# Laboratory Directed Research and Development
# Procedure for "Integrated Experiment" DR Projects

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## Overview

About a quarter of Los Alamos LDRD/Directed Research projects can be classified as integrated experiments. These are projects that focus on a single large initiative, such as building a new instrument and using it to take scientific data. For these projects, success tends to be "all or nothing." All but a handful of such projects that concluded at the end of FY12-14, most of them before the FY14 budget reductions, failed to complete their integrated experiment in time to obtain a significant science result during their three-year duration. Most were not failures, generally delivering some sort of capability and a body of theoretical results. Some succeeded with follow-on funding from LDRD or elsewhere. Nonetheless, it is not sound management practice to accept this level of incompletion, and a new approach is needed.

This procedure for managing such projects was developed in collaboration with panel of experienced hardware project leaders that included Cris Barnes (P), Subrata Nath (AOT), Kevin John (C), Herb Funsten (ISR), Jon Kapustinsky (P), Chuck Mielke (MPA), and Jason Scharff (WX). The panel agreed that steps should be taken to increase the probability of project success.

While we in no way wish to change the exploratory, high-risk high-reward nature of LDRD, we also do not want LDRD to promote overselling and under-delivering as a way to run projects. We propose certain measures to be put into effect as soon as possible to help "integrated experiments" reach a higher level of success. These would be implemented throughout the lifecycle of a project, from proposal selection onwards.

## Proposal Selection

*Deeper Consideration of Project Experience by Review Panels*

The SAP criteria include:

> ***"****Qualifications****:*** Do key participants have a record of delivering, quantitatively and qualitatively, as appropriate to their seniority? Have they successfully managed R&D risk? Is the team strong with respect to their national and international peers?"

However, this has been largely interpreted as an assessment of technical accomplishment. We will make clear to the SAPs that their job includes evaluating the experience of project leadership in pulling off complex projects, inside and outside LDRD, including engineering design, integration, construction, and commissioning required to make difficult measurements. Review panels will still consider technical credentials, but will also include leadership credentials, taking care not to bias against emerging leaders. It is the task of proposers to make their own case in this regard, like their case for any other criterion; the appropriate place to do so is in the resume section.

Proposers will be informed after pre-proposal round that their projects are candidates to be managed as "integrated experiments," with minimal impact on full proposal evaluation process but more impact thereafter. They are thus warned to make their case for project

experience. After the final Strategy Round rankings, and before AD final engagement, the LDRD Program Office will consult with outside experts to finalize which proposals would be managed as integrated experiments.

**Post-selection Development of Schedule, Budget, and Success Criteria**

*Feasibility Review*

All integrated experiment DRs must pass a Feasibility Review in order for the full project to be funded. Typical criteria for a feasibility review are shown in the Appendix; the feasibility review panel would be drawn from staff that is expert in project management at the appropriate scale, and independent of the project. The panel would be selected in consultation with the PI and Co-PI divisions. At the Feasibility Review, the team might demonstrate that they have commitments from people to start working, in particular, ensuring that key hires or postdocs are here or on the way.

*Goal/Schedule/Milestone/Budget Negotiation*

In the interim between project announcement and fiscal year start, the LDRD Program Office will begin discussions with the PI regarding minimum and desired project goals, with defined success criteria, and resources/schedule to achieve those goals. These would be finalized at the Feasibility Review. The desired goals should remain consistent with the proposal, unless there has been a significant change in the funding from what was proposed. The schedule should include 2-4 milestones per year, which will be the basis for interim discussions between the PI, line management, and the LDRD Program Office (see below). While it is unlikely that the overall budget for a project can be significantly increased, it may be possible to renegotiate the funding profile and change it from the default flat budget for three years. The goal is to provide the PI as much flexibility as possible to optimize the chance of success. In addition to managing risks, PI should identify opportunities that could reduce cost or accelerate schedule. They should avoid scope or requirements creep unless their original goals are on a path to success. We need to remember that success criteria are endpoints, not the path to the endpoint, and should not be defined in a way that hinders project leadership and thus makes success less likely.

Clarification of minimum goals will ensure that we do not scramble to determine whether a project has succeeded *post facto,* with no objective basis for deciding. If in the course of the pre-project discussion the LDRD Program Office concludes that there is high risk for achieving even minimum goals that still preserve the spirit of the proposal, the ADs and PADSTE will be brought into the discussion. No project will be started until and unless the minimum goals appear likely and the desired goals are credible. If this is not the case, the concern will be referred to the relevant ADs and PADSTE and a path forward negotiated between them and the LDRD Program Office.

*Feasibility Studies*

As a default, projects that were defined as "integrated experiments" in the invitation for a full proposal will be initially funded for an ~$225K, six-month feasibility study. This budget will be additional to that for the main, 36-month project. The

goal/schedule/budget agreement above will be put off until the end of the feasibility study. Large procurements are better understood after feasibility study, and the feasibility study gives time to get the big procurements going. The feasibility study does not obviate the need for proposals to set out enough analysis of feasibility in their full proposals for SAP review. An additional benefit would be that the main project would thus run from April of the first FY to March of a fourth FY, which is more consistent with the current LANSCE beam cycle for experiments that need beam time. The Feasibility Review would take place towards the end of the feasibility study.

In discussions with the LDRD Program Office before project start, the PI may propose a different duration and funding level for the feasibility study, or propose to waive the feasibility study and move directly into the project, for example because time is of the essence. If the PI of an integrated experiment chooses to waive the feasibility study, he/she would be nonetheless required to pass a Feasibility Review by the end of the fourth month of the project.

## PI Project Management Training

The panel thought it would be helpful to establish a PI training focused on project management to introduce PIs to the financial system (OBI), establish a simple work breakdown structure, and draw on lessons learned from other successful projects. The training would take place in September before the projects start.


*This SharePoint site is an example of a project management tool that could be used to manage an LDRD integrated experiment.*

## Project Tracking During Its Term

*More Frequent Engagement Based on Milestones*

To improve communication between the project team, line management, and the LDRD Program Office, we will use project milestones as a basis for informal communication 2-4 times per year. The PI, division, and LDRD/PO will agree at the start of the project on 2-4 “Milestone” objectives each year, with informal reporting on each milestone to line management and LDRD/PO. Divisions will name a Project Management Mentor as a point of focus for these communications Learning to report on "milestones" is an important skill for PIs to learn for working on sponsored programs, as is learning how to estimate the resources (funding, people, schedule logic) needed to achieve each milestone. Without these skills, errors and omissions are likely.

Milestone reporting will be written, typically in an e-mail, in a format defined by line management. This would drive more frequent engagement between program, line, and the team, without the large preparation costs associated with formal appraisals. A summary of milestone interactions will be included in the next project appraisals. The dialog will largely be between the project team and line management, and follow-up action should the project be lagging will be led by line management.

The LDRD Program Office will track these interactions, and may get involved when significant delays are experienced, or if the milestone reporting is absent. However, it is the responsibility of line management to inform the LDRD Program Office if the project is *significantly* lagging in its milestones. If the lag is such that minimum project success no longer appears likely, the concern will be referred to the relevant ADs and PADSTE and a path forward negotiated between them and the LDRD Program Office.

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## Appendix

*Typical criteria for a feasibility review.*

### *Project Organization*

1. In your estimation, does the project have an effective organizational structure?
2. Do you have any concerns and/or suggestions regarding project roles and responsibilities?

### *Project Plan*

3. In your estimation, is the proposed project plan an effective tool to guide the project from inception to completion?
4. Does the project plan include relevant portions, appropriate to the size and phase of project, such as the Statement of Work (SOW), Work Breakdown Structure (WBS), Project Execution Plan (PEP), Risk Management Plan, and the Budget and Schedule Estimates?

### *Technical Aspects*

5. Does the project have a clear development plan for all the technical goals?
6. Are technical tests and anticipated results stated?

### *Cost*

7. Is the Budget Estimate comprehensive and verifiable?

### *Schedule*

8. Are schedule milestones clearly identified, and are the milestones frequent enough to gauge progress? Does this schedule include sufficient time for scientific exploitation of the instrument, once it is commissioned?

### *Risk*

9. Does the plan include a method for managing technical risk, budget risk, and schedule risk?

### *Procurement*

10. Are critical procurements identified?