LGS WFS Mini-Review

- ☐ Requirements
  - ☐ Get Mitch to talk w/ Clare before finalizing v2.0 of the WFE Error budget tool
  - ☐ When referred to WBS 1.48, replace with an answer
  - ☐ Don takes an action to revise the sodium dichroic reflectance to 589 - 594 nm
- ☐ Optical Design
  - ☐ We agree that LGS WFS team will look initially at a double window for the AO cold box
  - ☐ p parameter section in KAON needs to have better documentation
  - ☐ Peter - p = 1 for the patrolling asterism seems like overkill
    - ☐ Rich - we've done one calculation of the anisoplanatic motion at 60" assuming the LO DM is correcting on-axis; this drives p = 1, but let us look more closely at the linearity and dynamic range requirements
  - ☐ discussion of matched filtering, linearity, or dynamic range that all effect the choice of the p parameter a topic for a face-to-face meeting to be scheduled
  - ☐ looking for commonality for optics, stages, etc., in addition to cameras would be a good thing
  - ☐ Stalcup points out that the 'delta sag' calculation in slide 11 assumes the patrolling sensor is at the edge of the FoR - the 'full full' sag should look at max sag change in any configuration of the sensor (not only at the FoR edge)
  - ☐ Don - we also need an analysis of the vibration (VNV - this is a tolerancing issue to be done)
- ☐ Mechanical
  - ☐ Probe arm width - there is no requirement, but perhaps there should be; the LGSF projector should also have some kind of similar requirement
  - ☐ Stalcup - a plot of the accessible region of the field is needed for the PDR
    - ☐ Perhaps chosing a few example fields and how the arms will access it
      - ☐ e.g. slide 16 of Alex's talk - probe at 180 doesn't work due to vignetting of the Fixed asterism
      - ☐ e.g. slide 17 view shows one of the patrolling arms vignetting a fixed asterism arm
    - ☐ Sean - maybe consider a few diabolic cases
  - ☐ Design accuracy on slide 15 is so 'theoretical' it may not be relevant; it's never like this for real, so this is misleading - Stalcup
  - ☐ Peter - why not use a pyramid mirror instead of probe arms? In fact a pyramid and the fixed asterism collimators could be on a common plate downstream of the focal plane
  - ☐ We need eye-bolts for lifting
  - ☐ We need a way of pushing the 250kg structure around in order to align it the cold box
  - ☐ We need earthquake restraints
  - ☐ We need access to the large focus slide for maintenance
  - ☐ Errors in focus tracking of the WFS could on short time scales corrupt correction (in the time we're awaiting a TWFS update). The entire issue of focus control deserves a separate KAON
- ☐ Risks
  - ☐ There is really limited space volume available; we need to know the limits
- ☐ Debriefing Highlights (to be updated within about 5 days)
  - ☐ Reasonable approach to the sensor
  - ☐ Low aberrations
  - ☐ Mechanical design - team has learned from previous lessons with multi-star sensors
    - ☐ Liked idea of basically using a rail and a pivot
    - ☐ Keep looking to make it shorter
  - ☐ Requirements were difficult to find; all design teams are struggling with this...
  - ☐ Action items
    - ☐ Needs to be a one-day interface meeting for LGS WFS, RTC, and maybe SysE
      - ☐ Nail down the spot size calculations; understood and establish requirements
      - ☐ Establish specs for Point and Shoot control loops
    - ☐ Dynamical range of each WFS not well documented or understood
      - ☐ Don to provide new #'s whether or not the LO DM is correcting for low-altitude turbulence, or on-axis only
    - ☐ Calibration
      - ☐ Unclear if there is too much aberration left in the patrolling WFS, so that we'll require an optical solution - need a better bookkeeping of all the off-crosshair error terms
    - ☐ Patrolling WFS error budget for entire control loop
    - ☐ Commonality
      - ☐ Design team should make a choice and document it; feeds into spares strategy
    - ☐ Tolerancing
      - ☐ Design team should understand the sensitivity of the position of every element degree of freedom to e.g. pupil registration
      - ☐ Thermal drift if we're temp uncontrolled needs to be worried about
      - ☐ Nasmyth deck interface has it's own thermal tolerancing issue
      - ☐ Registration and distortion of the pupil over the field for each sensor needs to be looked at; calculate the sensitivity matrix between misalignment of the optic and the pupil registration needs to be developed
    - ☐ Animation
      - ☐ For PDR, need a clear animation
    - ☐ Try to get rid of 'xtra' fixed asterism (the 'blue' TTM) via optical work on the cold box double window
    - ☐ Mechanical housing
      - ☐ Needs handling, earthquake, and mounting support
    - ☐ Needs better estimate of the OSM positioning precision (not based on manufacture's 'design spec' data)
      - ☐ Also need tolerancing for the OSM degrees of freedom
    - ☐ Need focus tracking analysis needed; what is the update rate, with what accuracy, to control the focus stage (Peter volunteers to take a first pass at this; will probe old KAON's)
  - ☐ Add the Zemax prescription data as an Appendix to KAON 642