

Three laboratory perspectives on LDRD strategy

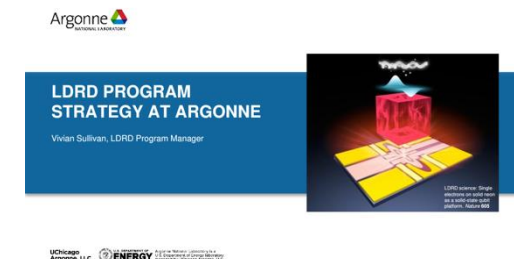
The goal was to compare how three very different laboratories use LDRD to shape their future.

Perspectives

Chris Polly, Fermilab A focused HENP laboratory extending core capabilities into emerging areas and possible future missions

Vivian Sullivan, Argonne A multidisciplinary laboratory using LDRD to implement a broad laboratory strategy

Kirsten Taylor-McCabe and Debora Wagner, Los Alamos A large NNSA laboratory sustaining scientific vitality, building future capabilities, and connecting science to mission needs



How does each laboratory use LDRD to shape its future mission?

Fermilab: extending a focused mission

Strategic context

- A deep HENP base, with most funding tied to a few major experiments and facilities
- Almost everything has an R&D component, which can make the programmatic boundary tricky
- New directions should build on capabilities that already make Fermilab distinctive

How LDRD is used

- Keep a general call open to good ideas, including ideas that advance the HENP core
- Use directed calls when we need to move quickly, as we did for Genesis

Fermilab's strategic vision



Our core program

- Particle physics provides a deep, long-lived programmatic base
- Most funding concentrates on a small number of major experiments and facilities
- Almost everything we do is R&D of one sort or another

Strategic laboratory goals

- Apply capabilities developed for HENP to AI, quantum science, microelectronics, and fusion technologies
- Expanding new core capabilities while building on existing synergies
- Explore future accelerator and detector concepts too nascent for programmatic funding
- Give the laboratory a head start when national priorities are shifting

Strategic test: Does Fermilab have a distinctive capability that gives this R&D a credible, unique path forward?

Strategic test: Does Fermilab have a distinctive capability that gives the proposed R&D a credible path forward?

Argonne: LDRD as an implementing arm of strategy

Portfolio construction

- The laboratory plan defines the major focus areas
- Leadership divides the budget among those areas before projects are selected
- Focus-area leads run the calls, reviews, and renewal decisions
- Investigators still compete on the strength of their ideas

Strategic outcomes

- A successful focus area can grow into a center, institute, program, or user capability
- Core capabilities persist even as names and federal priorities change

Argonne National Laboratory S&T Strategic Framework and LDRD

Argonne is an Office of Science Multi-Purpose Laboratory

S&T strategic planning

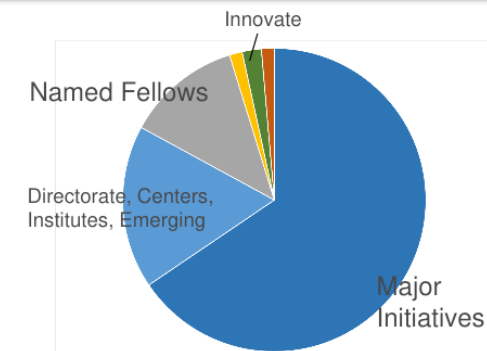
- § Major initiatives as presented in the Annual Laboratory Plan
- § Core capabilities
- § Centers and Institutes arising from past major initiatives
- § Emerging initiatives and directorate specific opportunities

Workforce development

- § Named fellows program
- § Postdoctoral program
- § Innovate LDRD proposals

Capability development

FY26 LDRD investment



Argonne uses the laboratory planning process to create strategic coherence while retaining investigator competition.

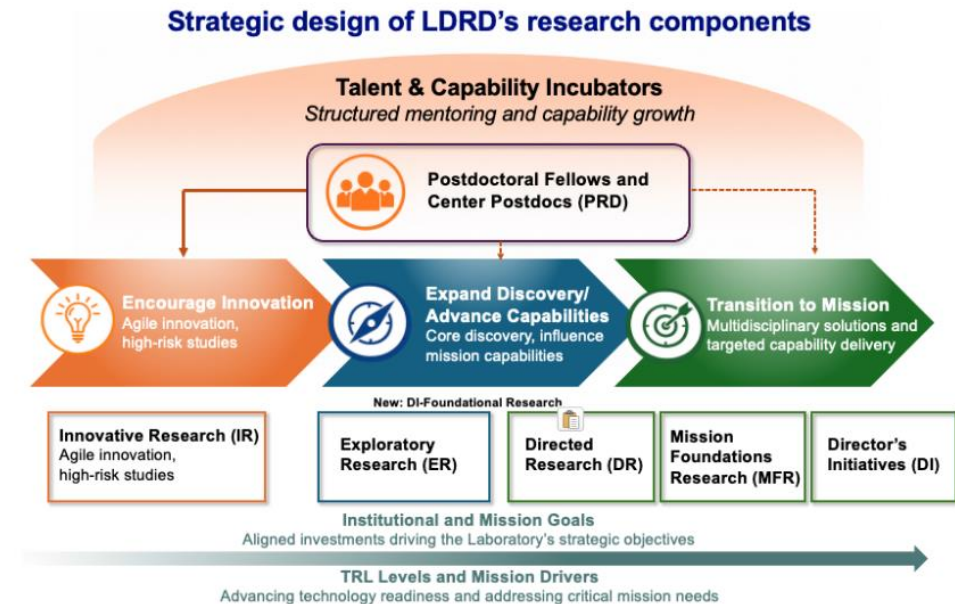
Los Alamos: connecting discovery to mission

Portfolio architecture

- A roughly \$260M program with more than 500 active projects
- Different funding mechanisms cover different levels of maturity and strategic direction
- Small innovative-research projects leave room for bottom-up ideas
- Larger directed efforts connect more explicitly to mission needs

Mission and institutional impact

- Both funded and unfunded proposals show where new ideas and gaps are emerging
- Program representatives and regular summits help projects find a path to mission



LANL treats agility, institutional learning, and transition planning as strategic capabilities in their own right.

Strategic direction and investigator discovery

- Directed investments let a laboratory respond quickly when national priorities shift
- Open calls preserve good ideas that formal planning will miss
- Fermilab, Argonne, and LANL strike this balance in very different ways
- The portfolio needs room for both

How LDRD is evolving the Laboratories innovation engine



The most effective portfolios create separate pathways for urgent priorities and unanticipated ideas.

Workforce development is a strategic outcome

What LDRD provides

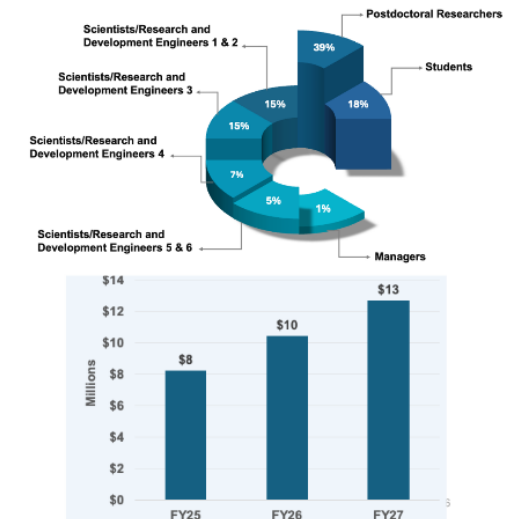
- A way for researchers to move into AI, quantum, and other emerging areas before programmatic funding exists
- Early experience writing proposals, managing money, and leading a team
- Compelling work and a path to leadership when laboratory salaries cannot match industry

Approaches and tensions

- Many Early Career winners were built on an initial LDRD investments
- Argonne and LANL use dedicated mechanisms to develop junior researchers

Developing future leaders through LDRD

- ✓ Funding for Early Career (EC)-led projects increased by **25%** from FY24 to FY25.
- ✓ **30%** of the awarded FY27 Exploratory Research projects are EC led.
- ✓ FY27 EC investments are projected to grow as additional EC-led projects are added to the FY27 mortgage plan.



Workforce development should be evaluated as an intended return on investment, not merely a by-product of the research.

The programmatic funding boundary

- At Fermilab we struggle a bit with how to define if R&D already has programmatic funding
- General consensus: A proposal rejected by another program is not automatically ineligible for LDRD
- The real test is whether the LDRD has its own scope and technical goals
- Broader use beyond one experiment or facility helps make that case

Fermilab and the programmatic funding boundary

- LDRD should not be used for R&D that already has programmatic funding available
- Can be a tricky distinction at Fermilab where almost everything we do can be considered R&D
 - All of our experiments are first-of-their-kind
 - New accelerators push the envelope of what is possible
- We have dedicated funding pools for Detector R&D and General Accelerator R&D for HEP
 - Should we use LDRD funds for efforts that were proposed and didn't make the cut? Usually the cuts are made strictly to balance budgets. Always more good ideas than \$ in any pot.
- We manage this by having the leaders of the other R&D pools serve as ex-officio, non-voting advisors on the selection committee to advise when programmatic overlap is a potential concern

What about Genesis? Is LDRD fair game to continue to advance efforts that weren't successful in the first round of funding?

9/2026

Chris Polly - Fermilab LDRD

The key question is the specific task and scope, not simply whether a program exists somewhere in the technical area.

External participation and independently executable projects

The challenge

- University users provide a large share of the intellectual horsepower at user facilities
- Their students and postdocs may already be fully supported on agency grants
- Using that effort can make an LDRD appear dependent on outside funds
- Paying again through LDRD is an expensive solution that solves the accounting problem but creates another one

Models discussed

- Fermilab pays for defined university deliverables through a PO and statement of work
- Argonne defines its LDRD around the work and funding controlled by Argonne

Advancing innovation: Where industry can engage

We are looking for strategic partners to transition emerging innovation into scalable capabilities

CRADAs and Strategic Partnerships

- Identify mission-aligned technologies or capabilities suitable for collaborative development
- Engage with LANL researchers to define shared technical objectives and transition pathways
- Co-invest in applied R&D, prototyping, and validation activities through partnership mechanism

Pilot demonstrations

- Provide operational environments, testbeds, or use cases for technology evaluation
- Partner on demonstration campaigns to validate scalability and performance

Technology Transition

- Identify integration opportunities within operational systems, workflows, or mission applications
- Participate in transition planning, commercialization pathways, and adoption strategies

University partnerships

- Establish collaborative research initiatives aligned with emerging mission needs
- Support joint proposal, student engagement, and workforce development opportunities
- Contribute complimentary expertise, facilities, and academic research capabilities

Data & Model Collaboration

- Share relevant datasets, modeling frameworks, or analytical tools to accelerate innovation
- Support data collection, operational feedback, and transition assessment activities

The Order's independence requirement does not map cleanly onto the collaborative operating model of user facilities and is subject to FSO interpretation

Transition begins before the project ends

- Follow-on funding is more likely when potential customers engage early
- LANL starts transition planning before the project is selected
- Argonne focus-area leaders stay responsible for the path beyond LDRD
- Fermilab asks whether the work can justify a larger future commitment

Transitioning innovation to mission and industry impact

Transition Planning

- Pls identify the Program Offices that are aligned to their projects, creating connections between outcomes and programmatic mission needs and support
- Organized LDRD Summits and engagement forums build awareness of emerging capabilities, transition opportunities, and mission relevance across programs and partners
- Assigned Program Representatives (larger projects) support continuity in planning from concept development to operational relevance

Feynman Center for Innovation

- Connects researchers with external partners and strategic collaborators
- Expand opportunities for co-development, transition, and commercialization
- Strengthens alignment with national security and industry priorities



Technology Maturation

- LDRD's clear innovation pathway that supports projects on a continuum from low to high TRL levels helps advance technologies from proof-of-concept toward deployable capability
- Positions innovations for program adoption and broader mission impact

9/15/26

9

Transition is a managed relationship with future users, not a funding event at the end of year three.

Success is broader than follow-on funding

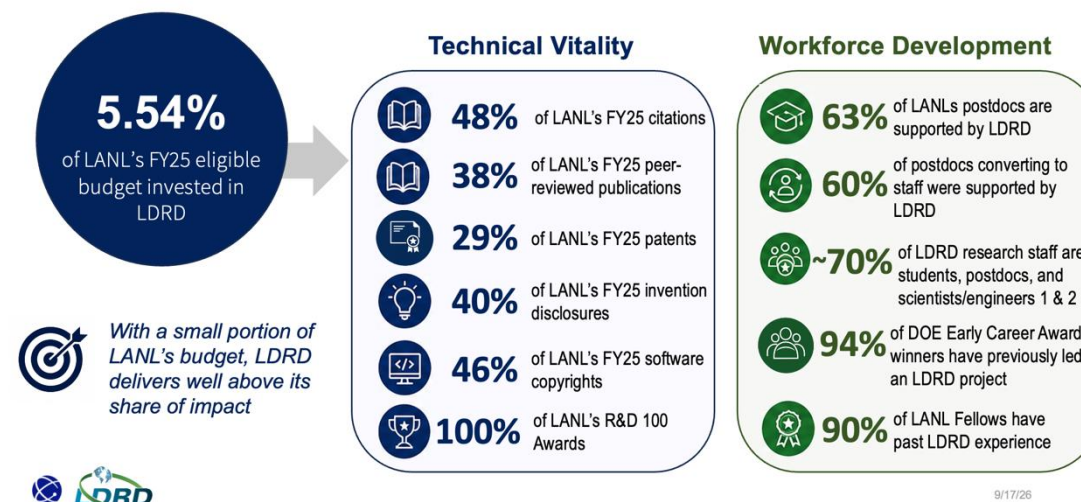
Observable outputs

- Publications, software, patents, awards, and follow-on funding
- New programs, partnerships, user capabilities, and deployed technologies
- Early Career awards, leadership roles, recruitment, and retention

Strategic value

- A capability that changes what the laboratory can credibly propose
- A workforce better able to move between science and mission

LDRD accelerates scientific and workforce impact at LANL

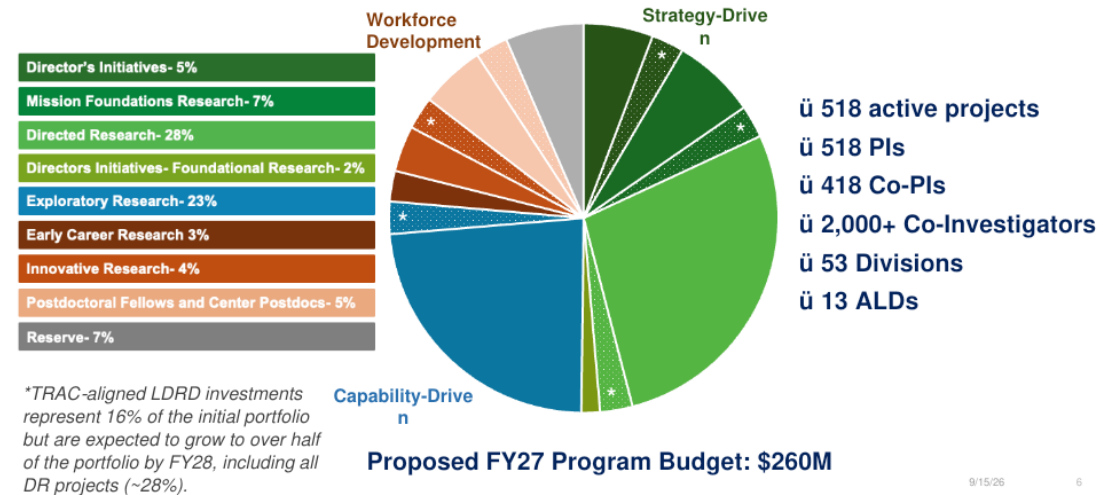


No single metric captures the strategic return. Laboratories need a compact portfolio of scientific, mission, capability, and workforce measures.

Different scales require different governance

- Fermilab can review a modest portfolio largely through one central process
- Argonne allocates funding by focus area and delegates project decisions to the area leads
- LANL manages several funding mechanisms and more than 500 projects with a small central team
- The right governance model depends on the laboratory's scale and mission

The LDRD Program today



LDRD programs should share principles across the complex while retaining governance that fits each laboratory's mission and scale.

What we learned

- LDRD moves faster than programmatic funding and gives laboratories room to test uncertain ideas
- Strong portfolios leave room for both investigator discovery and directed priorities
- The return includes capabilities, people, institutional learning, and future options
- Issues can arise at the boundaries of the DOE Order and local interpretation

Warm thanks to Vivian Sullivan, Kirsten Taylor-McCabe, and Debora Wagner for sharing candid perspectives from Argonne, and Los Alamos.



The differences among the laboratories made the common lessons much clearer.