



Level 2 Requirements Discussion

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Introduction



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- Level 2 requirements encompass all aspects of mission
 - Focus in coming year is to define requirements that may have challenging implications for the hardware design.
 - Can begin work on Level-2 requirements in parallel with refining Level-1.
 - We will pursue this with two complementary approaches:
 - Top-down and bottoms-up



Top Down



- Draft WFI observation requirements document circulated Dec 3, 2013
- Capture, at the highest level, the characteristics of the data returned by the mission that are needed to perform the scientific investigations, *not* how those characteristics are to be achieved.
 - Data quality requirements – photometric (absolute & relative) accuracy, redshift accuracy, PSF knowledge, etc.
 - Each item will flow down into a detailed error budget, and each entry in the error budget will flow down into engineering requirements.
 - Data Products
 - Flows into ground system design, and can help bring to mind implicit assumptions on calibration and observing procedures.
 - Operations Concept
 - Explicit requirements for microlensing and SNIa (observation cadence, targeted IFU pointings...)
 - Implicit requirements may emerge e.g. derived from calibration approach



Top Down - 2



- Draft document will be updated as inputs arrive.
- Will serve as repository for supporting information and for documenting trades
 - For example, operations concept may depend on detector systematics that are not yet known.
 - When a requirement is well-understood, indicate that.
 - When a requirement is tentative and needs more analysis, indicate that too.
- Treat very much like a wiki in near term
- Long term: this will be incorporated into the formal Level-2 requirements document for the mission.
 - If all goes well, ***What is in here is what you will get!***



Critical Near-Term Analyses (Bottoms Up)



- There are some specific subsets of hardware performance for which we hope to set requirements in the coming year.
- These correspond to particular entries in error budgets, so there may be room for adjusting allocations within the error budgets later, but the sooner we can set realistic requirements, the better.
- Examples:
 - Correlated noise in the detector readout
 - Persistent images
 - PSF quality/stability vs knowledge trade
 - Adequacy of monitoring PSF from stellar images in each field
 - Allowed range of dispersion for SN and GRS prisms
 - Absolute and relative pointing accuracy
 - Impact of distortion on stacking GRS spectral images



Critical Near-Term Analyses (Bottoms Up)



- Setting requirements on these performance parameters will generally require high-fidelity simulations.
- We can do some of this internally, but we'd like help from the SDT. Examples:
 - Run WFIRST-specific variants of GREAT03 test cases
 - Generate representative IFU spectral images and extract SN spectra with realistic optical and detector characteristics
 - Generate realistic series of bulge images and extract light curves
 - Simulate GRS grism exposures with anticipated observing sequences, then extract and combine the spectra.

The WFI observing requirements will be incorporated into the Mission Level-2 document & included in Feb 2015 report; draft to be included in April 2014 interim report.