

**Los Alamos National Laboratory
Information Science and Technology
Institute (ISTI)**

FY2021 Call for Proposals

—

Research and Development

November 2020

LA-UR-22-20003

ISTI Information Science
& Technology Institute

1 Introduction

The Information Science and Technology Institute (ISTI) at Los Alamos National Laboratory (LANL) is one of the Science Institutes in the Lab's National Science Education Center (NSEC). It covers three science disciplines:

- Computer and Computational Science
- Computing Platforms (including Quantum and Novel Computing)
- Data Science and Artificial Intelligence

1.1 ISTI Strategy

As one of the six strategic centers organized under the NSEC, ISTI is chartered to foster high quality research efforts, specialized recruiting, and strategy development within its assigned scientific discipline areas. The main purpose of strategic centers is to:

1. Focus, Laboratory-wide, on strategically important areas of science, engineering, or technology that span areas of expertise beyond that residing in any single management structure,
2. Provide external visibility and collaboration in strategic areas of need that require a single Laboratory voice,
3. Provide education of present and future scientists and engineers that are required to maintain LANL competency,
4. Help with recruitment or retention of technical talent.

A key part of fulfilling ISTI's strategic role is offering this call for proposals that supports strategic research opportunities for students, postdocs and staff. These opportunities build new capabilities or explore new approaches in the science disciplines supported by ISTI.

The pace of innovation and advances in information science and technology (IS&T) has continued to create new opportunities across the IS&T science discipline areas. For example, the Exascale Computing Project (ECP) has matured and is delivering on the goals of applications, software, and hardware for the upcoming generation of high-performance computing systems. Nationally, discussions are underway to plan for research beyond the ECP, including computing technologies with extremely heterogeneous architectures, and novel computing paradigms such as quantum and neuromorphic computing. The broad National Strategic Computing Initiative (NSCI) Strategic Plan and the DOE's Artificial Intelligence Technology Office makes the case for how Artificial Intelligence and Machine Learning, Novel Computing Technologies, and Computational Science, in combination with large-scale computing, are revolutionizing scientific discovery. Future opportunities for the continued advancement of modeling and simulation and computing platforms has been articulated recently by the National Laboratory Directors Council Future Science and Technology Opportunities, while National Nuclear Security Administration (NNSA) needs are motivated by the recent Nuclear Posture Review and more detailed articulations in the FY20 Stockpile Stewardship Management Plan. Other emerging LANL mission priorities include Design for Manufacturing (DFM), Infrastructure Security, and Global Security.

2 Strategic Focus Area

The specific ISTI strategic focus area for this call is data science and artificial intelligence. Within this focus area, two areas of interest are described: 1) data science and artificial intelligence infrastructure, and 2) computational and data integrity.

2.1 Data Science and Artificial Intelligence Infrastructure

The Laboratory generates large data sets via experiments, sensors, observations, and simulations. Current data management, reduction, and analysis techniques often produce only limited analysis results, typically because the mechanisms for more detailed analysis are unwieldy or cannot be completed in a timely manner. Data in many forms and venues is regarded as a valuable resource for artificial intelligence and advanced analytics, but current approaches to extracting value from data are not generally well-matched to the size and dimensionality of the scientific data we produce. The Laboratory needs to adopt a comprehensive approach to data management and analysis.

Artificial intelligence will enhance our computational, analysis and high-performance computing approaches. Computing at the edge of experiments or of space requires a different set of mechanisms to manage large-scale streaming data flows. Timely interactive feedback is critical to understanding and acting on observations, experiments, and predictive simulations. Co-design of appropriate software and hardware assisting in each of these scientific discovery regimes is another necessary priority.

An overall goal is to engineer and incorporate a full toolchain of artificial intelligence, data management, streaming, interactive, and large-scale data analysis mechanisms that routinely extract enhanced knowledge from raw scientific data.

Priority areas include:

- **Simulation:** Research the intersection of artificial intelligence, machine learning, statistics, and/or data science with computational multi-physics approaches.
- **Co-design:** Incorporate data-centric hardware elements with software and applications to produce efficient and effective data understanding and analysis solutions.
- **Data management:** Develop mechanisms within computing platforms to efficiently capture, manage, query and steward data and metadata generated by large multi-scale scientific simulations.
- **Streaming:** Develop streaming techniques to manage and combine data generated by sensors or observations and develop techniques to process and analyze data both at edge devices and at centralized computing facilities along the data path.
- **Workflow validation:** Integrate real-world data into robust validation workflows for mission relevant processes such as materials design and characterization.
- **Interactivity:** Develop data-centric techniques and AI-based methods for providing rapid and actionable interactive feedback during experimental, simulation, and analytics focused workflows.

2.2 Computational and Data Integrity

Data science and artificial intelligence promise breakthroughs in the speed, accuracy, and scale of data analysis, simulation, and signal processing. Yet the validity of data-driven decisions and discoveries made from these tools depend critically on the integrity and correctness of both data and analytical tools; particularly as data-intensive science and analysis are increasingly automated. This includes providing transparency and understanding of the limits of the underlying mathematical model embedded in the tools. Information, in the form of data or an analysis tool, lacks integrity when it is manipulated, unintentionally biased, or otherwise inappropriate for answering the question at hand. Understanding and preventing information manipulation and bias is an increasingly important field of study. Assuring the veracity and validity of inferences through methods including uncertainty quantification are essential components of data-driven decision making.

An overall goal is to detect and insure against both intentional and unintentional misleading, corrupted, or biased data, analytic methods, artificial intelligence and machine learning (ML) algorithms, simulations, and conclusions. Longer-term the goal is to significantly increase our confidence in predictions by implementing methods to ensure the integrity of information in applications of interest to LANL such as modeling and simulation tools, experimental and manufacturing facilities, sensors, satellites, AI algorithms, and detectors in the field.

Priority areas include:

- **Verifiable AI & ML:** Research and develop robust prediction methods with quantified uncertainty, to include resilience of AI decisions in contested environments.
- **AI model interpretability:** Research methods to interpret model results that are defensible to the decision-maker.
- **Information protection:** Research and develop impenetrable methods of information protection and information transfer.
- **Data integrity:** Explore methods for verifying data, including sensor and metadata, and tool integrity, by detecting deviations or manipulations supported by provable methods including quantum and post-quantum classical methods such as zero-knowledge proofs.
- **Computational & system integrity:** Research and develop methods and techniques to provably protect and assure computational integrity using highly robust and novel approaches such as cryptography, formal methods, secure hardware, physically unclonable functions, and quantum technologies.

3 Program Elements

All ISTI program elements should support the ISTI strategic focus area (defined in Section 2) or support revolutionary ideas that are ISTI-related and are relevant to Laboratory missions. Please identify in your submission as supporting the strategic area or as a revolutionary idea. Note that the majority of funded program elements will support the ISTI strategic focus area. The current ISTI research and development (R&D) program elements are:

Program Elements	Selection Period per year	Submissions Due	Document section that describes the program and how to apply
Rapid Response R&D	2	December 18 and April 15	3.1
Student Fellow Program	1	December 18	3.2
Postdoctoral Fellow Appointment	4	Quarterly	3.3

Each program element is described below and lists the typical maximum budget and the anticipated number of awards that can be made. Proposals requesting less than the maximum budget will have a competitive advantage. Each proposal will clearly identify a single principal investigator (PI) who is responsible for the proposed project. Co-principal investigators and co-investigators are allowed but responsibility for the proposal rests with the PI.

These program elements (Rapid Response R&D, Student Fellow Appointment, and Postdoctoral Fellow Appointment) are funded through a Lab Directed Research and Development-Directed Research (LDRD-DR) project managed by ISTI and are administered as tasks of this DR. As such, all work must adhere to LDRD rules as dictated by DOE Order 413.2C, particularly:

- All tasks must be in the forefront areas of science and relevant to DOE/NNSA missions
- Tasks must not require the addition of non-LDRD funds to accomplish their goals, that is, augmentation is not permitted

At each selection date, proposals will be divided into three categories:

1. Fund Now – these will go forward immediately.
2. Defer – these will remain to be considered again at the next selection date together with any new proposals received.
3. Do not fund – proposal is denied and can only be submitted again after a significant re-write.

3.1 Rapid Response Research and Development

ISTI Rapid Response - Research and Development	
Description	
ISTI solicits proposals for small but crucial projects in support of new, high-risk ideas, feasibility studies, or other basic R&D in support of upcoming proposal opportunities across the spectrum of LANL programs. These proposals are reserved for new scientific ideas that are mission-relevant, at their early stage of development, and involve a multi-disciplinary approach. Proposals along the lines of this call's focus areas are strongly encouraged.	
Funding Guidance	Funding maximums are \$30K for a 3-month and \$60K for a 6-month study.
Project Length	3 or 6 months
Who can apply?	LANL Technical Staff Members, LANL Postdocs
Submission Guidelines	To submit, send your proposal via email to: istisupport@lanl.gov . Please indicate "2021 Rapid Response R&D Submission" in the subject line.
Anticipated Number of Awards	8 to 10, depending on available funding
Requirements	
All ISTI program elements need to support the ISTI strategic focus areas (defined in Section 2) or support revolutionary ideas that are ISTI-related and are relevant to Laboratory missions. Please identify in your submission the strategic area you are addressing or identify it as a revolutionary idea.	
The Rapid Response Research and Development Program (RR-RD) is funded out of the ISTI LDRD portfolio and <i>can</i> be used to support technical research work.	
ISTI will organize an ISTI workshop for presentations from all funded project PIs. A short report and presentation will be sent to ISTI before the workshop. In addition, the PI will provide ISTI with project metrics as requested.	
Cover Sheet	
A cover sheet that includes the ISTI program element name, the PI's name, the PI's group, any additional project personnel, the title of the project, the ISTI focus area / revolutionary area supported, a 100-word project abstract, the amount requested, and the project length.	
Proposal Format	
Use the following formatting suggestions for the main body; please limit to two total pages of text and figures plus one-page biographical sketches: <ul style="list-style-type: none"> ● Statement of problem to be addressed; ● Approach: Statement of work including expected outcomes; ● Relevance: Significance and timeliness; ● Which targeted funding opportunity does this work support; ● Short budget justification. PEM sheets not required. 	

3.2 Student Fellow Program

ISTI Student Fellow Program	
Description	
<p>A university and LANL collaborative research program. The objective of this program is to support a university student researcher as an ISTI Student Fellow to perform part of their Ph.D. thesis work at LANL in close collaboration with their LANL PI. Proposals may be submitted for collaboration with any national or international university. The number of new appointments anticipated is approximately 1-2 across all ISTI discipline areas.</p>	
Funding Guidance	
<p>The funding profile for this program consists of two parts:</p> <ol style="list-style-type: none"> 1. Support for the ISTI Student Fellow to spend a significant portion of the year at LANL. For example, graduate student support for a typical 12-week summer stay at LANL costs approximately \$35K. Note that the student can be at LANL at any time(s) during the year. While summers are typical, we encourage other times as much as possible. 2. Support for the LANL PI to devote a reasonable fraction of their time to the collaborative research project (about \$15K). <p>The individual funding items are negotiable with a total cap for this program not to exceed \$50K/year of LDRD-type funding.</p> <p>No direct funding support to a university is envisaged under this program. Note that while no direct funds flow to a LANL university partner, there are benefits to the University PI and the student:</p> <ul style="list-style-type: none"> ● The ISTI Student Fellow requires no university financial support during the time spent at LANL (typically ~3 months/year). ● The ISTI Student Fellow gains exposure and experience at an outside organization with many career opportunities for post- doctoral work and beyond. <p>Successful proposals need to include some form of matching support for the student from their university or other institutions. Acceptable forms of matching support are the same as, but not restricted to, those accepted by the National Science Foundation or other Federal research funding agencies. This matching support can include waived or reduced academic fees and travel or conference support. Note that “matching support” here refers to university support for the student at and from his university to support the student outside of the time covered by Student Fellow’s project at LANL.</p>	
Project Length	Approximately 3 months
Who can apply?	A LANL technical staff member as PI, a student & a University PI
Submission Guidelines	To submit, send your proposal via email to: istisupport@lanl.gov . Please indicate “ISTI Student Fellow” in the subject line.
Anticipated Number of Awards	1-2, depending on available funding

Requirements

All ISTI activities need to support the ISTI strategic focus areas (defined in Section 2) or advance revolutionary ideas that are ISTI-related and are relevant to Laboratory missions. Please identify in your submission, the strategic area you are addressing or identify it as a revolutionary idea.

- Each proposal is required to be staffed by an ISTI Student Fellow, a University Principal Investigator and a Los Alamos National Laboratory Principal Investigator (PI).
- The Los Alamos National Laboratory PI must submit the proposal.
- The ISTI Student Fellow needs to be enrolled in a Ph.D. program, and ready to embark on their thesis project and pass their qualifiers.
- The University PI may be any university scientist entitled by the university to be a Ph.D. program supervisor.
- Visiting scientists, adjunct faculty, and postdocs do not qualify as University PIs.
- The collaborative University-LANL research project will typically consist of a jointly agreed Ph.D. thesis research project.

The Student Fellow Program endeavors to build and foster new and/or long-term relationships with university researchers. This program offers a stepping-stone for both the student, as a prospective LANL postdoc, and the LANL and University PI to build a strong relationship. The work performed here should provide the basis for a follow-on joint proposal by the LANL and University PI to a Laboratory internal or external funding source.

If offered and applicable, the student is encouraged to participate in one of the ISTI summer schools. The University PI is encouraged to offer a lecture to an ISTI summer school as part of the PI's visit to LANL. The University PI is also encouraged to give a topical seminar on the PI's research area during the PI's visit to LANL.

ISTI will organize an ISTI workshop for presentations from all funded project PIs. A short report and presentation will be sent to ISTI before the workshop. In addition, the PI will provide ISTI with project metrics as requested.

Cover Sheet

A cover sheet that includes the ISTI program element name, the PI's name, the PI's group, any additional project personnel, the title of the project, the ISTI focus area / revolutionary area supported, a 100-word project abstract, the amount requested, and the project length.

Proposal Format

Use the following formatting suggestions for the main body; please limit to two total pages of text and figures plus one-page biographical sketches:

- Statement of problem to be addressed;
- Approach: Statement of work including expected outcomes;
- Relevance: Significance and timeliness;
- Short budget justification. PEM sheets not required.

3.3 Postdoctoral Fellow Appointment

ISTI Postdoctoral Fellow Appointment	
Description	
<p>ISTI will oversee the ISTI Postdoctoral Fellow appointment. The appointment is aligned with the other Laboratory Postdoctoral Fellow appointments including the Harold Agnew National Security, Director's, Nicholas C. Metropolis, and Chick Keller in Space and Earth Sciences. Candidates must meet the Fellows' quality bar of the Postdoctoral Committee to be considered for an ISTI Postdoctoral Fellow appointment. ISTI solicits postdoctoral research proposals from LANL mentors for postdoctoral research aligned with the mission of ISTI.</p>	
Funding Guidance	
<ul style="list-style-type: none"> • Support is 50% of the postdoc's salary in the first two years of the postdoc appointment. Third year support is limited to 25% of the postdoc's salary and is subject to a new proposal. The LANL mentor is expected to have identified funding from other program resources prior to submission to the ISTI Postdoctoral Fellow Program. For 3rd year postdocs a viable path to conversion is expected to be in place with strong programmatic support, which is why the ISTI support level drops to 25%. • New postdocs or current LANL postdocs within one year of their hire date are eligible. Preference will be given to new postdocs starting at Los Alamos. • While the proposed ISTI work can be related to the research funding providing the balance of support to the postdoc, it cannot directly support tasks from the statement of work of that research funding. 	
Schedule	
<p>Frequency of call: Typically, four times per year. Solicitations will not be offered when there is no available funding. Consideration for this appointment is currently OPEN.</p> <p>Submission: Conforming to the LANL Postdoctoral Office Quarterly meeting schedule.</p> <ul style="list-style-type: none"> • February Review - Submit early December, outcome mid-February. • May Review - Submit early March, outcome mid-May. • August Review - Submit early June, outcome mid-August. • December Review - Submit mid-September, outcome mid-December. <p>Selections: Within one week of the scheduled Quarterly meetings.</p> <p>Program New Starts: As soon as the postdoctoral candidate is available.</p>	
Project Length	2-years with a possible additional 1 year
Who can apply?	New LANL Postdoctoral candidates via LANL staff member mentor (PI), as well as current postdocs within their 1st year of hire.

Submission Guidelines	Completion of a Postdoc Candidate package by the designated quarterly deadlines and submitted to the Postdoc Program Office - https://int.lanl.gov/employees/postdoc-program/package-requirements/index.shtml
Review	Submitted postdoc candidate packages will be reviewed by the LANL Postdoctoral Committee, and final selections will be made by an ISTI Review Committee.
Anticipated Number of Awards	1-2, depending on available funding
Requirements	
<p>All ISTI program elements need to support the ISTI strategic focus areas (defined in Section 2) or support revolutionary ideas that are ISTI-related and are relevant to Laboratory missions. Please identify in your submission the strategic area you are addressing or identify it as a revolutionary idea.</p> <p>The Los Alamos National Laboratory mentor must submit the postdoctoral package.</p> <p>ISTI will organize an ISTI workshop for presentations from all funded project PIs. A short report and presentation will be sent to ISTI before the workshop. In addition, the PI will provide ISTI with project metrics as requested.</p>	
Proposal Format	
<p>As part of the postdoc package submission, you are required to submit a one-page ISTI justification memo. Please also submit your package with this memo to ISTI. This memo needs to address the following:</p> <ul style="list-style-type: none"> • How the proposed research contributes to the focused science topics of ISTI. • How the proposed ISTI 50% work differs from the main Postdoc Research proposal. • What the envisaged funding mix is for the postdoc. <p>Because of the 50% ISTI / 50% Other dual funding nature of the ISTI Postdoctoral Fellowship, proposers MUST exercise care in differentiating the work scope between the work performed for the two funding sources. In the required ISTI memo, the distinct work scope of the ISTI related work must be clearly identified and be distinct from the general Postdoctoral research statement. Topics may be related, but cannot have overlapping work statements.</p> <ul style="list-style-type: none"> • As one of the objectives of the ISTI Postdoctoral Fellow appointment is a pipeline for staff conversion, ISTI also looks at the particular mix of funding, which should be highlighted in the memo. The objective of the 50/50 funding structure is to have one-half of the funding come from a somewhat more programmatic and long-term source at LANL which ideally should help with conversion prospects for the postdoc, while the ISTI funding covers more basic research aspects. 	

Third year ISTI Fellow Applications:

- Follow the normal postdoc program directions for submitting the third-year extension memo (<http://int.lanl.gov/employees/postdoc-program/mentors/extensions/third-year-extensions.shtml>). Third Year ISTI funding is generally intended for postdocs that have a clearly identified path towards conversion.

4 Proposal Process

4.1 Review Criteria

All new proposals undergo peer review. There is one review panel for all ISTI program elements consisting of LANL IS&T experts which is augmented by external review members of subject matter experts primarily from academia when needed.

For the R&D proposals solicited through this call for proposals, we follow a similar set of criteria in the spirit of the Laboratory’s LDRD-Exploratory Research (ER) proposal process (see <https://int.lanl.gov/science/programs/ldrd/er/assets/fy20-er-assessment-criteria.pdf>) scaled and adjusted to the size and scope of ISTI programs, see Table 1.

Overall	Technical Vitality (40%)	Mission Agility (20%)	Workforce Development (10%)	Project Execution (30%)
	<i>Is the project making a significant contribution to the science and engineering strength of the Laboratory? Are the science and technology results of high quality? Is the project putting us in a position of leadership relative to and/or defining R&D directions for the broader technical community?</i>	<i>Is the project on track to deliver outcomes that support Laboratory Strategic Objective(s) and missions? Does the team understand the relevance of their work to Laboratory missions, and are they engaged with mission champions as appropriate for the maturity of their R&D?</i>	<i>Is the project making a significant contribution to attracting, retaining, and enhancing critical skills for key, long-term mission objectives?</i>	<i>Is the project well-conceived, coordinated, and executed? Is it making good progress against its objectives?</i>
Outstanding (5.0)	Work is amongst the leaders in its technical field. Project is pioneering an intellectual advance and/or a new approach to expanding our knowledge or understanding. Results of project have spurred follow-on research elsewhere and/or impacted national agenda in the field. Publications are plentiful and high- impact and/or valuable intellectual property is being produced.	The project is on track to deliver scientific discovery or technical breakthroughs that are highly supportive of one or more Laboratory Strategic Objective(s). The team understands how their targeted outcomes have potential relevance to multiple/broad Laboratory mission areas. The project is on track to make a clear mark by putting Los Alamos in a position of leadership in the technical field or mission area. If appropriate for the maturity of the R&D, the project is energetically engaged with mission champions in pursuit of follow-on work.	The PI and team members, particularly early- career emerging leaders, are rapidly growing in their technical leadership. The project is bringing talent to the Laboratory with outstanding scientific/technical and other career skills to contribute to the Laboratory’s pipeline of people and ideas. Excellent mentoring is being delivered in the course of the project.	Major productivity and output considering the level of investment. Scientific methodology is well-integrated, hypothesis-driven, and clearly articulated and executed. Project is actively and effectively managed to address difficulties and respond to new opportunities. Technical risks are well-understood and mitigated.
Excellent (4.0)	Work is highly competitive in its technical field. Project is significantly expanding knowledge or understanding. Results of project are of great interest in the field. Significant publications and/or intellectual property are being produced.	The project is on track to deliver scientific discovery or technical breakthroughs that are supportive of at least one Laboratory Strategic Objective. The team understands how their targeted outcomes have potential relevance to Laboratory mission areas. The project is on track to make a clear mark by putting Los Alamos in a leadership position of a limited sector of the technical field and/or mission area or as a competitive player in a major sector. If appropriate for the maturity of the R&D, the project is engaged with mission champions in pursuit of follow-on work.	The PI and team members, including early- career emerging leaders, are growing in their technical leadership. The project is bringing talent to the Laboratory with excellent technical and other skills. Effective mentoring is being delivered in the course of the project.	Significant productivity and output considering the level of investment. Scientific methodology is largely hypothesis-driven and is well executed. Project management typically addresses difficulties and responds to new opportunities. Technical risks are noted and generally mitigated.

Good (3.0)	Work is competitive in its technical field. Project is expanding knowledge or understanding. Results of project are of interest in the field. Publications and/or intellectual property are being produced.	The project may deliver scientific discovery or technical breakthroughs that are supportive of at least one Laboratory Strategic Objective. The team understands how their targeted outcomes have potential relevance to Laboratory missions, perhaps in a limited sector. The project is on track to position Los Alamos as a recognizable contributor to the technical field and/or mission area. If appropriate for the maturity of the R&D, the project is engaged with mission champions in pursuit of follow-on work.	The project is delivering identifiable positive impacts on technical leadership skills, Laboratory recruiting pipelines, and mentoring.	Good productivity and output considering the level of investment. Scientific methodology generally well executed. Evidence of project management that sometimes addresses difficulties and responds to new opportunities. Technical risks may be noted but not always well mitigated.
Fair (2.0)	Work is not particularly competitive in its technical field. There is little evidence that the project is expanding knowledge or understanding. Results of project do not appear to be of interest in the field. There is little or no publication or intellectual property output.	It is questionable whether the project will deliver advances that are supportive of a Laboratory Strategic Objective. The team lacks understanding of the relevance of their targeted outcomes to Laboratory missions. The anticipated STE products are at best indirectly relevant to Laboratory mission areas. The project is not currently on track to place the Laboratory amongst the competitive contributors in the technical field and/or mission area.	There is little evidence of positive impacts on technical leadership skills, Laboratory recruiting pipelines, and mentoring.	Unimpressive productivity and output considering the level of investment. Project execution based on hypothesis-driven scientific methodology is not clearly evident. Project management often fails to address difficulties or respond to new opportunities. Technical risks are often ignored or not mitigated.
Poor (1.0)	Work is not competitive in the field. Project is not expanding knowledge or understanding. Results of the project, if they exist, are uninteresting. Project has not produced publications or intellectual property.	The project is unlikely to deliver advances that are supportive of a Laboratory Strategic Objective. The team does not understand the relevance of their targeted outcomes to Laboratory missions. The anticipated STE products do not support the Laboratory Strategic Objectives or Laboratory mission areas. The project lacks technical/mission leadership potential.	There is no evidence of positive impact on technical leadership skills, Laboratory recruiting pipelines, or mentoring.	Very little productivity and output considering the level of investment. No evidence of hypothesis-driven scientific methodology in project execution. Project management does not address difficulties or respond to new opportunities. Technical risks are not discussed or mitigated.

Table 1: ISTI Research and Development Program Element review criteria

In particular, reviewers are asked to judge proposals on these additional points specific to ISTI:

- This call establishes the mission relevance of the ISTI focus areas, and the proposal must clearly address these areas and show relevance to ISTI goals.
- ISTI programs are intended to be innovative and risk tolerant. Proposals clearly need to address a new and innovative aspect, and while high risk is tolerated, the proposal needs to clearly outline these risks.
- ISTI programs support NSEC's goals of growing university interactions, educating present and future scientists and engineers, and to help with recruitment or retention of technical talent.

In preparing proposals, PIs should be aware of these factors that contribute to successful proposals:

- Proposals that are genuinely new, innovative, and not incremental.
- Willingness for risk – even the answer “now we know we can't do it this way” is a successful outcome.
- Great university interaction as evidenced by significant student interaction with LANL employees and significant PI interactions with the university personnel.
- Good use of unique LANL facilities.

4.1.1 Conflict of Interest

ISTI is committed to a fair review process and will adopt guidelines similar to those used in the Laboratory's LDRD proposal review process. In addition:

1. The ISTI Director and Focus leads are not allowed to submit or be PI of ISTI proposals.
2. ISTI Advisory Committee Members may not be external reviewers if their institution is a university partner on any of the ISTI proposals.
3. LANL reviewers may not be PIs or Co-PIs on proposals they review.

4.1.2 Written Proposal Feedback

All ISTI proposals will receive short written email feedback within a few weeks of review. Unsuccessful PIs are encouraged to discuss their proposal with ISTI management and their line management to develop strategies that can lead to a successful future ISTI submission.

4.2 Budget Caveats

ISTI will make every effort to honor the budget requests in the original proposal. However, ISTI is dependent on budget resources that at most are known for the current fiscal year only. The ISTI research portfolio is funded by the LDRD Program, which is subject to Congressional approval. Thus, ISTI project funding will always be subject to available funding to the Institute.

New or renewal proposal awards will always be subject to some uncertainty on the available funding. This can lead to awards with a reduced budget, or in the worst-case, award cancellation. ISTI will inform awardees of the final proposal budget as soon as the next year's budget is known, typically within a few weeks of the start of the fiscal year.

ISTI assumes that the proposal cost is accurate and when a project is approved for funding. ISTI expects the out-year budgets to be as originally proposed and approved. Requests for changes in funding must be well justified and will be considered on a case-by-case basis.

4.3 Miscellanea

4.3.1 Authority to start work

Because all ISTI funding is dispersed at LANL, any work by a LANL PI or postdoc can only start once a valid program code has been established for the project. University student visits cannot commence before that time.

For the rare cases where a project involves a university subcontract, work cannot begin until the Los Alamos contracting officer formally authorizes the initiation of work. There will likely be a delay of about two months (no earlier than December 1 of a given year) when the “start work” order is issued. Invoices submitted for work conducted prior to the “start work” order will not be reimbursed.

If your Student Fellow project involves a subcontract, you are encouraged to start the subcontract process as soon as possible in order to have the subcontract in place at the beginning of the fiscal year.

4.3.2 Security considerations

Classified work is not supported under the Student Fellow Program.

4.3.3 Policy regarding prejudice and bias

There is no prejudice based on race, gender, or nationality, for PI’s, postdocs, and students.

4.3.4 Further information

ISTI website: ISTI.lanl.gov

ISTI general email: istisupport@lanl.gov (preferred)

To submit, send your proposal via email to istisupport@lanl.gov.

James Ahrens, ISTI Director, ahrens@lanl.gov, 505-667-5797

5 Strategic Drivers

Many strategic drivers are called out in the Laboratory Director’s Office FY22 Strategic Priorities (found on the LDRD DR webpage). In addition, see:

- National Strategic Computing Initiative Strategic Plan
<https://www.whitehouse.gov/sites/whitehouse.gov/files/images/NSCI%20Strategic%20Plan.pdf>
- The National Artificial Intelligence Research and Development Strategic Plan
<https://www.nitrd.gov/pubs/National-AI-RD-Strategy-2019.pdf>
- DOE AI for Science Report
<https://www.anl.gov/ai-for-science-report>
- DOE’s Artificial Intelligence Technology Office
<https://www.energy.gov/science-innovation/artificial-intelligence-and-technology-office>
- DOE Fusion Energy Sciences/ASCR Machine Learning Report
https://science.osti.gov/-/media/fes/pdf/workshop-reports/FES_ASCR_Machine_Learning_Report.pdf

- National Strategic Overview for Quantum Information Science
<https://www.whitehouse.gov/wp-content/uploads/2018/09/National-Strategic-Overview-for-Quantum-Information-Science.pdf>
- NNSA's FY20 Stockpile Stewardship Management Plan
https://www.energy.gov/sites/prod/files/2019/08/f65/FY2020__SSMP.pdf
- NNSA Advanced Simulation and Computing and Institutional R&D Programs
<http://nnsa.energy.gov/aboutus/ourprograms/defenseprograms/futurescienceandtechnologyprograms/asc/aboutasc-0>
- Office of Science ASCR Workshop Reports
<http://science.osti.gov/ascr/Community-Resources/Program-Documents/>
- Basic Research Needs for Scientific Machine Learning
<https://www.osti.gov/biblio/1484362-brochure-basic-research-needs-scientific-machine-learning-core-technologies-artificial-intelligence>
- DOD Data Strategy
<https://media.defense.gov/2020/Oct/08/2002514180/-1/-1/0/DOD-DATA-STRATEGY.PDF>
- NGA Analysis Technology Plan
https://www.nga.mil/MediaRoom/PressReleases/Documents/NGA_Analysis_Tech_Plan.pdf
- ODNI (Office of the Director of National Intelligence) AIM Initiative (“A Strategy for Augmenting Intelligence Using Machines”)
<https://www.dni.gov/files/ODNI/documents/AIM-Strategy.pdf>