

CMS Tracker Upgrade programme

Tracker web pages

<http://cmsdoc.cern.ch/Tracker/Tracker2005/TKSLHC/index.html>

Tracker Upgrade Wiki pages

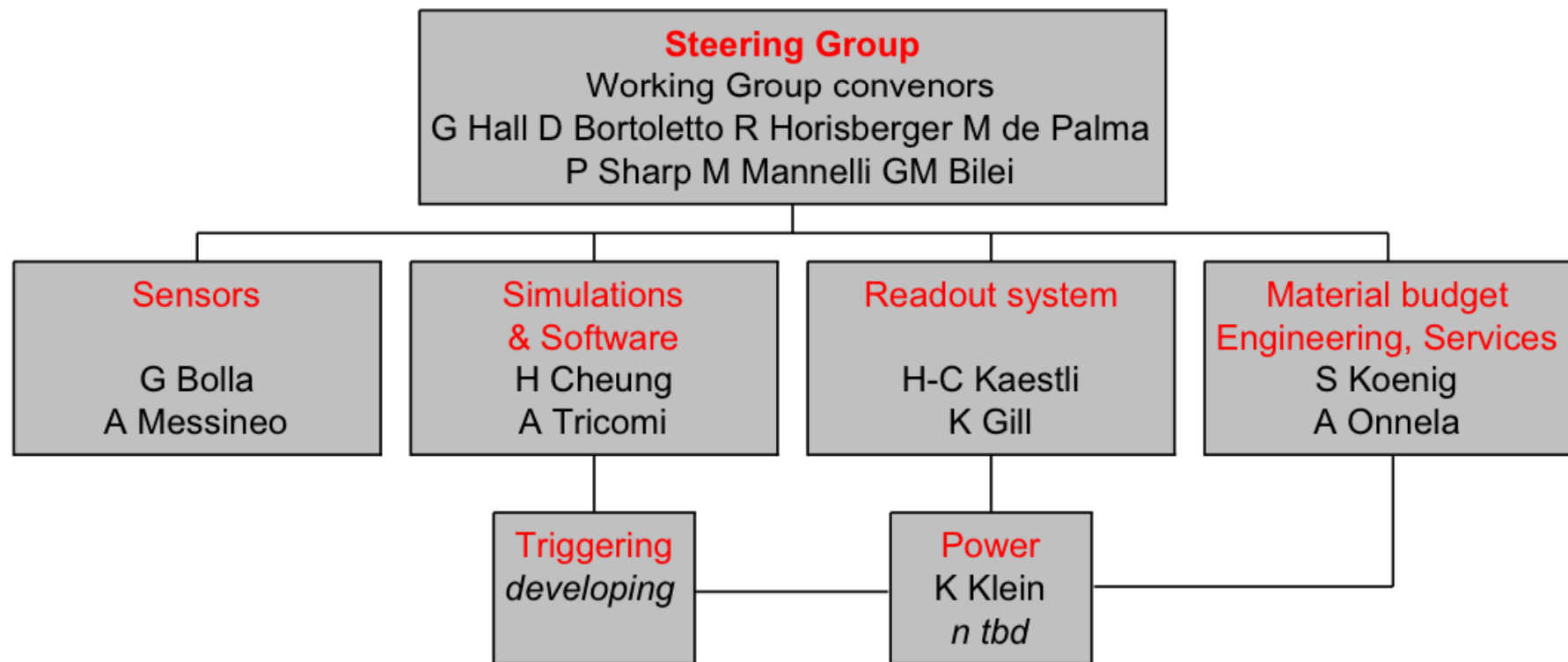
<https://twiki.cern.ch/twiki/bin/view/CMS/SLHCTrackerWikiHome>

Planning an Upgrade Project

- The SLHC planning assumption (**already out of date**)
 - Phase I to 2×10^{34} around 2013
 - Phase II to 10^{35} incrementally from ~2017
- Developing and building a new Tracker requires ~10 years
 - 5 years R&D
 - 2 years Qualification
 - 3 years Construction
 - 6 months Installation and Ready for Commissioning
- NB – even this is aggressive
 - System design and attention to QA are important considerations from a very early stage
 - Cost was a driver for LHC detectors from day one

Working Group organisation

- CMS Tracker R&D structure
 - active for 12-18 months



new power group met in May tracker week for first time

Tracker Upgrade Project

- We have an excellent Tracker and we should plan its improvement carefully
 - emphasis on R&D aiming to make progress on fundamental problems
- The largest challenges are
 - simulation of performance
 - understand what is required and how to build it, within a budget
 - power delivery and distribution
 - provision of triggering data
- but there are major questions everywhere
 - sensors, readout, data & control links, cooling, mechanics...
- We are now reaching the point where a **Project** should be defined

Possible scenario

- The first upgrade will involve the pixel system
 - simply because the inner layer must be replaced as it degrades
- The wise design for easy replacement simplifies our task
 - we can replace when we are ready to do so
 - and evolve it gracefully into the Phase II system
- How to upgrade:
 - design pixel system with 4 barrel layers and expanded endcap
 - in first step install what we believe is needed, at the right time
 - maximise benefits to CMS, including smooth transition
 - study PT (doublet) layers to contribute to trigger
 - design outer tracker to match cost, power and performance needs
- There are opportunities for innovations which will be beneficial in the shorter and longer term

Conclusions

- CMS is trying systematically to develop a new Tracker design
 - using simulations to define new layout
 - aim to reduce the material budget and achieve similar performance
- We are beginning to see real progress with the R&D
 - although there is a still a long way to go
- There are many significant challenges
 - new technologies to master
 - innovations in the components and systems
- It also needs a large, strong team
 - how can the entire Tracker community contribute best to the Upgrade programme, share the load, and ensure success?