LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

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Advanced LIGO Detector Organization, Responsibilities, Authority and Decision Tree
(Input to the Advanced LIGO Management Plan)

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1 Purpose

The purpose of this document is to define the roles, responsibilities, authority, scope and decision-making process ('decision tree') for the individuals assigned a technical leadership or project management role in the Advanced LIGO detector subsystems. The text of this document will be subsumed (and perhaps revised) into an Advanced LIGO Project Management Plan, which is yet to be written. This text is a partial revision of section 2.2 of the initial LIGO Project Management Plan, M950001-C. It is specifically focused on the project management of the effort at the subsystem level.

2 Relevant Documents

(Initial) LIGO Project Management Plan, M950001-C

Advanced LIGO Cost, Schedule and Management, G030251-01

Advanced LIGO: Context and Overview (Proposal to the NSF), M030023-00

"Exploring the Dark Side of the Universe: Proposal for UK Involvement in Advanced LIGO", UK Team proposal to PPARC, revised 11/11/2002

Management Plan for Advanced LIGO UK WP1, M030154-00

Management Plan for Advanced LIGO UK WP2, ?

Management Plan for Advanced LIGO UK WP3, M030155-00

Advanced LIGO Suspensions Developme nt Plan, M000202-A (to be revised)

Advanced LIGO Cost Estimating Plan (CEP), M990310-04

LIGO Project Quality Assurance Plan, M960076-A

3 Terminology

TRB Technical Review Board

CCB Configuration Control Board

4 Organization of the Advanced LIGO Project

The organization of the Advanced LIGO R&D program, leading to the construction phase of the Advanced LIGO detector, is represented in Figure 1. This organization uses individuals shared with the initial LIGO commissioning and operations organization. It is anticipated that the organizational structure and project management approach will remain predominantly unaltered as the project transitions into the construction phase; however, the technical and programmatic leadership in the R&D/design phase will be reviewed to ensure that the most appropriate individuals direct and manage the project in the construction phase. When the project enters into the commissioning and operations phases, the organization will transition from a construction-oriented organization to an operational organization.

In the organization at the detector subsystem level, we have in general a number of "lead personnel". The definition of these positions is defined in Table 1. The assignment of staff

(engineers, scientists, technicians, etc.) below the subsystem "lead personnel" are not shown in the organizational chart; these assignments will in general change with time and project needs.

Figure 1. General Definition of Organizational Positions

Subsystem Leader[1]
Scope: Limited to the associated subsystem.
Reports to: The LIGO Project Manager
Responsibilities:

- Defines the subsystem development plan
- Manages/directs the assigned resources (hardware and personnel) to perform the tasks
- Tracks and reports progress against the plan to management
- Makes decisions (programmatic and technical) at the subsystem level based on advice from staff (in particular the cognizant engineer and cognizant scientist)
- Represents the subsystem in interface discussions as part of the Interface Working Group (IWG), or delegates this responsibility.
- Decides on the readiness for formal and informal subsystem reviews and organizes these reviews
- Manages major subcontracts (as a Technical Monitor), or delegates this responsibility
- Decides on acquisition/procurement strategy (e.g., make or buy)

Authority:

- Has approval (signature) authority for all configuration controlled documents authored/originated by the associated subsystem.
- Has approval (signature) authority for interface agreements in the Interface Control Document (ICD).
- Has approval (signature) authority on all subsystem accounts (to a limit of $10,000 for each purchase order).

Cognizant Engineer[2]
Scope: Limited to the associated subsystem.
Reports to: The Subsystem Leader
Responsibilities:

- Oversees all technical aspects of the subsystem implementation
- Advises the Subsystem Leader of technical or engineering issues
- Oversees all form, fit, function assessment (CAD, simulation and test)
- Performs trade studies and value engineering as deemed necessary
- Provides input to the Subsystem Leader for decisions (programmatic and technical)

Authority:

- Has approval (signature) authority for all configuration controlled documents authored/originated by the associated subsystem.
- Has approval (signature) authority on all subsystem accounts (to a limit of $5,000 for each purchase order).

Cognizant Scientist[3]
Scope: Limited to the associated subsystem.
Reports to: The Subsystem Leader
Responsibilities:

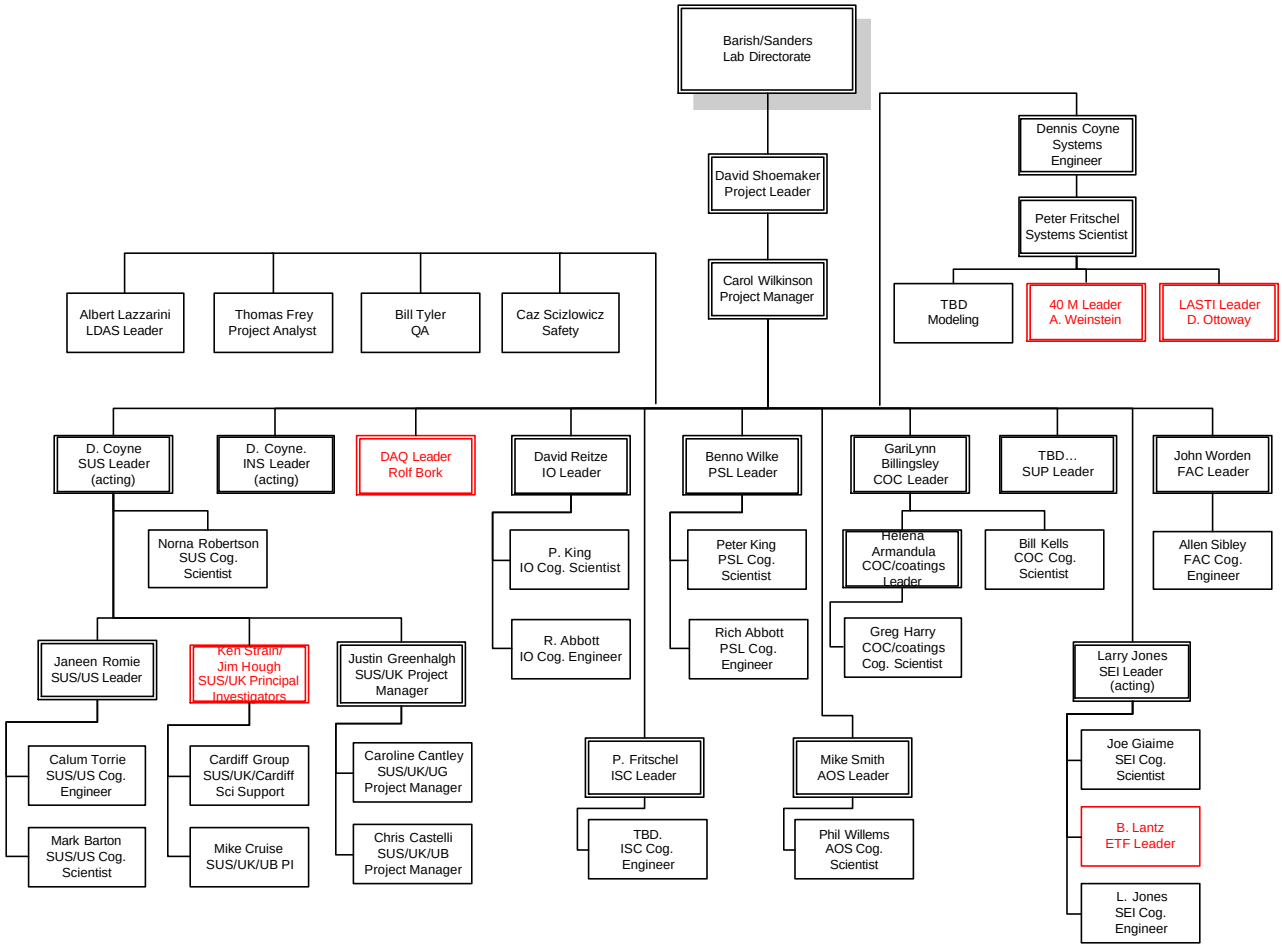
- Establishes the subsystem requirements in collaboration with the System Scientist
- Advises the Subsystem Leader of any science or performance related issues
- Oversees all performance related assessment (via analysis and test)
- Provides input to the Subsystem Leader for decisions (programmatic and technical)

Authority:

- Has approval (signature) authority for all configuration controlled documents authored/originated by the associated subsystem.
- Has approval authority for all critical (e.g., supporting design reviews) science and performance documentation (technical memos, test reports, etc.)

[1] In the UK organization, these "Subsystem Leader" is referred to as "Project Manager" for their subset of the project.
[2] In the UK organization, there is no equivalent "Cognizant Engineer" defined.
[3] In the UK organization, the "Project Scientist" is equivalent to the LIGO Lab "Cognizant Scientist".

Figure 2: Advanced LIGO Project Organization



In the following subsections, the responsibilities, authority and scope of each subsystem lead personnel are defined.

4.1 Suspension (SUS) Subsystem

The suspension subsystem is unique in that the overall scope is shared between the LIGO Laboratory and the UK Team. There are significant interfaces between the in-lab and the UK efforts in order to efficiently share (precious and limited) expertise, effectively perform technology transfer from the UK (who has built multiple pendulum suspensions for GEO already) to the LIGO Lab, and maximize commonality of design and parts (where appropriate). The organizational structure reflects this separation of scope within the SUS program. There is a single SUS Leader who manages the entire SUS project. Likewise there is a single SUS Cognizant Scientist who oversees the science aspects of the entire SUS project. The SUS Cognizant Scientist reports to, and is directed by, the SUS Leader.

The Leader of the in-Lab component of the SUS project, SUS/USand the Leader ("Project Manager" in the UK parlance) of the UK component of the SUS project, SUS/UK both report to the

overall SUS Leader. The SUS/US Leader is supported by a SUS/US Cognizant Engineer and a SUS/US Cognizant Scientist . The SUS/UK Leader (Project Manager) is supported by Leaders (Project Managers) for the institutions supporting Rutherford Appleton Laboratory (RAL), i.e., a Leader for the University of Glasgow (UG) and another for the University of Birmingham (UB). In addition to the SUS/UK Project Manager, two Principal Investigators manage the day-to-day efforts at the two UK institutions. They report to the overall SUS Leader . The principal point of US-UK interface from a management perspective is however the overall SUS/UK Leader .Technical interchange will of course occur freely at all levels between the US and UK efforts, but decisions of any significance which could impact one another must be handled by agreement between the SUS/US Leader and the SUS/UK Leader (Project Manager).. In the event that there is an impasse between the SUS/US and SUS/UK efforts, then the overall SUS Leader will make the decision.

A decision process diagram (decision tree) for SUS project management is indicated in Figure 2. In the case of impasse, or conflict, the decision is referred to the next highest authority in the organizational chart. For example, if there is a disagreement between the SUS/US Leader and the SUS/UK Leader, the issue is brought to the SUS Leader for resolution. Similarly if there is a disagreement between the SUS Leader and the SUS Cognizant Scientist, then the matter is brought to the Adv. LIGO Project Manager for resolution.

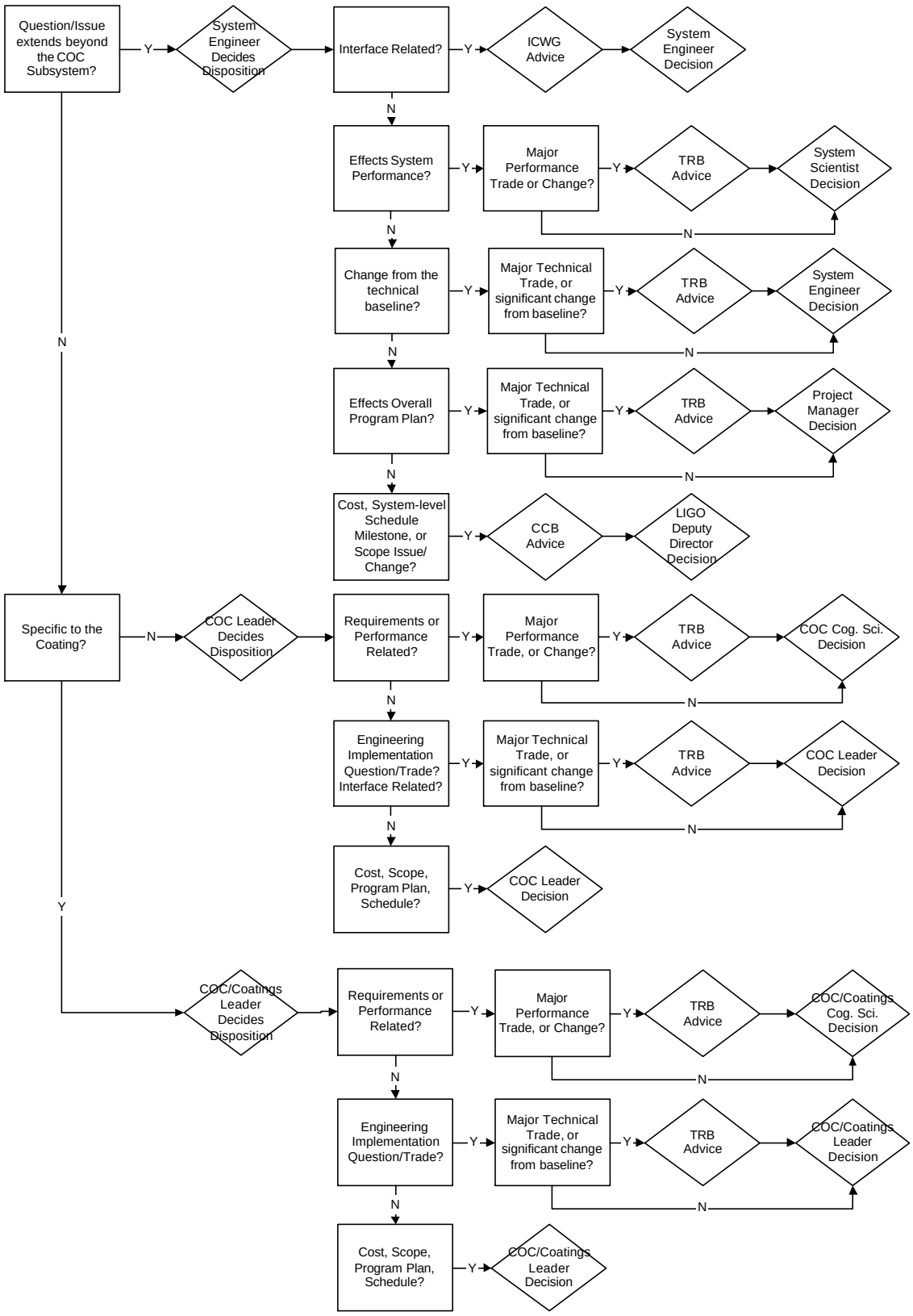
Figure 3: Decision Tree for the SUS Subsystem

4.2 Core Optics Components (COC) Subsystem

The COC Leader is supported by a COC Cognizant Scientist. These two individuals oversee the entire COC effort. Due to the technical challenges associated with the development of high performance coatings for the optics, this aspect of the COC project has it's own Leader and Cognizant Scientist. The scope of these two latter individuals is limited to coatings. Since virtually all of the engineering for COC is contracted outside of the LIGO Lab, there are no assigned Cognizant Engineers. The responsibilities generally performed by a cognizant engineer falls to the two Leaders.

A decision tree for the COC subsystem is given in Figure 3. In the case of impasse, or conflict, the decision is referred to the next highest authority in the organizational chart. For example, if there is a disagreement between the COC/Coatings Cognizant Scientist and the COC/Coatings Leader, the issue is brought to the COC Leader for resolution. Similarly if there is a conflict at the COC Leader's level, then the matter is brought to the Adv. LIGO Project Manager for resolution.

Figure 4: Decision Tree for the COC Subsystem



4.3 SEI

The SEI Leader is supported by an SEI Cognizant Scientist and an SEI Cognizant Engineer. The individuals in these positions oversee the entire SEI effort. The development and testing at the Stanford Engineering Test Facility is overseen by the ETF Leader.

A decision tree for the SEI subsystem is given in Figure 5. In the case of impasse, or conflict, the decision is referred to the next highest authority in the organizational chart. For example, if there is a disagreement between the SEI Cognizant Scientist and the ETF Leader, the issue is brought to the SEI Leader for resolution. Similarly if there is a conflict at the SEI Leader's level, then the matter is brought to the Adv. LIGO Project Manager for resolution.

4.4 PSL

The PSL Leader is supported by a PSL Cognizant Scientist and a Cognizant Engineer. The individuals in these positions oversee the entire PSL effort.

A decision tree for the PSL subsystem is given in Figure 5. In the case of impasse, or conflict, the decision is referred to the next highest authority in the organizational chart. For example, if there is a disagreement between the PSL Cognizant Scientist and the PSL Cognizant Engineer, the issue is brought to the PSL Leader for resolution. Similarly if there is a conflict at the PSL Leader's level, then the matter is brought to the Adv. LIGO Project Manager for resolution.

4.5 IO

The IO Leader is supported by a IO Cognizant Scientist and a Cognizant Engineer. The individuals in these positions oversee the entire IO effort.

A decision tree for the IO subsystem is given in Figure 5. In the case of impasse, or conflict, the decision is referred to the next highest authority in the organizational chart. For example, if there is a disagreement between the IO Cognizant Scientist and the IO Cognizant Engineer, the issue is brought to the IO Leader for resolution. Similarly if there is a conflict at the IO Leader's level, then the matter is brought to the Adv. LIGO Project Manager for resolution.

4.6 ISC

TBW

4.7 AOS

The AOS Leader is supported by an AOS Cognizant Scientist . These two individuals oversee the entire AOS effort. There is no AOS cognizant engineer. The responsibilities generally performed by a cognizant engineer fall to the AOS Leader.A decision tree for the AOS subsystem is given in Figure 5. The AOS Leader acts as the sub-system Cognizant Engineer in the decision making process. In the case of impasse, or conflict, the decision is referred to the next highest authority in the organizational chart. If there is a disagreement between the AOS Leader and the AOS Cognizant Scientist, the matter is brought to the Adv. LIGO Project Manager for resolution.

4.8 INS

TBW

4.9 SUP

TBW

4.10 FAC

TBW

Figure 5. Decision Tree for all Advanced LIGO subsystems except SUS and COC.