

# Some Concluding Remarks

CMS Upgrade Workshop

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# Thanks!

- For attending and participating
- CMS is obviously giving highest priority to the startup
- It was the willingness of people in the late 80's and throughout the '90s to divert a little energy from the great endeavors of the moment – of which there were many – to think about a distant enterprise on a machine that seemed far off that led us to the place we are today – on the threshold of an exciting adventure

# Progress

- Has been very impressive
  - Many plans, ideas from just a year ago now have
    - R&D plans
      - And even results
    - Designs
    - Prototypes
    - In a few case, candidate solutions
    - Some instructive failures
  - New joint working groups
    - Real progress in understanding how to use tracking with other trigger information
    - Beginning of the study of the calorimetry in the forward direction
      - New crystals
      - Other approaches

# New Emphasis

- On radiation studies and simulation
- Beam backgrounds
- Computing – looking forward to progress
  - Supporting and improving Simulation
    - High pileup
  - Computing R&D
    - efficiency for HLT and reconstruction

# Balance

- CMS needs to establish a balanced approach to the tasks ahead of
  - To operate the experiment and to do the physics
  - To prepare for the next steps
- The Upgrade community needs to accept that progress may be slow because of competition for resources

# Learn from the early experience

- Really learn as much as possible from the LHC running
  - What do typical events look like?
    - How to extrapolate to 7 TeVx7 TeV from 3.5x3.5 and 5x5
  - Begin to understand and to test our ability to simulate various backgrounds and hard to calculate effects
  - Learn as much as possible about the detector performance and the trigger
  - Really track the performance of each detector as a function of radiation exposure
  - Of course, our developing understanding of the physics will help us define the schedule and also justify the upgrade project itself

# Expect uncertainty

- Surely in schedule for the machine and experiments
- The basic machine behavior
  - Luminosity leveling being an example

# Keep an Open Mind

- Try to avoid allowing false “schedule optimism” to drive unnecessarily premature choices
  - That has been a tendency in nearly every subgroup
- Once something is working, we should not necessarily abandon R&D if there are real opportunities for better physics
  - Luminosity upgrades are hard to justify. Getting significant factors in efficiency with the upgraded detector can help the case

# Pace of the Project

- Proceed with all deliberate speed – be patient
- The schedule is not what was anticipated a year ago and that needs to be included in all our plans
- This upgrade is shaping up to be very challenging. We have to maintain a healthy respect for this challenge.

# Conveners' Assignment

- Work plans for next 6 months