# 7. Omega Facility Governance Plan and Shot-Allocation Process

## 7.1 INTRODUCTION

The Omega Governance Plan covers the process by which the Omega Laser Facility, including OMEGA EP, is governed to determine the allocation of system time, schedule user experiments, and ensure that users' current and future requirements are presented to the Omega Facility Director. This governance plan does not cover the line-management functions of the Omega Facility Director to operate and maintain OMEGA and OMEGA EP. The organization for Omega Governance is outlined in Fig. 7.1.

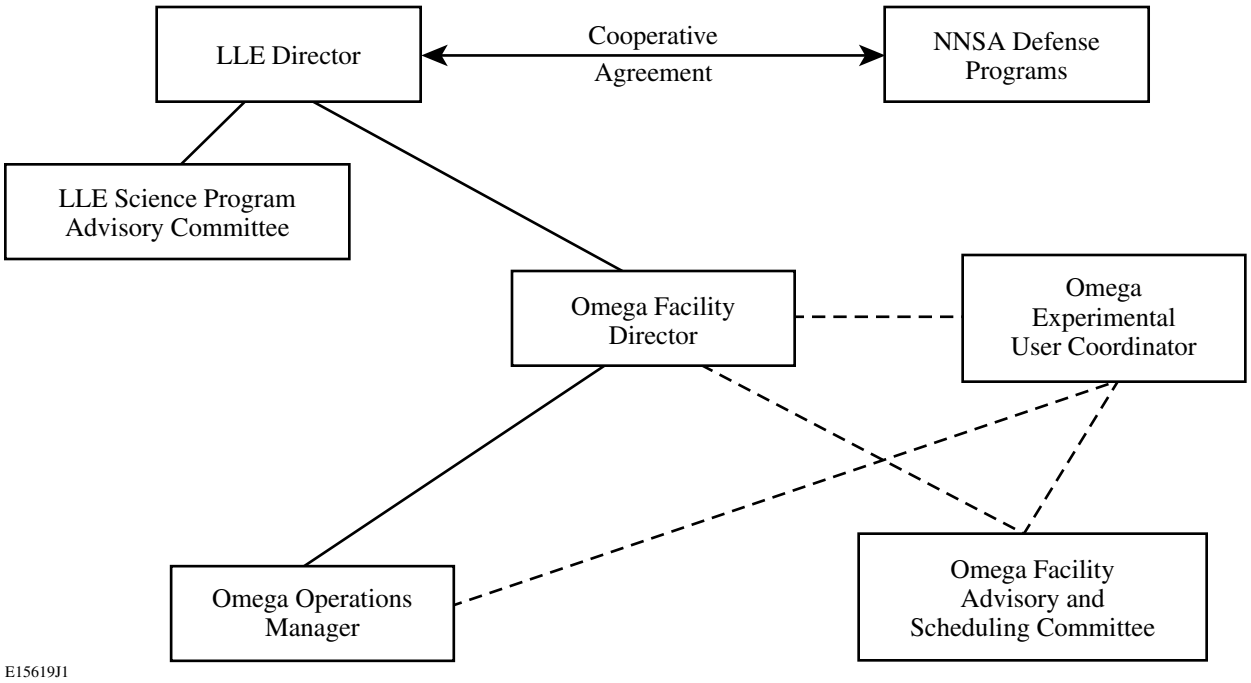


Figure 7.1
Omega Governance organizational chart.

### 7.1.1 LLE Director

The LLE Director is responsible for the overall direction of the laboratory to ensure that National Nuclear Security Administration (NNSA) program goals are supported. He is responsible for appointing the Omega Facility Director.

- The LLE Director is selected by the President and approved by the Board of Trustees of the University of Rochester in consultation with NNSA and is appointed for a five-year renewable term.

- The LLE Director reports administratively to the University of Rochester's Provost. Programmatically, the LLE Director consults with the NNSA Assistant Deputy Administrator Office for Inertial Confinement Fusion.

- The LLE Director approves and publishes the annual Omega fiscal-year shot schedule three months prior to the start of the fiscal year and certifies that it fulfills the guidance provided by NNSA.

### 7.1.2 Omega Facility Director

The Omega Facility Director is responsible for defining the overall Omega facility use that maximizes the benefit to the national stockpile stewardship and ignition programs and balances security priorities with broader scientific, technological, and economic competitiveness goals.

### 7.1.3 Omega Facility Advisory and Scheduling Committee (FASC)

This committee recommends Omega system time allocation, promotes an effective user community, and reviews the facility's overall effectiveness for users.

### 7.1.4 LLE Science Program Advisory Committee

This committee advises the LLE Director on major policy issues, balance of program use, use strategy, availability, and future capabilities of Omega. It advises on LLE's inertial confinement fusion (ICF) science program direction.

### 7.1.5 Omega Experimental User Coordinator

The Experimental Coordinator is the single point of contact for all non-LLE Principal Investigators (PI's). He/she is the liaison between the PI and the Omega support staff for technical information and user support for planning and conducting experiments on Omega. He/she is also the liaison between the PI and LLE support staff for target fabrication and LLE Engineering. The user coordinator is appointed by the Experimental Division Director.

### 7.1.6 Omega Operations Manager

The Omega Operations Manager is responsible for the overall operation and operational readiness of the OMEGA Laser System, including the OMEGA compression and OMEGA EP facilities. The OMEGA Laser Facility Manager and OMEGA EP Laser Facility Manager report to the OMEGA Operations Manager and are responsible for the operation of their respective facilities.

## 7.2 OMEGA SYSTEM TIME AVAILABILITY, PROGRAMMATIC ALLOCATION, AND USER SUPPORT

### 7.2.1 System Time Availability

There are three principal uses of Omega: ignition physics, weapons physics, and basic science. The allocation of system shot time to users will be based on NNSA's programmatic needs and available shot time. The number of shots depends on the type of shots, system availability, experimental effectiveness, and funding levels.

The Omega Operations Manager is responsible for the overall operation of Omega, including ensuring that system availability and experimental effectiveness are optimized. The Operations Manager will provide the following to the Omega Facility Director, the Omega Facility Advisory and Scheduling Committee, and the LLE Science Program Advisory Committee:

- Monthly report on the number of target shots scheduled and completed by user, including the experimental effectiveness of each shot. A yearly summary report will be provided.

- Monthly report of Omega system availability, including an analysis of the contribution to system nonavailability. A yearly summary report will be provided.

- An annual projection of the system time available based on the expected funding.

### 7.2.2 Programmatic Allocation

The Omega Facility Advisory and Scheduling Committee (FASC) will recommend system time allocations as described in Sec. 7.4 following guidance on program balance. In FY13 the system time allocation was 35% for inertial confinement fusion (ICF), 30% for weapons physics, 30% for basic science (NLUF and Laboratory), and 5% for contingency. Contingency will be assigned to make up system time lost due to unavailability and/or additional urgent requirements. The FASC will advise the LLE Director and Omega Facility Director on changes to the guidance for program balance.

### 7.2.3 Omega User Support

The Omega Facility Director has fiscal responsibility for operating the facility and is responsible for ensuring that all appropriate support functions are provided. Standard capabilities required for users to conduct experiments supplied by the facility include

- Experimental support, including facility diagnostics, operations data processing and access, standard phase plates, and polarization rotators. An on-site target contractor provides support for national laboratories and NLUF users; however, targets are not supplied and are the responsibility of the user.

- Administrative support including badging, safety training, facility orientation, data archiving and retrieval, Shot Request Form (SRF) administration and preparation assistance, working areas and logistic support, and computer network connections.

- Engineering support to field/adapt user-supplied diagnostics.

- Technical information and support for planning and conducting user experiments.

## 7.3 SCIENCE PROGRAM ADVISORY COMMITTEE

LLE's Science Program Advisory Committee advises the LLE Director on significant policy matters relating to LLE's scientific program and Omega's use and capabilities planning. The organization of this committee is shown in Fig. 7.2; its chairman is appointed by the Laboratory Director. Its specific responsibilities include the following:

- Make recommendations to the Omega Facility Advisory and Scheduling Committee as to LLE experiments to be performed and their relative priorities.

- Formulate LLE's annual Work Plan.

- Formulate and maintain up-to-date long-range program plans of five and ten years.

- Advise on major changes to the overall balance of facility use that may be required.

- Recommend actions needed to resolve issues of inadequate system time or financial resources to meet programmatic requirements.

- Recommend policy with respect to international collaboration and use of Omega.

- Review major proposals that significantly add or change facility capabilities and advise on the merits of such additions or changes relative to cost (including the cost of the system time).

- Brief or provide a written report of its recommendations to the LLE Director and other LLE Division Directors. If a consensus view is not reached within the committee, all views will be represented.

- Develop LLE's Annual Self-Assessment.

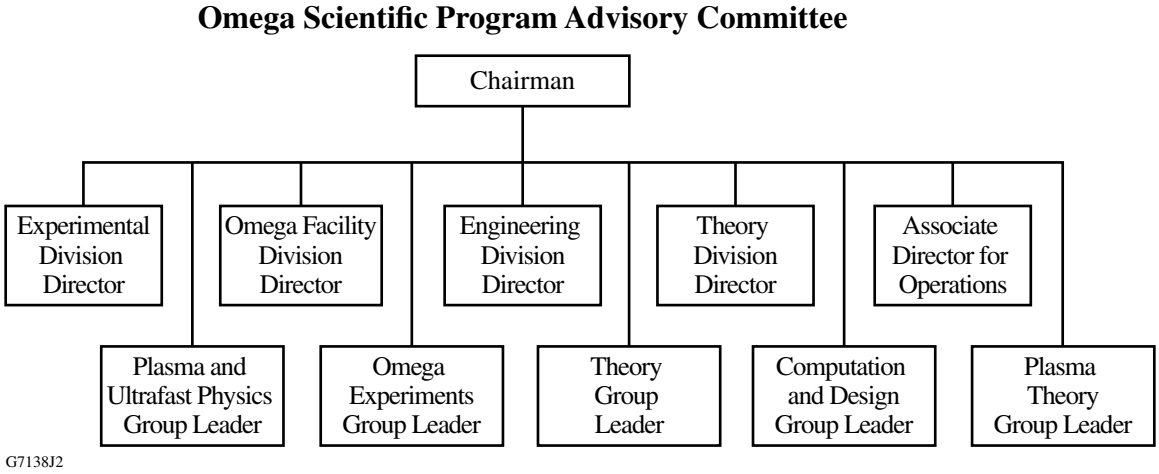


Figure 7.2
Omega Scientific Program Advisory Committee organizational chart.

## 7.4 FASC Roles and Responsibilities

### 7.4.1 Responsibilities

The Facility Advisory and Scheduling Committee formulates the annual facility schedule, reviews experimental proposals for compatibility and safety, and evaluates facility availability and experimental effectiveness. The FASC recommends the annual facility schedule and represents the needs of the users to the LLE Director and Omega Facility Director.

#### 7.4.1.1 Annual scheduling meeting

The full FASC meets in June of each year to formulate the one-year Omega facility schedule for the upcoming fiscal year. Additionally, the FASC reviews facility availability and effectiveness for the previous year and recommends notional shot allowances for the fiscal year after next. Specific responsibilities include

- Recommend shot allocations for the set of experimental proposals submitted by the Omega user groups for the upcoming fiscal year using the following criteria:
  - Consistency of experimental goals and NNSA's programmatic requirements and the likelihood of the experimental goals being achieved.
  - The uniqueness of Omega to perform the experiment or a recommendation that the experiment be performed by another facility.
  - The impact of the experiment on the facility, e.g., potential for system damage, environmental issues, etc.

- Review programmatic requirements for the fiscal year after next and make a recommendation for total system time required and the overall program balance.

- Review user requests for facility modifications and recommend appropriate action to the LLE Director and Omega Facility Director.

- Review the Omega availability and experimental effectiveness for the past year and recommend appropriate lessons learned to the LLE Director and Omega Facility Director.

- Review existing experimental capabilities such as diagnostics and information availability, and recommend improvements where warranted.

- Review policy for experimental data ownership, access, and security issues.

7.4.1.1.1 Membership

The FASC committee members are appointed by the host institution and approved by the LLE Director. The membership is summarized in Table 7.1.

Table 7.1: FASC membership.

| Number of Members | Subcommittee | Source |
|---|---|---|
| 8 | Ignition Physics | LLNL, LANL, NRL, SNL, LLE (4) |
| 2 | Weapons Science | LLNL, LANL |
| 2 | Basic Science | NLUF Manager (1)<br>University Community (1) |

The committee membership will serve for a term determined by the host institution. The term should nominally be for at least two years. The committee chairman will be the Omega Facility Director.

The basic science subcommittee consists of the NLUF manager and a representative of the university users' committee appointed by the LLE Director. Basic science consists of the NLUF and Laboratory basic science programs. Laboratory means the National Laboratories (LLNL, LANL, NRL, and SNL) and LLE (including the Fusion Science Center represented through LLE). An NLUF Technical Evaluation Panel is appointed separately as defined by the NLUF management program contained in the UR/LLE–DOE Cooperative Agreement. This committee meets biennially to review NLUF proposals and recommends to NNSA the proposals to fund and their shot allocations. The recommendations of this committee are represented by the NLUF Manager at the FASC. While the NLUF programmatic funding is provided separately by NNSA, the programmatic funding for Laboratory basic science is provided by the individual laboratory and system time is provided by the facility. The Laboratory basic science program will be administered by the NLUF Manager who will issue a yearly solicitation for proposals. The Laboratory Basic Science Review Committee members

will be approved by the LLE Director and will consist of members from the user laboratories (one each) as well as at least two independent members. This committee will peer review all proposals on merit and make a recommendation to the LLE Director of proposals in rank order including a recommended system time allocation.

7.4.1.1.2 Committee procedures

The procedures that govern the annual schedule formulation process and facility review are outlined in this section. This process will be initiated each year by the Omega Facility Director issuing relevant guidance and a planning timeline.

- The subcommittees meet in the early spring to review proposals and recommend system time requirements in time to provide an input to a draft of the annual facility schedule and support the annual FASC meeting held in June each year.

- The Omega Facility Director collects the inputs from the subcommittees, evaluates facility impact, and formulates a draft of the fiscal-year schedule for review at the annual FASC meeting. The subcommittee chairman will present proposals for system time to the FASC, including the results of proposal ranking and recommending experiments that should be scheduled.

- The full committee will meet in closed session to evaluate the input of the subcommittees and recommend a balanced program that meets the guidance provided by NNSA. If there is inadequate system time to fulfill all requests, the committee will recommend the "split" among the three areas and require the subcommittees to reduce the requests to meet the allocation. The full committee will recommend the fiscal-year schedule, which includes a 5% contingency, to the LLE Director for approval.

- The committee will complete the reviews identified in Sec. 7.4.1.1 and report the results to the LLE Director and Omega Facility Director.

7.4.1.1.3 User requirements

Each laboratory is responsible for formulating an experimental program to fulfill its campaign objectives. Proposals for experiments from selected PI's are formulated to meet these program objectives. Proposals that are not in support of program objectives should not be submitted. Members of participating laboratories cannot be PI's on NLUF proposals. Proposals from outside entities [for example, proposals resulting from international agreements (e.g., CEA, AWE)], will go through the same process as all other proposals. Proposal content and PI responsibilities are detailed in Sec. 7.5.

### 7.4.1.2 Fiscal year after next first-quarter schedule

A provisional first-quarter schedule will be developed in April of each year. The planning for this will be initiated by LLE at least two months in advance, and the scheduling meeting will be via video teleconference. This will allow for early identification of target requirements to ensure

that first-quarter experiments can be supported. While this schedule is provisional, it is envisioned that it will be adopted with little or no revision during the normal annual June Omega Scheduling and Advisory Committee meeting. The recommended notional system time allocations for the upcoming fiscal year should be used as guidance in arriving at this provisional first-quarter schedule. Section 7.4.1.1 procedures should be used in developing this schedule.

#### 7.4.1.3 Biweekly FASC meetings

A subcommittee of the FASC consisting of the LLE members of the FASC, the Laser Facility Managers, the Experimental Operations Group Manager, the Experimental Support Group Leader, and the Laser System Scientists meet biweekly to administer the facility schedule and monitor its effectiveness (other, non-LLE committee members are, if available, welcome to attend this on-site meeting). Specific responsibilities include

- Review experimental proposals submitted by Principal Investigators three months in advance for system and experimental compatibility and safety. Approve or recommend changes to the proposals.

- Review experimental critiques submitted by Principal Investigators and propose corrective actions to the Facility Director where warranted.

- Evaluate the current and planned activities on the system presented by the Operations Manager.

- Evaluate the experimental diagnostic performance presented by the Experimental Operations Group Manager and progress in implementing new/modified diagnostics presented by the Experimental Support Group Leader.

- Review the status of submitted proposals and critiques.

- Review recommended schedule changes and, in consultation with users, formulate schedule changes to accommodate user requests where possible.

- Assign system contingency time to make up for lost experimental time or to perform new, high-priority experiments.

- Conduct a running review of the system schedule to determine the ability to perform previously approved experiments, especially those dependent on system or diagnostic upgrades.

- Ensure that the facility schedule is kept current and posted on LLE's web site.

## 7.5 EXPERIMENTAL PROPOSALS AND PRINCIPAL INVESTIGATOR ROLES AND RESPONSIBILITIES

With respect to the laser facility, PI's are those individuals responsible for proposing experiments to be conducted at the Omega Laser Facility.

### 7.5.1 Principal Investigator Orientation

Principal Investigators must complete an Omega familiarization before conducting their first experiment. This familiarization should be scheduled through the respective Laser Facility Manager at least three months prior to the PI's first scheduled experiment. The familiarization will include the following:

- Briefing on OMEGA and/or OMEGA EP capabilities,
- Review of PI responsibilities including SRF preparation,
- Safety briefing,
- Tour of OMEGA/OMEGA EP,
- Observation of operations, preferably with an experimental PI,
- Target metrology and positioning requirements, and
- Briefing on diagnostic procedures.

### 7.5.2 Experimental Proposal

Once an experiment is scheduled by the FASC, the PI is responsible for submitting a proposal template and SRF's, coordinating experimental and laser requirements, monitoring the experimental execution, and writing a critique of the execution of the experiment within one week of its performance. Principal Investigators are responsible for submitting an electronically transmitted experiment proposal template to the FASC that amplifies and extends the information submitted prior to scheduling the experiment. This template and accompanying SRF's, target request forms (TRF's), and VISRAD files must be received at least two months prior to the conduct of the experiment and will initiate the preparation phase for the experiment.

#### 7.5.2.1 Proposal template instructions

1. Date of experiment, AM or PM, experiment title, Principal Investigator names, and applicable facility (OMEGA, OMEGA EP, or both)

2. Summary of the experiment's objectives

3. Laser and diagnostic requirements for the experiment. The input for this should include experimental configuration name and a request identification (RID) number for each experimental configuration. Any non-LLE supported diagnostics or unqualified diagnostics should be separately identified.

4. Type and number of targets including number of spares.

   a. Identify the target request form (TRF) number for each configuration, if available.

   b. A sample of complex targets (defined as other than a simple flat-foil, spherical direct-drive capsule, or plain hohlraum) must be delivered to LLE at least one week prior to the scheduled experiment. This will allow for testing the positioning of the target and developing accurate target-positioning procedures and reticles by placing the target at target chamber center (TCC) when TCC time is available. Indicate on the proposal if targets are complex and include the number of targets ordered for each configuration.

   c. Targets must be metrologized prior to delivery at LLE and verified after arrival at LLE using LLE's Powellscope. Metrology data will be available to the Experimental Operations Group no later than two full working days prior to the day of shots.

   d. Target, target support, and target-shield mass must be minimized to preclude either shrapnel or vapor-deposition degradation of optics. Generally this means that flat targets should be no larger than the beam spot size plus 100 $\mu$m, support structures should be of minimum mass to securely support the target, and shields should be of a minimum area and thickness.

   e. Theoretical 1-D calculated neutron yield must be provided for all fusion-yield targets.

5. A VISRAD file that shows the target including the mount stalks and the beams intercepting the target. (Use of the software program—VISRAD—enhances visualization and importation of data to the SRF.) The file name must be formatted "<RID Number>-<PI Name>.vrw"; e.g., for targets corresponding to RID 12345 and PI surname of Heeter, the file name is "12345-Heeter.vrw". VISRAD files must be submitted as attachments to the proposal.

6. Quantity (shot count) of target shots proposed.

7. Identification of diagnostics planned for use on the experiment that are not qualified for use on OMEGA/OMEGA EP. Nonqualified diagnostics are those that have not completed facility qualification per LLE Instruction 7700 and are not generally selectable on the SRF.

8. Laser-energy transport considerations (OMEGA only)

   a. Estimate laser-energy transmission through target:

      Significant transmission of laser light through a target can cause damage to the opposed beam optics of the OMEGA compression facility. A beam transmitted through an underdense target can have significant spatial modulation. The potential for such damage is increased when a distributed phase plate is used in a beam. To assess the potential for such damage, the PI is required to state the estimated level of laser-beam transmission

through the target (including blow-through) for the proposed experimental configuration. The basis of this estimate can be a simulation of the laser–target interaction or data from an experiment that closely simulates the proposed experimental configuration. No experiment will be approved unless such an estimate is provided in the template submitted for approval to the Omega FASC two months prior to the scheduled shot day. Beam dumps or calorimeters can be installed in opposing beams to increase the maximum acceptable energy transmission (for up to six beams). The maximum allowable blow-through under various scenarios is shown in Table 7.2):

b. Estimated laser-energy backscatter from the target

Significant backscatter from a target can cause damage to the beamline optics. To prevent damage, the estimated backscatter energy must not exceed 140 J.

c. Estimated laser energy reflected from the target

Significant laser energy reflected from a flat target can be directed into other beam ports and damage beamline optics. To reduce the reflected energy and prevent damage, the maximum angle of incidence of a laser beam on a flat target must not exceed 65°.

Table 7.2: Maximum allowable blow-through under various scenarios.

| DPP in either target or opposing beam? | Beam block (in opposing beam?) | Maximum acceptable energy transmission |
|---|---|---|
| Yes | No | 20 J |
| Yes | Yes | 200 J |
| No | No | 100 J |
| No | Yes | 300 J |

9. Special shot-schedule considerations associated with experiment.

10. Campaign configuration variables. Include all shot parameters such as pulse shapes, beam energies, beam delays, diagnostic setup, etc., that will be varied during the campaign.

#### 7.5.2.2 Proposal template review

The proposal template (see Table 7.3) will be reviewed by the FASC to ensure that the experiment's requirements are consistent with the capabilities of the Laser Facility.

### 7.5.3 Principal Investigator Responsibilities

Once the Principal Investigator's experiment has been scheduled, it will become the PI's responsibility to interface (via the Experimental Division liaison representative for user experiments) with the assigned experimental coordinator, and ultimately with the Laser Facility Manager, the

Table 7.3: Experimental Proposal Template.

| General: | Date of Experiment: | | AM PM |
|---|---|---|---|
| | A. Experiment Title: | | |
| | B. Principal Investigators: | | |
| | C. Facility: | OMEGA | OMEGA EP |
| | D. Cryogenic Target | Spherical | Planar |

Summary of Experiment Objectives:

Experimental Specifications and Laser/Diagnostic Requirements:

| SRF | | Targets | | | | # of |
|---|---|---|---|---|---|---|
| Experimental Configuration Name | Example RID # | TRF # | Complex Yes ☐ No ☐ | Quantity | VISRAD Filename (RID-PI Name. vrw) (Submit files with proposal) | Target Shots |
| | | | ☐ ☐ | | | |
| | | | ☐ ☐ | | | |
| | | | ☐ ☐ | | | |
| | | | ☐ ☐ | | | |
| | | | ☐ ☐ | | | |

Identify all diagnostics required that are not qualified

| Diagnostic Name | Description |
|---|---|
| | |
| | |

Energy Transport Considerations

A. Estimated laser transmission through target (OMEGA only): ___J

B. Estimated backscatter energy is less than 140 J ☐

C. For flat targets, verify maximum angle of incidence is less than 65° ☐

Special considerations:

Campaign configuration variables:

Experimental Support Group, and the LLE Target Fabrication Group (while keeping the experimental coordinator and liaison representative informed) to ensure that the experimental and laser system requirements are coordinated and understood (see Fig. 7.3). If a Principal Investigator requires targets and/or diagnostics not provided by LLE resources, the PI must coordinate those respective requirements through the corresponding LLE groups and the Laser Facility Manager. All LLE-provided services, including new pulse shapes, target-alignment scheme, and beam targeting must be coordinated through the Laser Facility Manager to ensure that, at the time the experiment is to be conducted, issues associated with availability or compatibility of those services have been resolved.

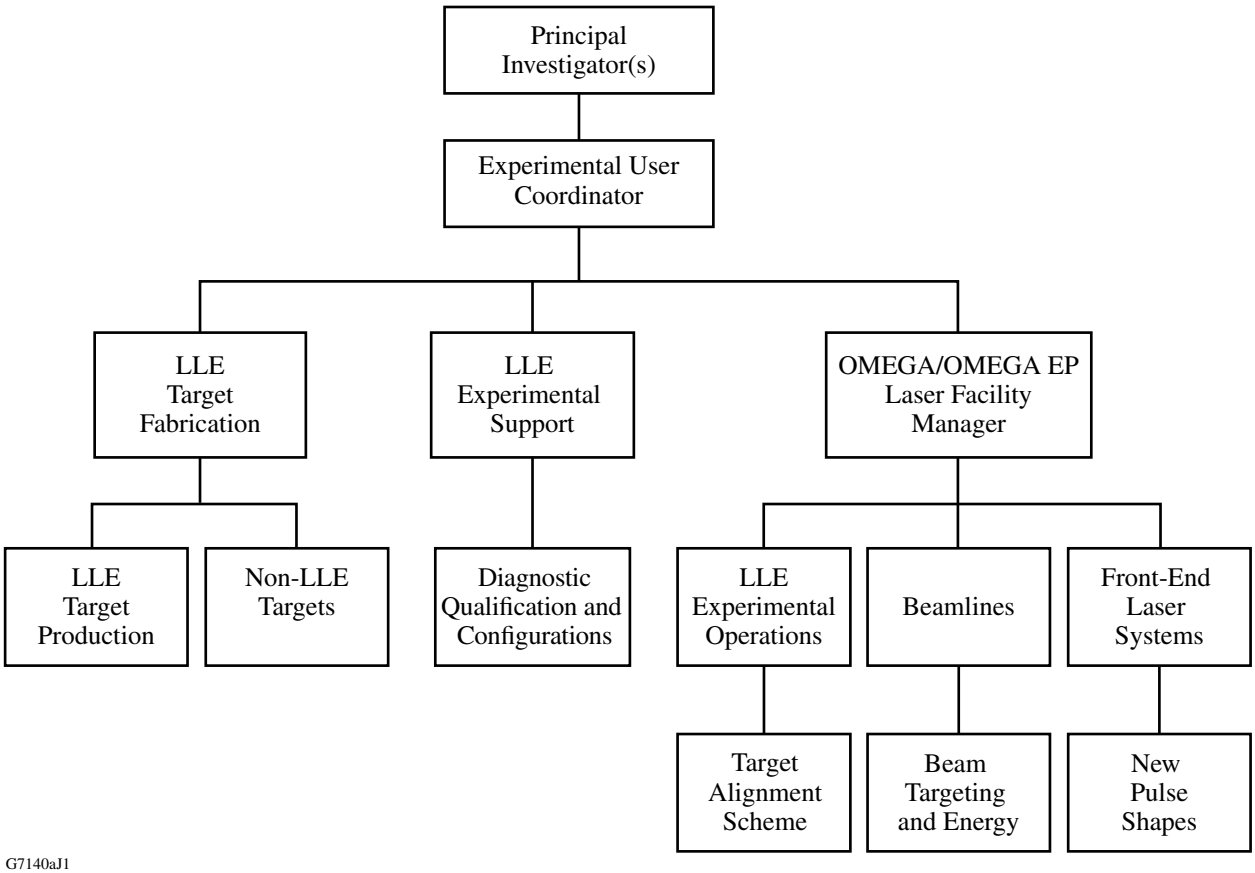


Figure 7.3
Principal Investigator Responsibilities.

#### 7.5.3.1 Experiment reviews

Approximately two weeks prior to commencing the experiment, the PI, or designee, will conduct a comprehensive review of the detailed requirements for their upcoming campaign. This review is for the mutual benefit of the laser and experimental operations group, target fabrication, and support personnel involved with the laser and diagnostic systems. If changes have been made since the approved proposal submission, the PI must resubmit the proposal including a VISRAD model of the targets and revised SRF's that define each unique shot configuration prior to this meeting. (See Sec. 4010 "Shot Request Forms and Administration" of LFORM for more information concerning the forms; http://www.lle.rochester.edu/media/resources/documents/3000.pdf.)

All new diagnostics must be fully qualified two full weeks before the date of the experiment.

Final Shot Request Forms must be submitted to the respective Laser Facility Manager by the close of business on the Monday prior to the week of target shots. A one-week PI brief is conducted to ensure all elements of the campaign are in final form prior to execution. The SRF's are locked to changes on Thursday at midnight (local Rochester time) the week prior to the experiment. The Laser Facility Manager must be notified of subsequent change requests prior to the initiation of the shot by the operations crew. Any special requirements for set up of the diagnostics for the first shot should be clearly indicated: for example, modifications to the ten-inch manipulator set-up sheets.

By two working days before the shots, the PI will provide target metrology results for all targets to the Experimental Operations Group Manager. Additionally, the theoretical 1-D calculated neutron yield must be provided to the Laser Facility Manager for all fusion-yield targets.

For each shot day of the campaign, the PI will support the shift briefings as appropriate. During the actual execution of the experiments, the Principal Investigator will act as an advisor to the LLE Shot Director and may be called upon to render advice on whether to proceed with planned experiments in the event of abnormal system performance. The Shot Director is in charge of the overall laser and target systems during a shot series. If issues associated with safety (personnel or equipment) arise during an experimental sequence, the Shot Director can abort that shot or even the whole series if warranted.

Submit the shot Experimental Effectiveness Assessment Form (EEAF) prior to the shot after next.

#### 7.5.3.2 Experimental critiques

Once the experiment (or sub-series of the experiment) has been conducted, it is the responsibility of the Principal Investigator to provide to the FASC [within one week after the experiment (or sub-series) has been conducted] a written critique of the performance of the experiment and facility. The following items should be included:

- Problems encountered
  - Laser
  - Experimental diagnostics
  - Experimental
  - Target

- Suggestions for improvements

- Positive feedback