LIGO-M020382-A-M

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Date: Tue, 24 Sep 2002 08:50:13 -0700
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Subject: Detector subsystem (re)design review process
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During the initial design phases for the detector subsystems, we adhered to a formal design review structure (per M950090-A). Recent re-designs, motivated by commissioning results, whether for electronics, optics, or mechanical design, on large or small scales, have had a much more informal and ad hoc review. While this has been expedient for short term gain, it introduces long-term risk and sometimes wasted effort.

It is our firm intent to apply more design review than has occurred recently in support of the commissioning. This will (unfortunately) slow down revisions and incremental improvements. We need more review of the change requests to ensure that we are doing what is sensible, and more review of the implementation to ensure that the designs will meet requirements. We also need to improve the documentation of current and future designs.

Starting immediately:

1) Each (re)design effort must have a cognizant scientist and a cognizant engineer. (See the list below.)

2) Each (re)design effort must have an account number and budget for the design phase and for the production phase. Authorization and a budget is given by Dennis Coyne in coordination with the commissioning team, observatory heads, cognizant engineer, appropriate account managers and (if required) the Change Control Board (CCB).

3) The engineer and scientist together must issue (and file into the electronic DCC) a requirements statement (or revise or re-affirm an existing requirements statement) and a block diagram for the system-level (if appropriate) and detail- or circuit-level implementation. If the system-level block diagram associated with a new board design is missing or obsolete, then it must be created or revised (no "grand-fathering").

4) The board-level (and if appropriate system-level) requirements statement and the block diagram are to be made available for review by a standing Revision Technical Review Board (RTRB) as well as peer review by the science and engineering groups at all LIGO Lab sites for a minimum of 1 week for comments.

The technical review board *must* review the proposed requirements and design and reply to the cognizant engineer and scientist; The review board may delegate this review to others as it sees fit. It is the joint responsibility of the review board and the cognizant scientist and engineer to conduct a review to the depth that they feel is warranted. In order to maintain pressing schedules these reviews must be timely and responsive to the design team.

5) As soon as implementation documentation is available, it too must be made available for review by the review board as well as LIGO Lab peer review. This documentation shall include in the case of electronics changes schematics, board layouts, shielding & grounding plan and cabling & connector choices; analogous information for optics or mechanics changes are required (e.g. optical layout, component and assembly drawings, fabrication specifications, etc.). This information should be shared and discussed between the design team and the review board as soon as possible of course so that timely feedback does not require revised design work. All of this documentation shall be available for a minimum of 1 week for comments, prior to committing to production fabrication. Note that for pressing schedules, the requirements review period and the implementation review period may overlap with concurrence from the RTRB chairman. It is highly encouraged, and the RTRB may require, that an accompanying "theory of operations" document (both at the systems-level and the board-level) be provided as well as any analysis/test reports.

6) On a case-by-case basis, the cognizant engineer or scientist or the technical review board may call for a more in-depth or formal review depending upon other factors such as complexity, difficulty, development risk, costs, etc. For example, the effort to mitigate RFI by infrastructure changes (listed below) or a choice of pre-isolator design will require a more formal and extensive review (per M950090-A) than the minimal review process outlined above.

7) The current standing Detector Revision Technical Review Board, appointed by Gary Sanders, is intended to include system designers and observatory staff as "customers" for the detector . Obviously members who are involved in a design effort are recused from its review.

Dennis Coyne
Peter Fritschel (co-chairman)
David Shoemaker
Daniel Sigg
Rai Weiss
Mike Zucker (co-chairman)

for Software issues:
    Dave Barker
    Ashfaq Khan

for Electronics issues:
Richard McCarthy
Paul Schwinberg
Rusyl Wooley

for Lasers & Optics issues:
Bill Kells
Rick Savage
Peter King

for Mechanical issues:
Phil Willems
Doug Cook
Jonathan Kern

Members or their supervisors may delegate the review to others with appropriate expertise within their groups.

8) Current list of new design efforts for initial LIGO (listed in M020135):

Current Design Effort	CogE	CogS	Design Accnt	Prod Account
ISS (Intensity Stab. Servo)	R. Abbott	M. Zucker	construction	construction
FSS (Frequency Stab. Servo)	P. Schwinberg?	M. Zucker	lho ops, mit ops	TBD
MC (Mode Cleaner Servo)	R. Abbott	P. Fritschel	TEC-1.3	TBD
CM (Common Mode Servo)	R. Abbott	P. Fritschel	TEC-1.3	TBD
Timing Module (Altera FPGA)	J. Heefner/R. Bork	D. Sigg	TEC-1.3	TBD
Seismic Retrofit	R. Abbott (elect)	P. Fritschel	BSCCH-5.18, HAMCH-5-19	TBD
	K. Mason (mech)	J. Giaime		
Lower Noise DACs	J. Heefner	P. Fritschel	ADISC-5.6	TBD
Infrastructure for RFI Mitigation	J. Heefner	M. Zucker	TEC-1.3	TBD
ISC beam auto-centering	J. Heefner	P. Fritschel	TEC-1.3	TBD
DSC (incl. digital LSC-MC2)	J. Heefner	P. Fritschel	TEC-1.3	added to const?

Account notes:

a) The "design account" is for supplies and equipment prior to defining a budget for fabrication. A fabrication budget request should be made as soon as possible; most costs should be against the production account. All engineering and science labor is against the individual's operations organization's budget. Technician labor can, if required and established as part of the budget, be included in the "production account".

b) construction = split as appropriate to the following accounts: LIGO.HAN2k-1-NSFLIGO.HAN2KM, LIGO.HAN4K-1-NSFLIGO.HAN4KM, LIGO.LIV4K-1-NSFLIGO.LIV4KM

c) TBD = not yet authorized, pending a CCB request.

Dennis & Gary

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