Strategy proposal

- getting ready to problems
- different kinds of scenarios
- consequences on software
- examples

WARNING !

- This proposal is not a revolution
- It just adds more work (in case we were facing severe underemployment…)
- It is just a draft version : all ideas are obviously welcome/needed !

Getting ready to problems

- We have now an almost complete analysis (from trigger to IRFs and cuts)
- This analysis is heavily based on our «ideal» simulation
- Obvious bias from the last beam tests :
  - Problems, data/MC discrepancies were seen rather quickly
  - But solving them takes a long long time…
- Proposition : prepare ourselves to all problems we may encounter in orbit, in order to :
  - Know how much our analysis is robust
  - Be able to react quickly during operation in orbit
- Obviously related to Science Ops : avoid massive overlap

Different kind of scenarios

- Failure modes
  - List the various kinds of failure modes
  - For each important one :
    - Try to modify the algorithms to take into account the problem
    - See how well the Classification Tree analysis handles the problem
    - Assess the consequence at the IRFs and rejection level
- Systematics errors
  - List the source of known/potential systematics
  - For each one, derive its contribution to IRFs, rejection
  - Make sure that the error on IRFs is used by the science tools
- Others :
  - The background level is in fact 2 times larger…

Software consequences/requirements

- Failure modes
  - How the algorithms can have access to the list of dead channels, etc…
  - How can we efficiently/quickly simulate failure modes :
    - Failure mode implementation
    - xml file ? job options ?
    - Keeping MC files and reprocess them with failure modes ON
  - New merit variables (for the CTs). For instance :
    - Distance of the closest dead crystal to the shower axis
    - Number of dead strips in a defined volume around the track
- Systematics
  - At the digi level as in failure modes : signal -> f x signal
    - f is in [0.9,1.1] : it's systematics
    - f = 0 or infinity : it's failure mode
  - When the events are classified (in/before the package classifier)
    - Modify/smear the variables just before the classification is performed
- Others
  - Increasing the level of background is easy and has already been done…

Examples

- One ACD tile doesn't work
  - Classification : 5 different classes of single tile ACD failures have been identified (at least at the triger level) (Science operations meeting – March 9, 2007 – Bari group)
  - Modify existing variables/build new variables to be used by the CT
    - Do the tracks pass through the dead tile ?
    - Number of hits in tracker volume around the dead tile
  - Look at the CT results and assess the impact on effective area
- Dead strips in the tracker
  - Classification of failures
  - How can we modify/adapt the track reconstruction to take into account dead strips (maybe already done ?)
  - New variables : count the number of dead strips around the tracks
  - Look at the direction CT results and assess the impact on PSF
  - Look at the impact on background rejection !
    - The distance between the first hit and the ACD, etc…

Examples

- Dead crystals in the calorimeter : energy
  - Classification of failures (one side or two sides, etc…)
  - Modify the energy reconstruction algorithms :
    - EvtEnergyCorr : energy <-> centroid position. The reconstruction of the centroid position has to take into account the dead crystals.
    - CalLkHdEnergy : only based on simulation -> resimulate. Is is not sure how this algorithm can easy takes into account dead crystals
    - CalCfpEnergy : this algorithm should take into account dead crystals «easily» since it performs the calculation of the energy in each layer (one has just to calculate the energy in the dead crystal and substract it)
  - New variables : distance of the closest dead crystal to the shower, fraction of the predicted deposited energy in the crystal over the total energy of the cluster, etc…
  - Look at the energy CT results and assess the impact on energy resolution
- Dead crystals in the calorimeter : position
  - The calorimeter position information is used in the direction reconstruction and in the background rejection and in the energy reconstruction
  - Classification of failures
  - How can we modify the moments analysis ?
  - New variables (maybe the same ones as in the energy case)
  - Look at the CTs results

Systematic errors

- Classification
- Two sets of detector related systematics (depending on how they can be simulated)
  - Those which have to be implemented on the digi level
    - Pro : accurately simulated
    - Con : need complete reprocessing
  - Those which can be modeled and implemented during the classification stage
    - Pro : maybe not so accurate
    - Con : we just have to reclassify the events
- How can we define the error on the IRFs
  - Depends on how it looks like
  - Depends on how the science tools want to use it

Conclusion

- All these analyses will need time
- But it's worth/compulsory to prepare ourselves to all kinds of problems
- Everyone is a potential volunteer
- Algorithms authors should think of the feasible modifications
- Work with ISOC Science operations
- Assess quickly the possibility of keeping MC and digi files of the next massive simulations