per month
  - We hit 25M events per month during the summer of 2006



# Processing Goals

We will be exercising two dedicated gLite RBs during CSA06

- ➡ Currently we are seeing roughly 4000 jobs per day per LCG-RB with the CMS payload
- ➡ Hopeful we will see a factor of 2-3 with the gLite RB. This fairly easily gets the CSA06 submission goals
  - The next factor of two has the potential for a challenge

We are attempting to be more systematic with the scale testing

- ➡ The current robot load generators are reasonably realistic but when we begin to hit scaling issues it's not always obvious how the system is breaking down



# Transfer Goals

The Tier-0 to Tier-1 transfer goals are similar to rates we achieved this summer so they do not represent a big jump in rate

- ➡ Reliability and robustness are goals for next 12 months
  - The individual sites and CERN both appear to have issues with the effort and attention required to run the transfer service

The Tier-1 to Tier-2 are more ambitious

- ➡ The rate bursts to higher values
- ➡ There are more permutations of sites
- ➡ Smaller support teams and more diversity in network connections

I expect CSA06 to be a good indicator of the readiness of the T1 to T2 transfers

- ➡ There is going to be a work in the next 12 months



# The vague future

CMS has a big challenge coming up

- ➡ There is a fairly detailed schedule between now and the end of the year

Past experiment indicates the challenge will expose a number of issues and spawn specific activities

- ➡ While we roughly know the expected scale in 2008, it is difficult to indicate exactly where we will be concentrating effort before the challenge

CMS is in the process of reorganizing the management structure for the computing, software, and physics groups

- ➡ New names, new structures