

RISK REGISTRY

for
The Linac Coherent Light Source
Ultrafast Science Instruments (LUSI) Project

Lead Program Office:

Office of Basic Energy Sciences
Office of Science

Stanford Linear Accelerator Center
for the Department of Energy

Document No.: PM-391-001-11
Revised - March 2008

LUSI PROJECT RISK REGISTRY

Risks identified and assessed as per the LUSI Risk Management Plan:

ITEM NO.	POTENTIAL PROBLEM	RISK	RESPONSIBLE INDIVIDUAL(S)	CLOSE OUT
R-1	The post CD-2 cost estimate for the project during the design phase increases because of scope creep	Medium	Project Director	June '10
R-2	CR Delay in DOE yearly funding for the project in FY 2009- FY 2012 (Note: Impacts change yearly)	High	Deputy Proj. Dir.	Sep '12
R-3	Labor rates could exceed those planned	Medium	Deputy Proj. Dir.	Mar '12
R-4	Burden and overhead rates for out-years are uncertain	Medium	Project Director	Oct '11
R-5	Phased CD-4 for each instrument may cause contingency funds to be overused by early instruments	Medium	Project Director	Mar '12
R-6	Planned escalation rates could be exceeded leading to cost overruns.	Medium	Deputy Proj. Dir.	Oct '11
R-7	Cost estimate increases due to budget management	Low	Deputy Proj. Dir.	Mar '12
R-8	XPP robot arm detector positioning equipment does not meet the specified requirements	Medium	Lead Engineer / QA Coordinator	Dec '09
R-9	Lack of qualified vendors for critical components such as optics and detectors could lead to higher costs	Medium	Chief Project Engineer / Procurement	Mar '10
R-10	Increase in cost because of exchange rate fluctuations for foreign procurements	Low	Project Director / Procurement	Jan '12
R-11	Unplanned ES&H issues need to be resolved	Medium	ES&H Coordinator	Mar '12
R-12	Staffing difficulties could cause schedule delays in design activities	High	Project Director	Oct '09
R-13	Loss of key employees could cause schedule delays and cost overruns	Medium	Project Director	Oct '11
R-14	Time allotted for instrument testing underestimated	Medium	Lead Scientist	Mar '12
R-15	Schedule may slip due to late, poor and/or inadequate design data.	Medium	Lead Scientist	Mar '10
R-16	Schedule may slip due to poorly defined interfaces between LCLS and LUSI hardware.	Medium	Lead Engineer	Mar '12
R-17	Conflicts with LCLS operations could delay instrument installation and testing.	Medium	Lead Scientist	Mar '12
R-18	Impact of adjacent instruments could lead to redesign or delay installation	Low	Lead Engineer	Mar '10
R-19	Delaying staged CD-2 and CD-3 approvals could delay equipment procurements	Low	Project Director	Mar '10
R-20	CXI KB mirror vendor does not provide acceptable mechanical system	Medium	Deputy Proj. Dir.	Dec '10

PROJECT TITLE: LUSI	ITEM NUMBER: R-1 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Design	
2. POTENTIAL PROBLEM: The cost estimate for the project during the design phase (after CD-2) increases because of scope creep.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: Cost overruns because of scope creep.	
5. CONSEQUENCE LEVEL: Critical	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Scope tends to increase because of instrument stakeholder requests for increased performance or design enhancements.	
8. MITIGATION ACTION(S): Project management team will maintain close control of scope during design development phase and final preparation of drawings and specifications. Scope changes are discussed at weekly project meetings, and the changes and associated costs are closely tracked using a formal change control process.	
9. RESPONSIBLE INDIVIDUAL(S): Project Director	
10. EXPECTED CLOSEOUT DATE: End of design phase (varies for each instrument) June 2010	

PROJECT TITLE: LUSI	ITEM NUMBER: R-2 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Procurement of equipment.	
2. POTENTIAL PROBLEM: Delay in DOE yearly funding for the project (continuing resolution) in FY 09. FY 09 is a critical year for the LUSI project. The funding for for FY 08 was reduced from \$10M to \$6M. Funding for FY 09 was planned to be \$15M. A CR in FY 09.would limit spending during the CR to about \$500K/month which leaves little room for procurements. (Note: This risk will be re-evaluated yearly to adjust impacts)	
3. LIKELIHOOD OF OCCURRENCE: Very Likely	
4. EXPECTED CONSEQUENCE: Delays in funding will holdup procurement of equipment/services which would result in delayed schedules and increased costs/reduced instrument scope.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: High	
7. LIKELY CAUSES: Congress not passing legislation in a timely manner.	
8. MITIGATION ACTION(S): Phased award of contracts will help to minimize long term commitments, but there would be little room to award other contracts. Effort will be focused on critical path items to reduce impact to the overall project schedule and costs. The effect on the schedule will be substantial even with mitigating actions.	
9. RESPONSIBLE INDIVIDUAL(S): Deputy Project Director	
10. EXPECTED CLOSEOUT DATE: End of FY 2009 (Sep 2009)	

PROJECT TITLE: LUSI	ITEM NUMBER: R-3 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Assembly and installation.	
2. POTENTIAL PROBLEM: The planned out-year labor rates for technical support during the instruments' assembly and installation phase may increase.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: Costs could increase especially for XCS	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Negotiated labor contracts may result in higher rates than planned.	
8. MITIGATION ACTION(S): Monitor contract situation, consider contract labor if necessary.	
9. RESPONSIBLE INDIVIDUAL(S): Deputy Project Director	
10. EXPECTED CLOSEOUT DATE: March 2012	

PROJECT TITLE: LUSI	ITEM NUMBER: R-4 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: All project phases.	
2. POTENTIAL PROBLEM: Burden and overhead rates for out years are uncertain.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: Costs could increase if burden and overhead rates become higher than anticipated.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Burden and overhead rates are subject to change based on many factors outside of the project's control. The overhead rates at LLNL increased this FY due to the new management organization.	
8. MITIGATION ACTION(S): Will attempt to obtain an agreement on a fixed 'favorable' overhead rate for the life of the project. Any fluctuation in the burden rate will be managed through project contingency.	
9. RESPONSIBLE INDIVIDUAL(S): Project Director	
10. EXPECTED CLOSEOUT DATE: October 2011	

PROJECT TITLE: LUSI	ITEM NUMBER: R-5 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: All project phases.	
2. POTENTIAL PROBLEM: Project plan with phased critical decisions for 3 instruments presents concern that contingency funds will be overused by earlier instruments.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: Later instrument (XCS) would not have enough remaining contingency to complete project scope.	
5. CONSEQUENCE LEVEL: Critical	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Difficulties encountered with early instruments could be resolved using an excessive amount of project contingency.	
8. MITIGATION ACTION(S): Monitor contingency as a fraction of remaining work (estimate to complete or ETC) to ensure that the level always remains >20%. The ETC will be updated on a comprehensive basis at least once a year and for individual WBS elements whenever information becomes available that will impact the final cost of that element.	
9. RESPONSIBLE INDIVIDUAL(S): Project Director	
10. EXPECTED CLOSEOUT DATE: CD-4c, 2012	

PROJECT TITLE: LUSI	ITEM NUMBER: R-6 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Equipment procurement, installation and testing.	
2. POTENTIAL PROBLEM: Planned escalation rates could be exceeded leading to cost overruns.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: Costs for all instruments may exceed original estimates.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Perturbations to the U.S. economy could cause an inflationary trend.	
8. MITIGATION ACTION(S): LUSI (and LCLS) use escalation rates that are higher than the DOE published values due to the local history. These rates may still be exceeded during the life of the project. Review project data annually to ensure that the escalation estimates are consistent with actual escalation impacts being experienced. ETC will be updated at least annually.	
9. RESPONSIBLE INDIVIDUAL(S): Deputy Project Director	
10. EXPECTED CLOSEOUT DATE: October 2011	

PROJECT TITLE: LUSI	ITEM NUMBER: R-7 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: All phases of the project.	
2. POTENTIAL PROBLEM: The cost estimate increases because of poor budget management.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: Poor cost estimating and/or inadequate budget management will result in cost overruns.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Low	
7. LIKELY CAUSES: Failure to adequately acknowledge uncertainties/risks during the budget baseline establishment process and/or lack of vigilance as to obligations.	
8. MITIGATION ACTION(S): The baseline development process, which includes the risk-based cost contingency process, Appendix A of the LUSI Risk Management Plan, provides a methodology for ensuring that potential contingency demands of a sub-system are addressed. The project management team will use the project control system to monitor cost performance. Also, the finance manager will review all impending obligations for budget and appropriateness. Weekly meetings of the Integrated Project Team will be used to discuss and address cost overrun issues as they surface.	
9. RESPONSIBLE INDIVIDUAL(S): Deputy Project Director	
10. EXPECTED CLOSEOUT DATE: CD-4b, March 2012	

PROJECT TITLE: LUSI	ITEM NUMBER: R-8 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Procurement of equipment.	
2. POTENTIAL PROBLEM: XPP robot arm detector positioning equipment does not meet the specified requirements Equipment does not meet the specified requirements.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: Equipment would not operate properly thus unable to achieve performance parameter.	
5. CONSEQUENCE LEVEL: Critical	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Vendor does not have previous experience in building the required type of equipment or does not properly build and test equipment before delivery.	
8. MITIGATION ACTION(S): Plan to procure critical equipment as early as possible. Initiate communication with potential Vendor early to understand their capabilities. Include QA inspection and testing requirements in equipment specifications. Vendors will be required to demonstrate successful previous experience in building equipment, and engineers and LUSI QA representative will pre-qualify vendor QA programs and capability to perform proposed work before awarding contract. LUSI QA representative will perform necessary oversight and inspection role to ensure that vendors are meeting the technical specifications and technical performance before delivery.	
9. RESPONSIBLE INDIVIDUAL(S): Lead Engineer & QA Coordinator	
10. EXPECTED CLOSEOUT DATE: March, 2010	

PROJECT TITLE: LUSI	ITEM NUMBER: R-9 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Equipment procurement.	
2. POTENTIAL PROBLEM: Lack of qualified vendors for critical components such as optics and detectors could lead to higher costs.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: Cost overruns for optics and/or detectors.	
5. CONSEQUENCE LEVEL: Critical	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Uniqueness of component design could limit possible vendors thereby reducing competition.	
8. MITIGATION ACTION(S): The project's advanced procurement plan will provide purchasing with adequate time to search for potential vendors. Design review teams for optics and detectors will monitor these designs for scope creep and unnecessary frills. Expert advisory committee will be used.	
9. RESPONSIBLE INDIVIDUAL(S): Chief Project Engineer & Procurement	
10. EXPECTED CLOSEOUT DATE: End of contract awards for optics and detectors, March 2010	

PROJECT TITLE: LUSI	ITEM NUMBER: R-10 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Equipment procurements.	
2. POTENTIAL PROBLEM: Increase in cost because of exchange rate fluctuations for foreign procurements.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: Increase in cost of specific items based on the value of the dollar compared with the value of the currency in the country in which the equipment is manufactured.	
5. CONSEQUENCE LEVEL: Marginal	
6. RISK CATEGORIZATION: Low	
7. LIKELY CAUSES: Changes in the value of the dollar vs. foreign currency caused by the international monetary market.	
8. MITIGATION ACTION(S): Wherever possible, procurements will be placed using fixed price (dollars) contracts and the possibilities of this type of occurrence included in risk analysis during cost development.	
9. RESPONSIBLE INDIVIDUAL(S): Procurement / Deputy Project Director	
10. EXPECTED CLOSEOUT DATE: End of procurement phase (varies for each instrument) January 2012	

PROJECT TITLE: LUSI	ITEM NUMBER: R-11 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: All phases of the project.	
2. POTENTIAL PROBLEM: Unplanned ES&H issues need to be resolved.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: ES&H issues can delay or even shut down a project.	
5. CONSEQUENCE LEVEL: Critical	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Changes in safety criteria or requirements or inadequate hazard identification result in additional design or redesign effort to ensure safe implementation and operation of equipment.	
8. MITIGATION ACTION(S): The impacts of ES&H issues are well acknowledged. A preliminary hazards assessment that identifies potential hazards and appropriate mitigation techniques has been developed. The results of the hazards assessment will be reexamined on an annual basis and reviewed with the LUSI ES&H Coordinator to ensure that the conclusions have not changed.	
9. RESPONSIBLE INDIVIDUAL(S): ES&H Coordinator	
10. EXPECTED CLOSEOUT DATE: CD-4b, March 2012	

PROJECT TITLE: LUSI	ITEM NUMBER: R-12 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Design.	
2. POTENTIAL PROBLEM: Delay in adding appropriate staff could lead to delays in design activities.	
3. LIKELIHOOD OF OCCURRENCE: Very Likely	
4. EXPECTED CONSEQUENCE: Schedule slip.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: High	
7. LIKELY CAUSES: Tight job market and/or delay in initiation of hiring process. BA not available when needed due to CR or cut in BA.	
8. MITIGATION ACTION(S): Aggressive recruitment of remaining positions. Ensure that no “single source of failure” exists	
9. RESPONSIBLE INDIVIDUAL(S): Project Director	
10. EXPECTED CLOSEOUT DATE: CD-2b, October 2009	

PROJECT TITLE: LUSI	ITEM NUMBER: R-13 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: All phases of project.	
2. POTENTIAL PROBLEM: Loss of key employees.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: Schedule delays and potential cost overruns.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: The LUSI project is a planned six year effort. Over that period of time it is likely that one or more of the project's key employees will sever their relationship with the project.	
8. MITIGATION ACTION(S): Be proactive relative to personnel issues. Recognize and reward contributions. Wherever possible have some overlap of responsibilities.	
9. RESPONSIBLE INDIVIDUAL(S): Project Director	
10. EXPECTED CLOSEOUT DATE: October 2011	

PROJECT TITLE: LUSI	ITEM NUMBER: R-14 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Final instrument testing and conditioning.	
2. POTENTIAL PROBLEM: Instrument testing and conditioning times tend to be underestimated.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: Schedule delays could delay CD-4s beyond schedule completion dates.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Lack of schedule float to account for unforeseen delays in testing phase.	
8. MITIGATION ACTION(S): Allow sufficient schedule float to ensure that adequate time is available to overcome difficulties during final testing and conditioning phase.	
9. RESPONSIBLE INDIVIDUAL(S): Lead Scientist	
10. EXPECTED CLOSEOUT DATE: CD-4b, March 2012	

PROJECT TITLE: LUSI	ITEM NUMBER: R-15 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Design	
2. POTENTIAL PROBLEM: Schedule slippage due to late, poor and/or inadequate instrument specifications.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: Delays could impact level 1 – 3 milestones as defined in PPEP.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Lack of adherence to schedule, inability to convey design concepts or incomplete data.	
8. MITIGATION ACTION(S): Weekly staff meetings, variance analysis reporting and Chief Engineer oversight should prevent potential problems from escalating.	
9. RESPONSIBLE INDIVIDUAL(S): Lead Scientist/Chief Engineer	
10. EXPECTED CLOSEOUT DATE: March 2010	

PROJECT TITLE: LUSI	ITEM NUMBER: R-16 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Design and installation.	
2. POTENTIAL PROBLEM: Schedule slippage due to poorly defined interfaces between LCLS and LUSI hardware.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: Delays could impact Level 1 – 3 milestones defined in PPEP.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Medium	
7. LIKELY CAUSES: Lack of coordination / interface between the LCLS and LUSI projects.	
8. MITIGATION ACTION(S): A LCLS/LUSI Interface Committee has been formed to ensure that each project is aware of the others' plans. Engineering staff are involved in each others' design reviews. Reorganization now has LUSI project reporting to LCLS Project Director. Questionable areas will be "red flagged" and sent to LCLS Project Director for assignment of clarification and remediation.	
9. RESPONSIBLE INDIVIDUAL(S): Lead Engineer	
10. EXPECTED CLOSEOUT DATE: March 2012.	

PROJECT TITLE: LUSI	ITEM NUMBER: R-17 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Installation.	
2. POTENTIAL PROBLEM: Conflicts with LCLS operating schedule could delay installation activities.	
3. LIKELIHOOD OF OCCURRENCE: Likely.	
4. EXPECTED CONSEQUENCE: Delay in completion of installation for one or more of the instruments.	
5. CONSEQUENCE LEVEL: Significant.	
6. RISK CATEGORIZATION: Medium.	
7. LIKELY CAUSES: Certain instrument installation activities can only take place when LCLS is not operating.	
8. MITIGATION ACTION(S): All installation activities will be carefully preplanned to make most effective use of scheduled LCLS commissioning and shutdowns. To the extent possible design individual experiments with safety isolation to permit installation during LCLS operations. Installation plan will be integrated with LCLS operations schedule and vice versa. Also a LCLS/LUSI Interface Committee has been formed to ensure that each project is aware of the others' plans.	
9. RESPONSIBLE INDIVIDUAL(S): Lead Scientists	
10. EXPECTED CLOSEOUT DATE: CD-4b, March 2012	

PROJECT TITLE: LUSI	ITEM NUMBER: R-18 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Instrument engineering/mechanical design and installation	
2. POTENTIAL PROBLEM: Impact of adjacent instruments could lead to redesign or delay installation.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: Extended design effort because of redesign of portions of the instrument thereby increasing cost and delaying schedule.	
5. CONSEQUENCE LEVEL: Significant	
6. RISK CATEGORIZATION: Low	
7. LIKELY CAUSES: Incoherent phasing of individual instrument design and engineering projects. Lack of integration of designs between adjacent instruments.	
8. MITIGATION ACTION(S): Weekly instrument scientists and engineering integration meetings will promote interactive information transfer between instrument design groups. Design reviews will lessen possibility of conflict. Maintain an integrated design of all instruments and update within the LCLS. .	
9. RESPONSIBLE INDIVIDUAL(S): Lead Engineers	
10. EXPECTED CLOSEOUT DATE: March 2010	

PROJECT TITLE: LUSI	ITEM NUMBER: R-19 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Equipment procurement.	
2. POTENTIAL PROBLEM: Delaying staged CD-2 and CD-3 approvals could delay equipment procurements.	
3. LIKELIHOOD OF OCCURRENCE: Likely	
4. EXPECTED CONSEQUENCE: CD-4 dates could be delayed.	
5. CONSEQUENCE LEVEL: Marginal	
6. RISK CATEGORIZATION: Low	
7. LIKELY CAUSES: Delay in scheduling review or gaining approval of responses to findings from the review.	
8. MITIGATION ACTION(S): Schedule and conduct CD-2 and CD-3 reviews as soon as possible. Respond to review findings as quickly as possible. Prepare procurement packages for long lead items as early as possible. Long lead procurements have been identified and approval will be requested for their advance procurement.	
9. RESPONSIBLE INDIVIDUAL(S): Project Director	
10. EXPECTED CLOSEOUT DATE: March 2010	

LUSI Project - Risk Registry

PROJECT TITLE: LUSI	ITEM NUMBER: R-20 DATE: March 2008
1. PROJECT ELEMENT, STEP, OR ACTIVITY: Equipment procurement.	
2. POTENTIAL PROBLEM: CXI KB mirror vendor does not provide acceptable mechanical system.	
3. LIKELIHOOD OF OCCURRENCE: Unlikely	
4. EXPECTED CONSEQUENCE: CD-4 dates could be delayed.	
5. CONSEQUENCE LEVEL: Marginal	
6. RISK CATEGORIZATION: Low	
7. LIKELY CAUSES: Delay in scheduling review or gaining approval of responses to findings from the review.	
8. MITIGATION ACTION(S): Prepare long lead procurement of KB mirror system as early as possible to initiate vendor discussions about design. Monitor Vendor progress closely by including relevant go/no go milestones in the contract and by timely visits..	
9. RESPONSIBLE INDIVIDUAL(S): Project Director, Lead Engineer	
10. EXPECTED CLOSEOUT DATE: March 2010	