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# Large Synoptic Survey Telescope (LSST)

Risk & Opportunity Management Report

June 2019

Austin Roberts

Document-33786

Latest Revision Date: July 1, 2019

Change Record

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| **Version** | **Date** | **Description** | **Owner name** |
| 1.0 | July 1, 2019 | Initial Writing | A. Roberts |
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# Risk and Opportunity Management Report

# Summary

This report summarizes the changes made to the Risk and Opportunity Register for the specified time period. The report also includes information on the top risks as determined by Probability Weighted Cost Exposure and those deemed critical (red) risks on the typical 5x5 matrix; the report also provides summary statistics for each subsystem, reviews risks and mitigations for entries with upcoming trigger dates, provides trending information, and summaries changes made during the month.

Items colored in blue indicate a change from the previous month.

# Applicable Documents

Risk and Opportunity Management Plan (LPM-20)

# Reference Documents

Project Execution Plan (LPM-54)

Cost Estimating Plan (LPM-81)

Contingency Management Plan (LPM-61)

Safety Policy (LPM-18)

Hazard Analysis Plan (LPM-49)

Technical Scoping Options (LPM-71)

Camera Risk Management Plan (LCA-29)

Camera Risk Registry (LCA-30)

Change Control Process (LPM-19)

# Risk and Opportunity Management Report – June 2019

# Brief Narrative

The Jira tool functionality was further expanded with additional scripts and dashboards for more streamlined management. By expanding the tool and providing training on its usage, subsystems will have an increased ability to view, analyse, and manage their risks. The tool will therefore lead to an increased visibility on risk exposure at various project levels. In addition to risks and opportunities, this has allowed us to focus on discrete mitigating actions, an estimate of how these actions will reduce our current expose levels, and capturing anticipated completion dates of these mitigating actions. As these mitigating actions are completed, the exposure of the associated risks is re-evaluated against this estimate. We now also have the ability to report what our probability weighted cost exposure after the final mitigations are completed is expected to be with our Monte Carlo script.

The overall R&O Probability Weighted Cost Exposure (PWCE) decreased from **$33.89M** to **$33.36M**.

The overall R&O Probability Weighted Cost Exposure (PWCE) after final mitigations decreased from **$29.40M** to **$27.08M**.

**1.1 High Level Summary of Monthly Changes**

We are now focusing on schedule based reviews for risks with upcoming trigger dates and/or upcoming mitigating actions anticipated to complete. This month with the new PWCE after mitigation functionality, we focused on entering anticipated completion dates and the expected risk reduction on mitigating actions.

A more detailed summary of the changes made this period is documented in Section 8.

# Subsystem Risk and Opportunity Exposure Summary

The following tables summarize the Probability Weighted Cost Exposure for each subsystem as well as the state of each of their risks and opportunity entries. Changes from the previous month are shown in blue.

Table 1: Summary of Risk Exposure

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sub-system** | **Active Risk/Opportunity** | **Proposed** | **Realized** | **Retired** | **Expected Labor Risk Exposure (K-USD)\*** | **Expected Non-Labor Risk Exposure** | **Prob. Weighted Exposure Cost (K-USD)\*** |
| **Data Management** | 66 | 0 | 5 | 18 | $4,249 | $4,131 | $8,379 |
| **Education and Public Outreach** | 7 | 2 | 1 | 8 | $383 | $168 | $551 |
| **Project Management Office** | 14 | 4 | 0 | 2 | $5,962 | $3,469 | $9,430 |
| **Systems Engineering** | 25 | 5 | 1 | 8 | $2,720 | $1,448 | $4,168 |
| **Telescope & Site** | 63 | 0 | 2 | 16 | $3,941 | $2,222 | $6,163 |
| **Totals** | **175** | **11** | **9** | **52** | **$17,255** | **$11,437** | **$28,691** |

Table 2: Summary of Opportunity Exposure

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sub-system** | **Active Risk/Opportunity** | **Proposed** | **Realized** | **Retired** | **Expected Labor Risk Exposure (K-USD)\*** | **Expected Non-Labor Risk Exposure** | **Prob. Weighted Exposure Cost (K-USD)\*** |
| **Data Management** | 2 | 0 | 0 | 3 |  |  | $55 |
| **Education and Public Outreach** | 0 | 0 | 2 | 0 |  |  | $- |
| **Project Management Office** | 5 | 0 | 0 | 2 |  |  | $2,325 |
| **Systems Engineering** | 3 | 0 | 0 | 1 |  |  | $165 |
| **Telescope & Site** | 0 | 0 | 0 | 0 |  |  | $- |
| **Totals** | **10** | **0** | **2** | **6** |  |  | **$2,544** |

# Top Ten Lists

## 3.1 Risk Registry Top Ten List

As of July 1, 2019, the Risk & Opportunity Registry contains 175 active risk entries.

The following list contains the top 10 risks as evaluated by the probability weighted cost exposure in JIRA. The top ten are tracked closely as having potential contingency impact.

Table 3: Risk Registry Top Ten List

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Top Risks List** | | | | | |
| **Sort Number** | **Risk ID #** | **Subsystem** | **WBS** | **Risk Title** | **Probability Weighted Cost Exposure ($K)** |
| 1 | RM-886 | Project Management Office | 01C | Subsystem Milestone Execution | $4,347 |
| 2 | RM-888 | Project Management Office | 01C | Multi-agency coordination - Camera Delivery | $2,268 |
| 3 | RM-773 | Data Management | 02C.04 | Computing power required for Data Release Production exceeds estimates by large factor | $1,348 |
| 4 | RM-817 | Telescope & Site | 4.5 | Mount Late Delivery | $1,332 |
| 5 | RM-887 | Project Management Office | 01C | Institutional Overhead Rates | $1,260 |
| 6 | RM-814 | Telescope & Site | 4.4 | Dome Late Delivery | $1,221 |
| 7 | RM-775 | Data Management | 02C.04.06 | Unanticipated characteristics of real data result in poor MultiFit performance (computational) | $962 |
| 8 | RM-733 | Systems Engineering | 06C.02 | Discontinuity between subsystem I&T and Commissioning staffing levels | $888 |
| 9 | RM-815 | Telescope & Site | 4.14 | Telescope and Site Integration activities underestimated | $851 |
| 10 | RM-723 | Data Management | 02C.04 | Object counts exceed expectations, leading to insufficient compute | $823 |
|  | **Date:** | **6/6/2019** |  | ***Top Ten Total:*** | **$15,300** |

## 3.2 Opportunity Registry Top Ten List

As of July 1, 2019, the Risk & Opportunity Registry contains 12 active opportunity entries.

The following list contains the top 10 opportunities as evaluated by the probability weighted cost exposure in the Opportunity Register.

Table 4: Opportunity Registry Top Ten List

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Top 10 List - Opportunities** | | | | | |
| **Sort Number** | **Opp ID #** | **Subsystem** | **WBS** | **Title** | **Probability Weighted Cost Exposure ($K)** |
| 1 | RM-628 | Project Management Office | 1.01C.01 | Favorable Chilean Currency Exchange Rate Factor | $1,480 |
| 2 | RM-629 | Project Management Office | 1.01C | Favorable Personnel Costs | $442 |
| 3 | RM-630 | Project Management Office | 1.01C | Favorable Material Estimate Uncertainty | $340 |
| 4 | RM-785 | Systems Engineering | 1.06C.05 | Commissioning Finishes Early | $113 |
| 5 | RM-631 | Project Management Office | 1.01C | Favorable Institutional Overhead Rates | $60 |
| 6 | RM-627 | Data Management | 02C.10 | New or different technology provides saving in hardware/effort. | $30 |
| 7 | RM-786 | Systems Engineering | 1.06C | Standardizing Common Hardware Across Subsystems | $30 |
| 8 | RM-624 | Data Management | 02C.04.06 | Exceptional MultiFit Performance | $25 |
| 9 | RM-787 | Systems Engineering | 1.06C.05 | Camera Verification On Summit Finishes Early | $23 |
| 10 | RM-632 | Project Management Office | 1.01C | Purchase Forward Planned Hardware Sooner with Favorable Exchange Rates | $3 |
|  | **Date:** | **6/6/2019** |  | ***Top Ten Total:*** | **$2,544** |

# Probability vs Cost Exposure 5x5 Matrix

Each of the active risks have been sorted and binned in the following 5 x 5 matrix.

**Table 5: 5 x 5 Matrix**



The number of critical (red) risks stayed at 5. The risks that are in the critical range (red in Table 5) are shown in the following table.

**Table 6: Critical Risks List**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| JIRA ID | Subsystem | WBS | Summary | PWE ($K) | Proposed Management Response |
| RM-886 | Project Management Office | 01C | Subsystem Milestone Execution | 4347 | Schedule and contingency will be used along with reworking the integrated plan to deal with subsystem delays |
| RM-888 | Project Management Office | 01C | Multi-agency coordination - Camera Delivery | 2268 | At this time the NSF and DOE efforts are on the critical path. ComCam reduces the direct dependency of late Camera delivery but with an 80% confidence of delivery within 5 months of due date this risk covers the residual impact of the camera being later that ComCam can stay efficient. |
| RM-817 | Telescope & Site | 4.5 | Mount Late Delivery | 1332 | Working with vendor to develop logistics plan to minimize schedule risks in shipping. Oversight during the next few months as work focuses on factory integration to support testing campaign.  Aug 2017: TMA is now 2 months late, with shipment in July 2018. Jan 2019: TMA is now scheduled to depart Spain in May 2019. Working with Dome and SE to improve parallel work flow. |
| RM-887 | Project Management Office | 01C | Institutional Overhead Rates | 1260 | AURA was chosen as the basis because very little can be done in response to a rate change. AURA centers, including NOAO are subject to NSF approval so changes are well understood and will come with significant advanced warning. |
| RM-814 | Telescope & Site | 4.4 | Dome Late Delivery | 1221 | Dome vendor has maintained schedule as of September 2016.  The dome vendor is now committed to working through the winter months rather than stop work completely in an attempt to minimize schedule.  Embedded plate alignment is much longer than planned...final completion is now OCt 2018, which will interfere with TMA installation.  Jan 2019 Update: working to support enclosed dome by May 2019, but need additional contingency funds to support new schedule and cash flow issues. |

# Six Month Trigger Date Outlook

As of July 1, 2019 there were 28 risks with trigger dates in the next 6 months or past due. Table 7 summarizes those entries. Each of these risks have notes included in their entries describing the activities that will occur in the near term and the response needed if they are to materialize.

Table 7: Six Month Trigger Date Report

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subsystem | JIRA ID | Summary | WBS | Trigger Date | Probability | Nonlabor Cost | Labor Cost | PWE ($K) |
| Telescope & Site | RM-851 | LSST coating chamber performances below specifications | 4.9 | 01/03/2019 | 5%-10% | 250 | 240 | 36.75 |
| Telescope & Site | RM-871 | Calibration atmospheric telescope refurbishment does not meet performance requirements | 4.8 | 01/03/2019 | 5%-10% | 100 | 120 | 16.5 |
| Telescope & Site | RM-881 | Calibration atmospheric telescope dome does not meet automation requirements | 4.8 | 01/03/2019 | 0%-5% | 100 | 120 | 5.5 |
| Telescope & Site | RM-827 | Base Facility takes longer to complete than planned | 4.13 | 01/04/2019 | 5%-10% | 0 | 1800 | 135 |
| Telescope & Site | RM-834 | M1M3 damaged at SOML during fabrication and cell integration handling | 4.6.1 | 01/04/2019 | 5%-10% | 250 | 240 | 36.75 |
| Telescope & Site | RM-817 | Mount Late Delivery | 4.5 | 01/05/2019 | 25%-50% | 0 | 3600 | 1332 |
| Telescope & Site | RM-814 | Dome Late Delivery | 4.4 | 01/05/2019 | 25%-50% | 1500 | 1800 | 1221 |
| Telescope & Site | RM-869 | Telescope mount pier interfaces must be modified | 4.5 | 01/06/2019 | 0%-5% | 100 | 600 | 17.5 |
| Telescope & Site | RM-821 | Summit Integration of dome, mount and telescope causes project delays | 4.1 | 01/06/2019 | 25%-50% | 250 | 160 | 151.7 |
| Telescope & Site | RM-846 | Telescope mount interfaces to camera must be modified | 4.5 | 01/07/2019 | 0%-5% | 200 | 400 | 15 |
| Telescope & Site | RM-833 | Summit facility must be modified to accommodate interfaces | 4.3 | 01/07/2019 | 5%-10% | 300 | 80 | 28.5 |
| Systems Engineering | RM-733 | Discontinuity between subsystem I&T and Commissioning staffing levels | 06C.02 | 31/07/2019 | 25%-50% | 0 | 2400 | 888 |
| Telescope & Site | RM-815 | Telescope and Site Integration activities underestimated | 4.14 | 01/08/2019 | 25%-50% | 500 | 1800 | 851 |
| Telescope & Site | RM-816 | Weather impact on construction schedule | 4.1 | 01/08/2019 | 10%-25% | 500 | 900 | 238 |
| Telescope & Site | RM-822 | M1M3 cell assembly integration work falls behind schedule | 4.6.4 | 01/08/2019 | 5%-10% | 0 | 1800 | 135 |
| Telescope & Site | RM-1878 | Dome Maintenance Required before final acceptance | 04C.04 | 01/08/2019 | 25%-50% | 500 | 0 | 185 |
| Telescope & Site | RM-819 | Telescope and Site shipping and logistics scope and budget | 4.12 | 01/08/2019 | 10%-25% | 750 | 0 | 127.5 |
| Telescope & Site | RM-840 | Steel and erection crew require premium cost | 4.1 | 01/09/2019 | 5%-10% | 350 | 0 | 26.25 |
| Systems Engineering | RM-726 | Camera Refrigeration System Maintainability | 06C.01.01 | 30/09/2019 | 50%-75% | 750 | 0 | 472.5 |
| Systems Engineering | RM-746 | System Level Performance Impacts of Compounding Component Optical Defects | 1.06C.01 | 30/09/2019 | 5%-10% | 0 | 180 | 13.5 |
| Data Management | RM-813 | Insufficiently reliable network infrastructure at Base Center | 02C.08.01 | 30/09/2019 | 5%-10% | 500 | 0 | 37.5 |
| Telescope & Site | RM-826 | Dome dynamic performance below specifications | 4.4 | 01/10/2019 | 5%-10% | 300 | 320 | 46.5 |
| Systems Engineering | RM-731 | Infrastructure Interface between Base Facility and Camera Inadequately defined | 06C.02.02.02 | 01/11/2019 | 0%-1% | 500 | 80 | 2.9 |
| Telescope & Site | RM-849 | Dome Seal performance below specifications | 4.4 | 01/11/2019 | 5%-10% | 280 | 240 | 39 |
| Telescope & Site | RM-848 | Dome Flushing Performance below specifications | 4.4 | 01/11/2019 | 5%-10% | 300 | 240 | 40.5 |
| Telescope & Site | RM-832 | Excessive Vibration from Mount Drive System | 4.5 | 01/12/2019 | 5%-10% | 120 | 480 | 45 |
| Telescope & Site | RM-884 | M1M3 mirror damage during summit integration requiring repair | 4.14 | 01/12/2019 | 0%-1% | 200 | 3600 | 19 |
| Telescope & Site | RM-820 | AOS Software Late Delivery | 4.11 | 01/12/2019 | 10%-25% | 50 | 80 | 22.1 |

# Risk Exposure Trending

Figure 1 shows the time history of the Probability Weighted Cost Exposure of Risks for each subsystem and the project as a whole. These changes are explained in more detail in the Brief Narrative section.

Figure 1: Probability Weighted Cost Exposure Time History

# Monte Carlo Analysis

The following charts summarize the Monte Carlo Analysis conducted on July 1, 2019, consisting of 500 iterations.

|  |  |
| --- | --- |
|  |  |
|  |  |

The following table shows the risk exposure at several confidence levels.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Confidence Level** | **Cost (then-year)**  **This Period** | **Cost (then-year)**  **Previous Period** | **Cost After Mitigations (then-year)**  **This Period** | **Cost After Mitigations (then-year)**  **Previous Period** |
| 50% | $32.66M | $33.13M | $26.38M | $29.33M |
| 80% | $37.44M | $39.32M | $31.74M | $34.33M |
| 90% | $40.07M | $42.01M | $34.38M | $36.62M |
| 99% | $48.01M | $48.05M | $41.40M | $43.03M |

# Summary of Monthly Entry Changes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID** | **Date** | **Author** | **Field** | **From** | **To** |
| **RM-624** | **2019-06-22 23:46:18** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 0 | 22/Jun/19 11:46 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **2019-06-24 22:24:53** | **Yusra AlSayyad** | **General Notebook 1** | Trigger Event: Specification of DR1 compute hardware purchase. This ties to DM-022 risk of poor performance. | Trigger Event: Specification of DR1 compute hardware purchase. This ties to RM-022 risk of poor performance. |
| **2019-06-24 22:50:44** | **Yusra AlSayyad** | **General Notebook 1** | Trigger Event: Specification of DR1 compute hardware purchase. This ties to RM-022 risk of poor performance. | Trigger Event: Specification of DR1 compute hardware purchase. This ties to RM-775 risk of poor performance. |
| **RM-627** | **2019-06-05 19:06:04** | **Kian-Tat Lim** | **Last Reviewed (Deprecated)** | 0 | 05/Jun/19 12:06 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-672** | **2019-06-22 23:58:46** | **Wil O'Mullane** | **Obligation Date** | 1/Sep/19 | 1/Sep/20 |
| **RM-674** | **2019-06-25 21:54:36** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 25/Jun/19 9:54 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-684** | **2019-06-22 23:29:53** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:29 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-685** | **2019-06-25 21:52:34** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 03/May/19 9:17 PM | 25/Jun/19 9:52 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-687** | **2019-06-13 03:35:49** | **John Swinbank** | **Link** | This issue is mitigated by RM-1120 | 0 |
| **RM-691** | **2019-06-22 23:34:46** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:34 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-695** | **2019-06-22 23:26:53** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 15/Feb/19 5:23 PM | 22/Jun/19 11:26 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-698** | **2019-06-22 23:28:24** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:28 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-700** | **2019-06-22 00:00:58** | **Wil O'Mullane** | **Obligation Date** | 1/Nov/19 | 1/Dec/20 |
| **RM-704** | **2019-06-25 21:55:14** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 23/Jan/19 3:50 PM | 25/Jun/19 9:55 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-705** | **2019-06-22 23:35:39** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:35 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-706** | **2019-06-22 23:37:17** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 15/Feb/19 5:32 PM | 22/Jun/19 11:37 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **2019-06-22 23:38:19** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 22/Jun/19 11:37 PM | 22/Jun/19 11:38 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-707** | **2019-06-22 23:41:10** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:41 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-708** | **2019-06-25 21:57:43** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 03/May/19 9:48 PM | 25/Jun/19 9:57 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-710** | **2019-06-13 17:47:01** | **John Swinbank** | **assignee** | Wil O'Mullane | Fritz Mueller |
| **RM-711** | **2019-06-22 23:40:13** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 15/Feb/19 5:36 PM | 22/Jun/19 11:40 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-712** | **2019-06-22 23:38:51** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 23/Jan/19 3:49 PM | 22/Jun/19 11:38 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-713** | **2019-06-22 23:43:15** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:43 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-714** | **2019-06-22 23:44:29** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:44 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-715** | **2019-06-22 23:46:47** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:46 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-716** | **2019-06-22 23:47:50** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:47 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-717** | **2019-06-17 23:45:44** | **John Swinbank** | **Current Probability of Occurrence** | 5%-10% | 10%-25% |
| **RM-718** | **2019-06-13 17:45:07** | **John Swinbank** | **assignee** | John Swinbank | Fritz Mueller |
| **RM-720** | **2019-06-25 21:58:57** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 03/May/19 9:50 PM | 25/Jun/19 9:58 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-721** | **2019-06-22 23:51:19** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 31/Jan/18 12:00 AM | 22/Jun/19 11:51 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-723** | **2019-06-19 17:53:34** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 22/May/19 6:56 PM | 19/Jun/19 5:53 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-725** | **2019-06-05 20:42:47** | **Chuck Claver** | **General Notebook 1** | This is a random event that can occur at any time during early System I&amp;T, full System I&amp;T, and Science Validation.  The possible future event that may allow this to be re-evaluated: when the project secures funds for early operations, the probability associated with this risk may go down.  9/29/2016: Changed trigger date to reflect the commissioning and T&amp;S AI&amp;T planning and the expected reviews in the remaining time period.  1/05/17: Increased the number of possible occurrences from 5 to 7 to more accurately account for the number of FTEs within SE. Recently the previous Systems Engineering Manager left the company, so this risk has already been partially realized.  12/20/17: No change. However, management is looking into offering retaining bonuses for key staff as an incentive to stick around until the end. If that decision is made, then the probability of occurrence of this risk can be re-evaluated.  03/28/18: Probability of Occurrence changed from 50-75 percent to 25-50 percent. Additional new hires have recently come on board, decreasing the overloading rate for each member of the team. However, every member of the team continues to be overallocated and that will continue, as staffing levels will not increase to the level to properly harmonize the work to staffing ratio. Because of this, the probability of occurrence will probably not decrease past its current level. | This is a random event that can occur at any time during early System I&T, full System I&T, and Science Validation.    The possible future event that may allow this to be re-evaluated: when the project secures funds for early operations, the probability associated with this risk may go down.    9/29/2016: Changed trigger date to reflect the commissioning and T&amp;S AI&amp;T planning and the expected reviews in the remaining time period.    1/05/17: Increased the number of possible occurrences from 5 to 7 to more accurately account for the number of FTEs within SE. Recently the previous Systems Engineering Manager left the company, so this risk has already been partially realized.    12/20/17: No change. However, management is looking into offering retaining bonuses for key staff as an incentive to stick around until the end. If that decision is made, then the probability of occurrence of this risk can be re-evaluated.    03/28/18: Probability of Occurrence changed from 50-75 percent to 25-50 percent. Additional new hires have recently come on board, decreasing the overloading rate for each member of the team. However, every member of the team continues to be overallocated and that will continue, as staffing levels will not increase to the level to properly harmonize the work to staffing ratio. Because of this, the probability of occurrence will probably not decrease past its current level. |
| **RM-727** | **2019-06-06 15:28:19** | **Chuck Claver** | **General Notebook 1** | Weather events are generally of short duration and infrequent on Cerro Pachon. Baseline schedule allows for expected weather delays. Early I&amp;T with ComCam is planned for 6 months with 4 month of unplanned time that can be used to absorb some whether delays.  11/23/2015: Updated the anticipated completion date of Handling Action 1 to Feb 2016. This aligns with the next re-plan of the commissioning schedule.  7/18/16: Handling Action 1 date updated to January 2017 to align with the date of the Commissioning review, at which time this risk can be reviewed in terms of the flexibility and resiliency of the schedule.  1/4/17: No change. The commissioning plan includes assumptions about adverse weather downtime and also includes allocations for engineering time that could be used to compensate for additional bad weather. Awaiting feedback from the Commissioning Review Committees report and recommendations. | Weather events are generally of short duration and infrequent on Cerro Pachon. Baseline schedule allows for expected weather delays. Early I&amp;T with ComCam is planned for 6 months with 4 month of unplanned time that can be used to absorb some whether delays.    11/23/2015: Updated the anticipated completion date of Handling Action 1 to Feb 2016. This aligns with the next re-plan of the commissioning schedule.    7/18/16: Handling Action 1 date updated to January 2017 to align with the date of the Commissioning review, at which time this risk can be reviewed in terms of the flexibility and resiliency of the schedule.    1/4/17: No change. The commissioning plan includes assumptions about adverse weather downtime and also includes allocations for engineering time that could be used to compensate for additional bad weather. Awaiting feedback from the Commissioning Review Committees report and recommendations.    06/06/2019: No Change. AIV+Commissioning planning is being updated. Stress on the schedule reserve may ultimately increase the exposure on this risk due to compression of the Commissioning schedule. For now, there is still ample flexibility in the AIV+Commissioning plan to adapt to wether impacts. |
| **RM-728** | **2019-06-06 21:14:30** | **Chuck Claver** | **General Notebook 1** | A spare filter substrate is part of the LSST Spares and Consumables policy (LSE-170). As of August 2014 the Camera team is planning prototype procurement of a filter. This prototype was meant to be a spare, but is now going to be part of the 6-filter complement. This new strategy does not change this risk exposure.  Re-evaluation of risk exposure will be made following camera procurement decision and final filter test plans.  3/28/16: Reduced probability of occurrence from 10-25% to 5-10% due to ongoing prototyping work in France and the development of safe handling procedures to be conducted first with dummy filters at both SLAC and the summit facility. | A spare filter substrate is part of the LSST Spares and Consumables policy (LSE-170). As of August 2014 the Camera team is planning prototype procurement of a filter. This prototype was meant to be a spare, but is now going to be part of the 6-filter complement. This new strategy does not change this risk exposure.    Re-evaluation of risk exposure will be made following camera procurement decision and final filter test plans.    3/28/16: Reduced probability of occurrence from 10-25% to 5-10% due to ongoing prototyping work in France and the development of safe handling procedures to be conducted first with dummy filters at both SLAC and the summit facility.    06/06/2019: No Change. LSSTCam filter exchange system will have its pre-ship review Fall 2019. Once the filter system is delivered to SLAC it will subsequently be integrated and tested into the main LSSTCamera system. Success its teduring I&T should mitigate this risk fully. |
| **RM-729** | **2019-06-06 21:17:56** | **Chuck Claver** | **General Notebook 1** | The major operational facilities include: the summit facility, the base facility, the archive facility, and the headquarters facility. Operational uses cases are the typical compliment to standard performance and functional requirements, which collectively provide design teams a full set of requirements and constraints to which they can synthesize their designs. The technical operations concept defines how all users and stakeholders intend to use the system to conduction nominal science operations, daytime operations, scheduled maintenance, and unscheduled maintenance. Definition of all necessary use cases and activities provides design teams input on how their products and facilities should be designed to accommodate the desired operations. Without a technical OpsCon, teams are required to make assumptions which may not be optimum or may conflict with similar assumptions being made by other teams.  07/27/2015: Increased probability of occurrence from 10-25% to 25-50% because the team has met with management to define scope of the task and management has agreed, but to-date this additional work has not been formalized in resource-loaded PMCS activities and included in the project baseline. Because of this discrepancy, the TOWG activities are deemed low priority by project personnel.   11/23/2015: No change to probability or BOE but because the summit facility is in full construction and the base facility has been designed architecturally, to a large extent, the window to impact these facilities is dwindling.  07/18/16: A preliminary ConOps has been iterated using complementary bottom-up and top-down approaches, resulting in an evolving plan that is complimentary with existing capabilities. This plan is being further refined and will be presented to the agencies in 2017. At that time, this risk can be further evaluated. For now, we will not change the probability or exposure.  09/30/16: Reduced the probability of occurrence from 25-50 percent to 10-25 percent, as there is a significant effort on the project currently to refine the previous conops, update the current construction project baseline as needed to support needed operational concepts to ensure consistency, all in time for a submission to the agencies in 2017. Change requests have been filed to ensure that the ConOps will be consistent with what the construction project delivers.  01/05/17: No change. There are still some outstanding operational issues that need to be addressed, including proper definition of operating modes and degraded modes, configuration mechanism of software, and development of a work management system to name a few. All of these items have been addressed to a degree but require further work.  03/28/18: No change. Several examples have surfaced lately where an OpsCon working group would be helpful, including defining needs for control room displays, etc. | The major operational facilities include: the summit facility, the base facility, the archive facility, and the headquarters facility. Operational uses cases are the typical compliment to standard performance and functional requirements, which collectively provide design teams a full set of requirements and constraints to which they can synthesize their designs. The technical operations concept defines how all users and stakeholders intend to use the system to conduction nominal science operations, daytime operations, scheduled maintenance, and unscheduled maintenance. Definition of all necessary use cases and activities provides design teams input on how their products and facilities should be designed to accommodate the desired operations. Without a technical OpsCon, teams are required to make assumptions which may not be optimum or may conflict with similar assumptions being made by other teams.    07/27/2015: Increased probability of occurrence from 10-25% to 25-50% because the team has met with management to define scope of the task and management has agreed, but to-date this additional work has not been formalized in resource-loaded PMCS activities and included in the project baseline. Because of this discrepancy, the TOWG activities are deemed low priority by project personnel.     11/23/2015: No change to probability or BOE but because the summit facility is in full construction and the base facility has been designed architecturally, to a large extent, the window to impact these facilities is dwindling.    07/18/16: A preliminary ConOps has been iterated using complementary bottom-up and top-down approaches, resulting in an evolving plan that is complimentary with existing capabilities. This plan is being further refined and will be presented to the agencies in 2017. At that time, this risk can be further evaluated. For now, we will not change the probability or exposure.    09/30/16: Reduced the probability of occurrence from 25-50 percent to 10-25 percent, as there is a significant effort on the project currently to refine the previous conops, update the current construction project baseline as needed to support needed operational concepts to ensure consistency, all in time for a submission to the agencies in 2017. Change requests have been filed to ensure that the ConOps will be consistent with what the construction project delivers.    01/05/17: No change. There are still some outstanding operational issues that need to be addressed, including proper definition of operating modes and degraded modes, configuration mechanism of software, and development of a work management system to name a few. All of these items have been addressed to a degree but require further work.    03/28/18: No change. Several examples have surfaced lately where an OpsCon working group would be helpful, including defining needs for control room displays, etc.    06/06/2019: No Change. |
| **RM-730** | **2019-06-05 21:09:47** | **Austin Roberts** | **Handling Approach** | Mitigate | Accept |
| **2019-06-05 21:10:14** | **Austin Roberts** | **Handling Approach** | Accept | Mitigate |
| **2019-06-05 21:14:49** | **Austin Roberts** | **Link** | 0 | This issue is mitigated by RM-1920 |
| **RM-731** | **2019-06-05 19:08:16** | **Chuck Claver** | **Current Probability of Occurrence** | 5%-10% | 0%-1% |
| **RM-732** | **2019-06-06 21:33:22** | **Chuck Claver** | **General Notebook 1** | This risk includes the sub-risk that if the subsystems do not provide complete and comprehensive subsystem verification plans, then that will impact the ability to properly scope system-level verification plans and complete commissioning on schedule. (added on June 6 2017)  The project has implemented the technical de-scope option that shortens the commissioning period by 5 1/2 months so that the not to exceed TPC hit $473M. This decision was made without a full re-planed commissioning scenario analyzed, hence this is a risk until we can detail the re-plan.  This has an associated Opportunity: SE-292  9/29/2016: Schedule concerns stemming from TMA construction and weather related Summit Facility construction have increased the likelihood of meeting the T&amp;S readiness milestone for entering the commissioning phase. The will either eat into the ComCam time, thereby reducing the benefits gained from early I&amp;T, thus pushing risk onto full I&amp;T by increasing the amount of testing required during this period. While these concerns have not formally materialized in the current schedule they should be watch and reevaluated in the next couple of months.  1/7/17: No Change. This risk will be re-evaluated after the Commissioning Review to be held in late January 2017 where a revised and more detailed commissioning plan and schedule will be reviewed.  6/6/17: Added the first the note about the risk of inadequate subsystem verification plans impacting commissioning. | This risk includes the sub-risk that if the subsystems do not provide complete and comprehensive subsystem verification plans, then that will impact the ability to properly scope system-level verification plans and complete commissioning on schedule. (added on June 6 2017)    The project has implemented the technical de-scope option that shortens the commissioning period by 5 1/2 months so that the not to exceed TPC hit $473M. This decision was made without a full re-planed commissioning scenario analyzed, hence this is a risk until we can detail the re-plan.    This has an associated Opportunity: SE-292    9/29/2016: Schedule concerns stemming from TMA construction and weather related Summit Facility construction have increased the likelihood of meeting the T&amp;S readiness milestone for entering the commissioning phase. The will either eat into the ComCam time, thereby reducing the benefits gained from early I&amp;T, thus pushing risk onto full I&amp;T by increasing the amount of testing required during this period. While these concerns have not formally materialized in the current schedule they should be watch and reevaluated in the next couple of months.    1/7/17: No Change. This risk will be re-evaluated after the Commissioning Review to be held in late January 2017 where a revised and more detailed commissioning plan and schedule will be reviewed.    6/6/17: Added the first the note about the risk of inadequate subsystem verification plans impacting commissioning.    06/06/2019: No Change |
| **RM-733** | **2019-06-05 19:05:48** | **Chuck Claver** | **Notebook 2** | BOE provides funding support for additional FTEs needed in the commissioning phase to recover schedule in the event that T&amp;S AI&amp;T finishes late due to their key resources leaving the project early. | BOE provides funding support for additional FTEs needed in the commissioning phase to recover schedule in the event that T&S AIV finishes late due to their key resources leaving the project early. |
| **RM-734** | **2019-06-05 21:01:57** | **Chuck Claver** | **Expected (months)** | 1.5 | 1 |
| **2019-06-05 21:03:08** | **Chuck Claver** | **Obligation Date** | 1/May/20 | 1/Mar/21 |
| **RM-735** | **2019-06-05 19:35:15** | **Austin Roberts** | **FTE's required** | 0 | 2 |
| **2019-06-05 19:37:09** | **Austin Roberts** | **Obligation Date** | 1/May/20 | 1/Jun/21 |
| **2019-06-05 20:38:03** | **Chuck Claver** | **Obligation Date** | 1/Jun/21 | 1/Dec/21 |
| **RM-737** | **2019-06-06 21:16:29** | **Chuck Claver** | **General Notebook 1** | It is anticipated that this risk will be discovered during ComCam use, leaving at least 18 months of full system integration and test to address the algorithms with additional resources.  3/28/16. No change. Next time to update assessment is after the DM Verification Review (in May/June 2016).  7/20/16: The DM Verification Review is now scheduled for Nov 2016. We will evaluate again at that time.  1/6/17: No change. Will assess as the DMSR is updated along with its corresponding verification matrix.  12/21/2017: No Change. | It is anticipated that this risk will be discovered during ComCam use, leaving at least 18 months of full system integration and test to address the algorithms with additional resources.    3/28/16. No change. Next time to update assessment is after the DM Verification Review (in May/June 2016).    7/20/16: The DM Verification Review is now scheduled for Nov 2016. We will evaluate again at that time.    1/6/17: No change. Will assess as the DMSR is updated along with its corresponding verification matrix.    12/21/2017: No Change.    06/06/2019; No Change. |
| **RM-738** | **2019-06-06 15:30:58** | **Chuck Claver** | **General Notebook 1** | At beginning of construction the calibration plan will be fully vetted and the requirements finalized and allocated. The DM plan has calibration data products pipeline work starting FY2016. Trigger date is based on allowing for 6 month software release. The risk is that additional analysis of the implementation impacts of the calibration plan will not occur until the DM work starts.  Increased probability from 25-50% to 50%-75% for the following reasons: 1- added collimated beam projector and 2- the specific details of needed data is still undefined. July 27 2015  Extended the trigger date of the risk to follow an anticipated system wide review of the calibration plan.  01/15/2016: DM has a new hire planned in the Calibration area to start in the second half of FY16. In the interim, DM has put in place contracted resources and a post-doc at Harvard to support Calibration activities.  7/20/16: After discussions with Victor on July 1, an agreement has been reached that Z. Ivezic will be allocated to work on updating the Calibration Plan (LSE-180) by the end of the Dec 2016. Updated the trigger date to Jan 2017 based on this agreement.  1/6/17: No change. Waiting upon the update to the Calibration Plan (LSE-180). We will reassess the risk after that update, which is supposed to be completely imminently.  12/21/2017: Up dated trigger date. Will re-assess as part of the development of the Science Validation planning as part of the commissioning plan. Expect to have a review by July 2018. | At beginning of construction the calibration plan will be fully vetted and the requirements finalized and allocated. The DM plan has calibration data products pipeline work starting FY2016. Trigger date is based on allowing for 6 month software release. The risk is that additional analysis of the implementation impacts of the calibration plan will not occur until the DM work starts.    Increased probability from 25-50% to 50%-75% for the following reasons: 1- added collimated beam projector and 2- the specific details of needed data is still undefined. July 27 2015    Extended the trigger date of the risk to follow an anticipated system wide review of the calibration plan.    01/15/2016: DM has a new hire planned in the Calibration area to start in the second half of FY16. In the interim, DM has put in place contracted resources and a post-doc at Harvard to support Calibration activities.    7/20/16: After discussions with Victor on July 1, an agreement has been reached that Z. Ivezic will be allocated to work on updating the Calibration Plan (LSE-180) by the end of the Dec 2016. Updated the trigger date to Jan 2017 based on this agreement.    1/6/17: No change. Waiting upon the update to the Calibration Plan (LSE-180). We will reassess the risk after that update, which is supposed to be completely imminently.    12/21/2017: Up dated trigger date. Will re-assess as part of the development of the Science Validation planning as part of the commissioning plan. Expect to have a review by July 2018.    06/06/2019: No Change. The Calibration hardware has either been fully designed and/or delivered. There still uncertainty in the required inputs to the Calibration Products Pipeline and whether the daily requirements can be met. |
| **RM-739** | **2019-06-05 20:23:25** | **Chuck Claver** | **Current Probability of Occurrence** | 5%-10% | 0%-5% |
| **RM-740** | **2019-06-05 19:16:50** | **Chuck Claver** | **Current Probability of Occurrence** | 10%-25% | 5%-10% |
| **2019-06-05 19:22:00** | **Austin Roberts** | **Obligation Date** | 1/Feb/21 | 15/Jul/21 |
| **RM-741** | **2019-06-05 20:17:20** | **Austin Roberts** | **Obligation Date** | 1/Jan/20 | 15/Jul/21 |
| **RM-742** | **2019-06-06 21:21:01** | **Chuck Claver** | **General Notebook 1** | 11/23/2015: Reduced the Probability of Occurrence from 25-50% to 10-25% due to the significant attention this topic has garnered by Don Petravick and the team at NCSA. Don has been working on developing a detailed and comprehensive Information Technology Infrastructure Library (ITIL) plan that takes into account the desire to have a central integrated IT solution while accounting for the need to have site-specific implementation and support models. This work is being captured as part of the TOWG and LOPT operations planning efforts.  7/18/16: This topic has received extensive discussion and attention due in some part to identifying this topic as a risk. Jeff Kantor has now ben designated as a point person to lead this effort. He is receiving support from a team spanning multiple teams and disciplines across the project. This risk will be re-evaluated in a few months to determine if the probability of occurrence should be decreased due to work accomplished by then.  9/30/16: Jeff Kantor has made significant progress on this item, assembling several project-wide tiger teams. The results are being used to update project baselines where appropriate and to influence the LOPT / Operations Planning work, including updates to the Operations WBS. Reduced the probability from 10-25 percent to 5-10 percent.  1/05/17: No Change. The Summit-Base ITC Tiger Team is currently writing a baseline design document that should be ready for the Change Control Board in the Feb. 2017 timeframe. After that document gets written, reviewed, and approved as a baseline document, the probability of this risk can be further reduced. No change until the document is approved.  12/20/17: Probability was reduced from 5-10 percent to 0-5 percent. This is due to the strong leadership of Jeff Kantor who has coordinated the IT efforts between north and south. Jeff temporarily relocated to Chile for 3 months to oversee the design, install of fibers, networking equipment, and racks in the summit facility. Additionally, IT resources have been hired in Chile to help facilitate the installation and operation of equipment. | 11/23/2015: Reduced the Probability of Occurrence from 25-50% to 10-25% due to the significant attention this topic has garnered by Don Petravick and the team at NCSA. Don has been working on developing a detailed and comprehensive Information Technology Infrastructure Library (ITIL) plan that takes into account the desire to have a central integrated IT solution while accounting for the need to have site-specific implementation and support models. This work is being captured as part of the TOWG and LOPT operations planning efforts.    7/18/16: This topic has received extensive discussion and attention due in some part to identifying this topic as a risk. Jeff Kantor has now ben designated as a point person to lead this effort. He is receiving support from a team spanning multiple teams and disciplines across the project. This risk will be re-evaluated in a few months to determine if the probability of occurrence should be decreased due to work accomplished by then.    9/30/16: Jeff Kantor has made significant progress on this item, assembling several project-wide tiger teams. The results are being used to update project baselines where appropriate and to influence the LOPT / Operations Planning work, including updates to the Operations WBS. Reduced the probability from 10-25 percent to 5-10 percent.    1/05/17: No Change. The Summit-Base ITC Tiger Team is currently writing a baseline design document that should be ready for the Change Control Board in the Feb. 2017 timeframe. After that document gets written, reviewed, and approved as a baseline document, the probability of this risk can be further reduced. No change until the document is approved.    12/20/17: Probability was reduced from 5-10 percent to 0-5 percent. This is due to the strong leadership of Jeff Kantor who has coordinated the IT efforts between north and south. Jeff temporarily relocated to Chile for 3 months to oversee the design, install of fibers, networking equipment, and racks in the summit facility. Additionally, IT resources have been hired in Chile to help facilitate the installation and operation of equipment.    06/06/2019: No Change. it is noted that has been some loss in personnel in Chile for IT support. If replacement hires take long then the risk of occurrence may increase. |
| **WBS code** | 0 | 06C04 |
| **RM-743** | **2019-06-06 21:29:26** | **Chuck Claver** | **General Notebook 1** | Ellipticity contributions of the various components and physical effects to the overall system ellipticity are not decomposed into separate allocations to subsystems, and are instead tracked and managed at the system level, for two related reasons: (1) existing flow-down of other requirements that can be decomposed in a more straightforward way already expected to constrain the ellipticity and (2) ellipticity performance is a complex interplay of other performance characteristics, so factorized requirements would unnecessarily constrain design options. Instead, the ellipticity is treated as a system performance requirement. Although current estimates show compliance, the risk is that eventually actual performance may meet the other, factorized requirements but not the ellipticity requirement.  7/20/16: The integrated model is being updated to estimate ellipticity in all the wavelength bands. Current estimates are meeting the requirements at one wavelength. The updated model will be available by end of calendar year 2016.  21/21/2017: Updated trigger date to reflect revised schedule for the start of Commissioning with ComCam. | Ellipticity contributions of the various components and physical effects to the overall system ellipticity are not decomposed into separate allocations to subsystems, and are instead tracked and managed at the system level, for two related reasons: (1) existing flow-down of other requirements that can be decomposed in a more straightforward way already expected to constrain the ellipticity and (2) ellipticity performance is a complex interplay of other performance characteristics, so factorized requirements would unnecessarily constrain design options. Instead, the ellipticity is treated as a system performance requirement.  Although current estimates show compliance, the risk is that eventually actual performance may meet the other, factorized requirements but not the ellipticity requirement.    7/20/16: The integrated model is being updated to estimate ellipticity in all the wavelength bands. Current estimates are meeting the requirements at one wavelength. The updated model will be available by end of calendar year 2016.    21/21/2017: Updated trigger date to reflect revised schedule for the start of Commissioning with ComCam.    06/06/2019: No Change. Note that M1M3 successfully passed its re-verification at the MirrorLab, M2 has been accepted from Harris, r-band and i-band filter substrates have been accepted. All as-built optical performance has be brought into our integrated model framework. analysis continues to show baseline performance with allow specifications. |
| **RM-745** | **2019-06-05 20:13:39** | **Austin Roberts** | **summary** | OCS Interface Development Synchronization | OCS Architecture Changes Impact on Interfaces |
| **2019-06-05 20:15:03** | **Austin Roberts** | **description** | IF the OCS ISDs and OCS-to-subsystem ICDs are not synchronized prior to the earliest Phase 3 need dates, THEN systems engineering will have to initiate and negotiate unplanned technical change orders for vendor contracts or in-house designs. | IF the OCS ISDs and OCS-to-subsystem ICDs impact subsystem interfaces, THEN systems engineering will have to initiate and negotiate unplanned technical change orders for vendor contracts or in-house designs. |
| **RM-746** | **2019-06-05 21:30:57** | **Chuck Claver** | **General Notebook 1** | Several optical elements have had defects analyzed individually and deemed to be negligible. However, analysis has not been conducted at the system level to determine how the sum of the component level may affect overall system optical performance.  \* M1M3 crows feet \* M2 wood grain pattern \* L2 scratches(LCR-1115) \* L1 cracks ....  12/21/2017: No Change. | Several optical elements have had defects analyzed individually and deemed to be negligible. However, analysis has not been conducted at the system level to determine how the sum of the component level may affect overall system optical performance.   \* M1M3 crows feet  \* M2 wood grain pattern  \* L2 scratches(LCR-1115)  \* L1 cracks  ....    12/21/2017: No Change.    06/05/2019: No Change. It is noted that all optical delivered optical elements and their as-built features have been incorporated in the system optical models - ZEMAX and PhoSim. |
| **RM-747** | **2019-06-05 19:52:53** | **Austin Roberts** | **Handling Approach** | Mitigate | Accept |
| **2019-06-05 19:53:02** | **Chuck Claver** | **Current Probability of Occurrence** | 25%-50% | 5%-10% |
| **RM-749** | **2019-06-06 21:31:49** | **Chuck Claver** | **General Notebook 1** | Original Risk ID: DM-36 Risk Area: Security Risk Source: surprises Trigger Event: Science Verification Complete Comments: Edit risk after AP move CR | Original Risk ID: DM-36  Risk Area: Security  Risk Source: surprises  Trigger Event: Science Verification Complete  Comments: Edit risk after AP move CR    06/06/2019: No Change. |
| **RM-753** | **2019-06-22 23:55:06** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 16/Apr/18 12:00 AM | 22/Jun/19 11:55 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-754** | **2019-06-22 23:53:45** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 16/Apr/18 12:00 AM | 22/Jun/19 11:53 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-755** | **2019-06-22 23:50:37** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 16/Apr/18 12:00 AM | 22/Jun/19 11:50 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **2019-06-25 21:48:23** | **Wil O'Mullane** | **Current Probability of Occurrence** | 0%-5% | 0%-1% |
| **RM-757** | **2019-06-25 21:53:56** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 16/Apr/18 12:00 AM | 25/Jun/19 9:53 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-759** | **2019-06-22 23:34:14** | **Wil O'Mullane** | **Current Probability of Occurrence** | 10%-25% | 5%-10% |
| **RM-762** | **2019-06-22 23:48:31** | **Wil O'Mullane** | **labels** |  | Operations |
| **RM-763** | **2019-06-22 23:23:20** | **Wil O'Mullane** | **Current Probability of Occurrence** | 10%-25% | 5%-10% |
| **RM-765** | **2019-06-25 21:58:22** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 03/May/19 9:56 PM | 25/Jun/19 9:58 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-766** | **2019-06-22 23:56:57** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 16/Apr/18 12:00 AM | 22/Jun/19 11:56 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-769** | **2019-06-22 23:52:30** | **Wil O'Mullane** | **Last Reviewed (Deprecated)** | 16/Apr/18 12:00 AM | 22/Jun/19 11:52 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-774** | **2019-06-05 19:35:18** | **Tim Jenness** | **Current Probability of Occurrence** | 50%-75% | 10%-25% |
| **2019-06-05 19:35:58** | **Tim Jenness** | **assignee** | Tim Jenness | Leanne Guy |
| **2019-06-05 19:37:06** | **Tim Jenness** | **WBS code** | 02C.03, 02C.04 | 02C |
| **2019-06-05 19:37:13** | **Tim Jenness** | **assignee** | Leanne Guy | Wil O'Mullane |
| **2019-06-05 19:37:29** | **Tim Jenness** | **Last Reviewed (Deprecated)** | 03/May/19 2:03 PM | 05/Jun/19 12:37 PM |
| **status** | Active Risk/Opportunity | Active Risk/Opportunity |
| **RM-780** | **2019-06-06 21:12:11** | **Chuck Claver** | **General Notebook 1** | Trigger date based on first use of the commissioning camera after telescope acceptance.  7/20/16: Updated trigger date to Oct 2019 based on latest schedule of when ComCam will arrive on the mountain.  11/23/2015: Collected wavefront data on Magellan and applied our wavefront algorithm. The results are promising.  9/29/2016: ComCam as a wavefront sensor and its ability to align the telescope is currently being analyzed with PhoSim.  12/21/2017: Simulation and analysis of the AOS is a high priority for SE/Commissioning and T&amp;S. However the software development needed from T&amp;S is lagging to performance this analysis.  03/28/2018: T&amp;S software development continues to lag the need for simulations and analysis to determine optimum control strategy. Therefore the probability of occurrence has increased. | Trigger date based on first use of the commissioning camera after telescope acceptance.    7/20/16: Updated trigger date to Oct 2019 based on latest schedule of when ComCam will arrive on the mountain.    11/23/2015: Collected wavefront data on Magellan and applied our wavefront algorithm. The results are promising.    9/29/2016: ComCam as a wavefront sensor and its ability to align the telescope is currently being analyzed with PhoSim.    12/21/2017: Simulation and analysis of the AOS is a high priority for SE/Commissioning and T&amp;S. However the software development needed from T&S is lagging to performance this analysis.    03/28/2018: T&S software development continues to lag the need for simulations and analysis to determine optimum control strategy. Therefore the probability of occurrence has increased.    06/06/2019: No Change. T&S software has progressed, but there still remains work to be done to handle "image pre-processing" - e.g. source selection and de-blending - to fully validate the expected AOS perfromance |
| **RM-783** | **2019-06-06 21:30:57** | **Chuck Claver** | **General Notebook 1** | This Project-level systems engineering risk covers the risk of having to renegotiate 5 major subsystem interfaces (and associated contracts):    1) Camera cooling system [risk: cooling system not fully designed/specified]  2) Hexapod/Rotator [risk: late changes to interface mechanical drawing]  3) Cable wrap [risk: increase in number of utility lines exceeds capacity of baselined cable wrap]  4) Wavefront sensor [risk: late focus displacement requirement change causes redesign]   - Resolved  5) Utility interface definition to Phase 3    11/23/2015: No change in probability or cost, but it is noted that recently an issue between the Camera and T&amp;S has developed due to the camera now requesting an additional glycol allocation that cannot be supported with baselined hardware. Because the summit facility is now under construction, an associated change request may result in a portion of this risk being realized with the result being that the glycol system needing to grow in capacity.    3/28/2016: No change in probability or impact, but it is noted that there are still multiple open issues spanning the items listed above (1 through 5). For item 3) Cable Wrap, the number of lines will not change but there are open issues regarding the insulation thickness.    This risk has an associated opportunity: SE-293 Camera-Telescope Interfaces Finished Ahead of Schedule.    07/18/16: Item #4 (wavefront sensor - late focus displacement requirement: LCR-617 was approved on 6/21/16, which resolves the focus replacement TBR). On #5,we have reached technical agreement on the refrigerant line interfaces. There are still some open issues on where the compressors will be located. Additionally, there is agreement on the coolant requirements (flowrate, delta T, max pressure). While some items have been reduced in probability, others remain high, and many have not reached official agreement through an approved change request. As such, the probability and occurrence will remain the same for now but will be re-evaluated in a month or two after some pending change requests are evaluated by the CCB.    09/30/16: While there has been some previous progress on defining the details of many of the utility lines, the changes have not yet been voted on, as the teams have requested more time to review and hold meetings. There will be no reduction in probability or impact until these change requests get approved. Camera refrigeration performance is still a high risk item. This aspect of the risk will be re-evaluated after the refrigeration review in Nov. 2016.    01/04/17: 1) The camera refrigeration team lead recently left the project and the replacement is only part time. This camera subsystem still has some technical performance issues, and in particular, does not meet the maintainability requirements. 1a) An agreement to use dynalene has been generally accepted. This will be approved at the next CCB in Jan 2017. 2) There may be additional camera change requests to LSE-18 that could impact this item. 5) is still very high risk.    06/06/17: This risk used to include the risk of the camera refrigeration system not meeting performance requirements. This particular risk has been partially retired (technical performance requirements are now being met according to test data). However, the maintainability requirements of the camera are not being met by the refrigeration system and have observatory-level impacts. Because of this, the risk of the camera refrigeration system not meeting its maintainability requirements has been broken out as a separate risk (SE-322). The cost impact of this risk (SE-227) has been slightly reduced, accordingly.    7/5/2017: This risk is intended to cover the handling on vendor documentation also, not only internal LSST documentation.    12/20/17: No change. Recent updates to the camera mass and c.g. rollups showed the c.g. was out of specification. However, upon further analysis, it was shown that the integrated TMA and hexapod/rotator could handle the deviation, as the second moments of inertia were acceptable. It is expected that as final design decisions are made that potentially more cases like this example may arise; therefore, there is not change in the assessment of this risk at this time.    03/28/2018: reduced the probability of occurrence from 50-75 percent to 25-50 percent due to significant progress with the camera cooling and refrigeration systems as well as solidification of the associated ICDs. Hexapod rotator interfaces are stabilized. | This Project-level systems engineering risk covers the risk of having to renegotiate 5 major subsystem interfaces (and associated contracts):    1) Camera cooling system [risk: cooling system not fully designed/specified]  2) Hexapod/Rotator [risk: late changes to interface mechanical drawing]  3) Cable wrap [risk: increase in number of utility lines exceeds capacity of baselined cable wrap]  4) Wavefront sensor [risk: late focus displacement requirement change causes redesign]   - Resolved  5) Utility interface definition to Phase 3    11/23/2015: No change in probability or cost, but it is noted that recently an issue between the Camera and T&amp;S has developed due to the camera now requesting an additional glycol allocation that cannot be supported with baselined hardware. Because the summit facility is now under construction, an associated change request may result in a portion of this risk being realized with the result being that the glycol system needing to grow in capacity.    3/28/2016: No change in probability or impact, but it is noted that there are still multiple open issues spanning the items listed above (1 through 5). For item 3) Cable Wrap, the number of lines will not change but there are open issues regarding the insulation thickness.    This risk has an associated opportunity: SE-293 Camera-Telescope Interfaces Finished Ahead of Schedule.    07/18/16: Item #4 (wavefront sensor - late focus displacement requirement: LCR-617 was approved on 6/21/16, which resolves the focus replacement TBR). On #5,we have reached technical agreement on the refrigerant line interfaces. There are still some open issues on where the compressors will be located. Additionally, there is agreement on the coolant requirements (flowrate, delta T, max pressure). While some items have been reduced in probability, others remain high, and many have not reached official agreement through an approved change request. As such, the probability and occurrence will remain the same for now but will be re-evaluated in a month or two after some pending change requests are evaluated by the CCB.    09/30/16: While there has been some previous progress on defining the details of many of the utility lines, the changes have not yet been voted on, as the teams have requested more time to review and hold meetings. There will be no reduction in probability or impact until these change requests get approved. Camera refrigeration performance is still a high risk item. This aspect of the risk will be re-evaluated after the refrigeration review in Nov. 2016.    01/04/17: 1) The camera refrigeration team lead recently left the project and the replacement is only part time. This camera subsystem still has some technical performance issues, and in particular, does not meet the maintainability requirements. 1a) An agreement to use dynalene has been generally accepted. This will be approved at the next CCB in Jan 2017. 2) There may be additional camera change requests to LSE-18 that could impact this item. 5) is still very high risk.    06/06/17: This risk used to include the risk of the camera refrigeration system not meeting performance requirements. This particular risk has been partially retired (technical performance requirements are now being met according to test data). However, the maintainability requirements of the camera are not being met by the refrigeration system and have observatory-level impacts. Because of this, the risk of the camera refrigeration system not meeting its maintainability requirements has been broken out as a separate risk (SE-322). The cost impact of this risk (SE-227) has been slightly reduced, accordingly.    7/5/2017: This risk is intended to cover the handling on vendor documentation also, not only internal LSST documentation.    12/20/17: No change. Recent updates to the camera mass and c.g. rollups showed the c.g. was out of specification. However, upon further analysis, it was shown that the integrated TMA and hexapod/rotator could handle the deviation, as the second moments of inertia were acceptable. It is expected that as final design decisions are made that potentially more cases like this example may arise; therefore, there is not change in the assessment of this risk at this time.    03/28/2018: reduced the probability of occurrence from 50-75 percent to 25-50 percent due to significant progress with the camera cooling and refrigeration systems as well as solidification of the associated ICDs. Hexapod rotator interfaces are stabilized.    06/06/2019 No Change. |
| **RM-784** | **2019-06-05 19:14:44** | **Austin Roberts** | **Obligation Date** | 31/May/21 | 1/Dec/21 |
| **RM-813** | **2019-06-22 00:03:02** | **Wil O'Mullane** | **Random risk/opportunities may occur during** | 0 | Construction only |
| **RM-815** | **2019-06-27 16:50:31** | **Andy Clements** | **labels** |  | Software |
| **RM-820** | **2019-06-27 16:56:48** | **Andy Clements** | **labels** |  | Software |
| **2019-06-27 22:01:19** | **Austin Roberts** | **FTE's required** | 0 | 1 |
| **2019-06-27 22:01:50** | **Austin Roberts** | **FTE's required** | 1 | 0 |
| **2019-06-27 22:02:18** | **Austin Roberts** | **Schedule Recoverable** | No | Yes |
| **2019-06-27 22:02:37** | **Austin Roberts** | **FTE's required** | 0 | 2 |
| **2019-06-27 22:02:42** | **Austin Roberts** | **Expected (months)** | 1 | 2 |
| **2019-06-27 22:03:41** | **Austin Roberts** | **Expected Dollars (K$)** | 0 | 50 |
| **2019-06-27 22:05:23** | **Austin Roberts** | **Handling Approach** | Mitigate | Accept |
| **RM-821** | **2019-06-27 17:32:43** | **Andy Clements** | **labels** |  | Software |
| **RM-823** | **2019-06-27 16:57:50** | **Andy Clements** | **labels** |  | Software |
| **RM-824** | **2019-06-27 17:34:29** | **Andy Clements** | **labels** |  | Software |
| **RM-825** | **2019-06-27 17:34:54** | **Andy Clements** | **labels** |  | Software |
| **RM-826** | **2019-06-27 17:35:41** | **Andy Clements** | **labels** |  | Software |
| **RM-830** | **2019-06-27 17:36:34** | **Andy Clements** | **labels** |  | Software |
| **RM-831** | **2019-06-27 17:37:00** | **Andy Clements** | **labels** |  | Software |
| **2019-06-27 21:57:50** | **Austin Roberts** | **resolution** | 0 | Done |
| **status** | Active Risk/Opportunity | Realized |
| **RM-832** | **2019-06-27 17:37:41** | **Andy Clements** | **labels** |  | Software |
| **RM-835** | **2019-06-27 17:39:12** | **Andy Clements** | **labels** |  | Software |
| **RM-836** | **2019-06-27 17:39:46** | **Andy Clements** | **labels** |  | Software |
| **RM-837** | **2019-06-27 17:40:29** | **Andy Clements** | **labels** |  | Software |
| **RM-838** | **2019-06-27 17:41:15** | **Andy Clements** | **labels** |  | Software |
| **RM-839** | **2019-06-27 17:41:56** | **Andy Clements** | **labels** |  | Software |
| **RM-844** | **2019-06-27 17:44:28** | **Andy Clements** | **labels** |  | Software |
| **RM-848** | **2019-06-27 17:46:00** | **Andy Clements** | **labels** |  | Software |
| **RM-850** | **2019-06-27 17:46:44** | **Andy Clements** | **labels** |  | Software |
| **RM-853** | **2019-06-27 17:47:26** | **Andy Clements** | **labels** |  | Software |
| **RM-861** | **2019-06-27 17:49:01** | **Andy Clements** | **labels** |  | Software |
| **RM-862** | **2019-06-27 17:49:32** | **Andy Clements** | **labels** |  | Software |
| **RM-863** | **2019-06-27 17:50:07** | **Andy Clements** | **labels** |  | Software |
| **RM-868** | **2019-06-27 17:51:10** | **Andy Clements** | **labels** |  | Software |
| **RM-871** | **2019-06-27 17:52:28** | **Andy Clements** | **labels** |  | Software |
| **2019-06-27 17:52:46** | **Andy Clements** | **labels** | Software |  |
| **RM-876** | **2019-06-27 17:53:59** | **Andy Clements** | **labels** |  | Software |
| **RM-877** | **2019-06-27 17:54:27** | **Andy Clements** | **labels** |  | Software |
| **RM-879** | **2019-06-27 17:59:32** | **Andy Clements** | **labels** |  | Software |
| **RM-881** | **2019-06-27 18:00:23** | **Andy Clements** | **labels** |  | Software |
| **RM-885** | **2019-06-27 18:03:06** | **Andy Clements** | **labels** |  | Software |