Monitoring and Trends

An Introduction

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- *M &TA Mission Statement:*
  - *Monitor and study all S/C systems in order to maximize the science return from AXAF.*
- *There are three main components to this:*
  - *Software*
    - *Standalone*
    - *Archival*
    - *Real time*
  - *Sci-Ops*
  - *User Support*

- *Based on the results of warnings and alarms Sci-Ops expects to effect S/C commanding and operations.*
- *ACIS must be commanded when to send Housekeeping data.*
- *We may suggest certain observations:*
  - *Defocus image of Sco X-1 to measure epoxy shrinkage*
  - *repeated images of an open cluster to determine wide field PRF & aspect repeatability.*

- *Contingency planning*
  - *Inform mission planning that certain observations may be temporarily ill-advised.*
  - *Failure of a component requires backup electronics to be activated*
  - *Radiation event shuts down HRC.*
  - *Determine whether data are valid (good time).*
- *User support use of the M&TA databases*
  - *Some GOs will find the detailed status of the S/C during their observations of interest.*

- *M&TA covers 8 separate S/C components:*
  - *ACIS, HRC, SIM, HRMA, PCAD, Gratings, Subsystems and Alignments*
  - *Example monitoring tasks:*
    - *Monitor HRC Voltages (which side is on, is enough power getting through?) L0*
    - *Monitor the SIM power usage (is it what is expected given the SI configuration) L0*
    - *Monitor photon dosage on the HRC MCPs. L1*

the PRFs) L1.5

- *Locate zero order centroid of each grating image. L2*
- *Monitor the pointing accuracy. (L0, L1) Were we pointing accurately at first glance? After full aspect solution?*

- *Example trending tasks:*
  - *How does the current draw from the batteries change as a function of time during eclipse?*
  - *How do the tilts in the SIs depend on temperature gradients?*
  - *How do grating motions effect S/C stability?*

➔ Standalone

- *Initially, the primary product is standalone software to be self contained and run autonomously.*
  - *monitoring processes run whenever data comes out of a pipe: L0, L1, L2*
  - *Trending tasks are executed on time intervals TBD on data in the M&TA DB.*

- *ACIS, HRC and PCAD have engineering type data which is important in real time, but invisible to the OCC.*
  - *OCC/HOSC can only see data which is in fixed format.*
  - *ACIS Housekeeping and certain PCAD status words are not in fixed format.*
    - *To support these M&TA must read the output of the L0 pipes ASAP.*
    - *We must be able to support these functions by L+4 days.*

- *We are in the process of predefining search correlations so that monitored values can be quickly extracted and plotted as a function of S/C condition.*

- *It will be common that the standalone objects will indicate the existence of a problem, but not the source. Thus further analysis of archival M&TA data will be needed.*

- *All data output to the status database.*
- *General: usual output should be a daily report indicating the tool ran.*
  - *Red & yellow limits noted. Predetermined plots included.*
- *Interactive: The interactive perusal tool will be capable of plotting any three data sets against each other. If the required correlation is predefined.*

- *Non-interactive: All tools will have non interactive modes which will allow them to run on any random data set. This is for both reprocessing and anomaly investigation.*
- *Real time: All real time tools need to be able to plot data directly to the screen and create strip chart or image plots.*

- *M&TA is not an activity of a single group within ASCDS.*
  - *Jerry Cardillo is the lead programmer*
  - *We need the telemetry group to be able to decom the data and tell us how it will be formatted .*
  - *We need support from infrastructure WRT the data visualizer and general software design.*

supply requirements, build the predefined correlation tool. We need input from many DB including CAL DBs and the OCAT and ODB.

- *We need support from tools group so that we know what software is available and how to incorporate it (e.g. the time splicer & the fitting engine).*
- *We need the pipelines group to create the level 1 and level 2 products and formats so that we can extract the data we need.*

- *We set as the first priority running simple HRC threads*
  - *Temperature, electronics status, veto rates, shutter position*
  - *All can be determined from L0 output.*
  - *Read data from L0 fits files.*
  - *We can process 150 minutes worth of telemetry in 18 Seconds!*
  - *Output data to fits files. DB specs have been provided - DB is under development.*

- *We need to demonstrate functionality.*
- *Take L0 output. Limit check, Output to database, extract from database.*

② *Sept. 1997 beginning of the dry run.*

- *This is a total of 39.*
- *This must be fully operational for the test in Nov./Oct.*
- *We expect two months to debug.*
- *All systems monitoring tools for HRC, PCAD, SIM & ACIS.*

③ *Feb. 1998 End to End 2. All tasks are deliverable.*

- *This is a total of about 90 additional tasks.*
- *These need to be thoroughly tested with the OP-SIM over the summer.*