

Memorandum of Understanding
Between
Los Alamos National Laboratory
And
The Regents of The University of Michigan

Subject:

Transformative Collaboration in Computational Science, Artificial Intelligence, Engineering, Materials and Physics: Advancing National Security, Scientific Progress, and Global Sustainability

This Memorandum of Understanding (MOU) describes certain understandings between Los Alamos National Laboratory (LANL), which is operated by Triad National Security, LLC (Triad), a Delaware Limited Liability Company, for the Department of Energy, National Nuclear Security Administration (DOE/NNSA) under Contract No. 89233218CNA000001; and The Regents of the University of Michigan (UM) hereinafter referred to as the "Participants".

Now, therefore, it is hereby agreed as follows:

1. Background, Purpose, and Collaboration Scope

LANL executes work in support of all DOE/NNSA missions as a federally funded research and development center, which includes work under the following areas: national security, science, energy, and environmental management. A critical underpinning for achieving these missions is robust high-performance computing ("HPC") capability, along with the associated technical, scientific, and engineering computational expertise required to address increasingly complex problems and computational challenges. LANL seeks to collaborate with a university partner that is capable of advancing its national security and scientific missions in Computational Science, Artificial Intelligence, Engineering, Materials and Physics.

The University of Michigan has demonstrated knowledge and expertise in computational science, as evidenced by past and present collaborations with LANL, recent experience in developing joint research and development facilities for supporting university and industry collaborations that includes a UM/Ford Robotics Research Facility, and a pool of knowledgeable research personnel in the areas critical to LANL's work. The University of Michigan seeks to expand its existing work and computational capabilities to support DOE/NNSA's mission.

The purpose of this collaboration is to expand upon current areas where UM and LANL jointly work together to leverage each organization's expertise and efforts in addressing the research and expertise required to support the missions of both institutions. The purpose of this MOU is to

identify mutual institutional goals, define specific areas of collaboration, and establish management and collaborative frameworks that the Participants will use to achieve the goals of collaboration.

2. Authority

LANL enters this MOU pursuant to the authority granted by the LANL Prime Contract, specifically the authority to manage Simulation Codes & Computational Resources under Subsection 1.1.2, Scientific Capabilities Experiments and Tests under Subsection 1.1.4, Nuclear Materials Management under Subsection 1.1.7, and the Safeguards & Security Technology Program under Subsection 1.10 of Section J, Appendix A, Statement of Work.

UM's authority to enter this MOU is based on the constitution and laws of the State of Michigan, and the applicable bylaws and policies of the Regents of the University of Michigan.

3. Areas of Cooperation

The Participants presently intend to collaborate in the following areas, which are detailed further within this MOU:

- a. Further Research and Development (R&D) collaborations within Computational Science, Artificial Intelligence, Engineering, Materials and Physics;
- b. Mutual support of UM's Innovation Campus in Ann Arbor, Michigan; and
- c. Cooperate on efforts to jointly establish a center for high performance computing ("Center for HPC").

4. Goals of Cooperation

The Participants presently seek to establish a collaborative framework that builds upon both organizations' strengths to jointly expand their capabilities in computational science, artificial intelligence (AI), engineering, materials and physics. The Participants will conduct collaborative research and expand opportunities for each organization's personnel and students on vital initiatives. This collaboration seeks to bring together the complementary strengths of LANL and UM to address challenges of national and global significance.

Both organizations also seek to broaden and share talent between the two institutions on key projects, enriching both with diverse perspectives and expertise. The Participants' shared goal is to create stronger multidisciplinary teams capable of leading R&D efforts in both national and international arenas capable of engaging with additional partners on mutually important projects. The Participants presently believe that joint appointments for researchers and faculty between the two institutions will play a crucial role in strengthening partnerships, fostering closer collaboration, and creating more opportunities for meaningful engagement.

In support of this collaboration and in furtherance of these goals, LANL agrees to:

- a. Appoint the senior director-level employee identified in Section 7, to serve as LANL's management official for the collaborations envisioned under this MOU as the organizations work toward their mutual goals;

- b. Share responsibility with UM for the overall development and management of the broad collaboration programs envisioned under this MOU, coordination of computational and other scientific resources for scientific and national security purposes;
- c. Provide expertise, facilities, and resources necessary for collaborative R&D projects and support the establishment of an Innovation Campus, which may include a Center for HPC that meets LANL's operational, maintenance, and access requirements;
- d. Offer opportunities for university students and faculty to engage in joint research projects, internships, and collaborative initiatives; and
- e. Provide the necessary staff to support the projects identified below and mutually agreed upon by the management officials named in this MOU.

In support of this collaboration and in furtherance of these goals, UM agrees to:

- f. Appoint the senior director-level employee identified in Section 7, to serve as UM's management official for the collaborations envisioned under this MOU as the organizations work toward their mutual goals;
- g. Share responsibility with LANL for the overall development and management of the broad collaboration programs envisioned under this MOU, coordination of academic expertise, research capabilities, and student talent to the collaboration;
- h. Provide workspace and resources as may be mutually agreed to for the Innovation Campus, Center for HPC, and other collaboration activities in Michigan; which may require entering into follow on agreements for certain activities.
- i. Facilitate the integration of research activities into its academic programs; and
- j. Provide the necessary staff to support the projects identified below and mutually agreed upon by the management officials named in this MOU.

It is anticipated that the Participants will realize specific benefits from the successful implementation of the collaborations detailed under this MOU.

- k. LANL presently believes that the following benefits will result from the envisioned collaborations:
 - i. Improved institutional agility and innovation through access to the University's cutting-edge research environment, particularly in fast-evolving fields like AI;
 - ii. Optimized resources through the joint use of facilities that create new opportunities for research and accelerates the pace of innovation, allowing LANL to stay at the forefront of emerging technologies;
 - iii. Realized technological development through the exchange of knowledge and use of technology transfer mechanisms that ensure LANL benefits from the latest academic research while also contributing its expertise to the development of future academic programs;
 - iv. Creation of talent pipelines that can define and attract academic talent that aligns with its technical needs, ensuring a steady flow of well-prepared candidates for future roles;

- v. Increased access to existing and planned unique facilities that will improve collaboration between the organizations, scale research efforts, improve workforce agility, and enhance LANL's cutting-edge research.
- l. UM presently believes that the following benefits will result from the envisioned collaborations:
- i. Improved direct lines of sight into real-world applications of their research, aligning academic pursuits with national security missions;
 - ii. Expanded research opportunities through access to LANL's specialized facilities and resources, which is anticipated to significantly broaden the scope of their research and facilitate new discoveries;
 - iii. Enriched curriculum through direct engagement with LANL, which allows UM to integrate advanced real-world challenges into its curricula, enhancing the educational experience for students;
 - iv. Expansion of academic innovation by exposing UM researchers to complex, integrated problem-solving approaches crucial for tackling real-world issues;
 - v. Creation of employment opportunities through the development of an Innovation Campus and Center for HPC, which will employ local Michiganders and university graduates, making the University a more attractive option for prospective students;
 - vi. Enhanced faculty recruitment by providing opportunities for immersive collaboration, which gives the University a significant advantage in attracting top faculty talent; and
 - vii. Increased access to existing and planned unique facilities that will improve collaboration between the organizations, scale research efforts, improve workforce agility, and enhances UM's research capabilities.

5. Identified Areas of Collaboration

The Participants have currently identified several areas of collaboration as set out under this Section 5. These projects may be currently in progress or planned. The Participants will use the contracting and other vehicles identified under Section 6 below to implement these collaborative efforts. The director-level personnel identified in Section 7 from each organization will ensure these collaborations are adequately resourced and provide oversight and direction to guide these collaborative efforts. Additional collaborations not identified below, but within the areas of cooperation identified in Section 3 above, may be added through mutual written agreement between the Participants.

a. R&D Collaborations

The collaboration will focus on R&D in technical areas of critical mutual importance, including but not limited to the following specific projects:

- i. Artificial Intelligence: a series of R&D projects and applications in AI to innovate and advance both the theoretical understanding and practical implementations;

- ii. Co-Design of Computing Systems and Scientific Software: R&D projects to design computing architectures and software for optimization of performance and functionality for scientific research;
- iii. Computational Physics Algorithms and Software: R&D projects to develop cutting-edge algorithms and software for solving complex physical problems, including simulations and modeling; covering numerical methods such as hydrodynamics and radiation transport;
- iv. Physics model development and analysis: R&D projects for innovative approaches and implementations for mathematical modeling and experiments of complex physics such as high-energy-density physics, turbulence, and complex flow;
- v. Materials, R&D projects to develop novel processing techniques, qualification of new processing techniques, the science of scale up, and application of traditional manufacturing capabilities to new materials as well as properties in extreme environments;
- vi. Verification, validation, and uncertainty quantification R&D projects for innovation in the area of assessing fidelity of computational physics and artificial intelligence simulations and quantifying uncertainties and credibility of model predictions including model trustworthiness;
- vii. HPC Systems and Facility Management: R&D projects to design, implement, and manage HPC systems and facilities to support advanced research initiatives; and
- viii. Nuclear nonproliferation and safeguards: R&D projects to advance radiation detection capabilities to detect proliferation activities and safeguard new and existing nuclear reactors.

b. Innovation Campus

LANL will support UM's development of an Innovation Campus in proximity to the University of Michigan's Ann Arbor campus. The Innovation Campus will serve as a hub for joint research activities, talent development, and innovation with the following goals:

- i. Expanding opportunities for collaboration by enabling both institutions to scale their operations in response to emerging challenges and opportunities;
- ii. Furthering access to pools of diverse talent, easing collaboration with regional partners, and providing a platform for future expansion and growth;
- iii. Enhancing mission sustainability and resilience by providing additional resources and capabilities;
- iv. Accelerating the delivery, installation, and operation of information technology infrastructure for the Innovation Campus and emerging AI program by reallocating existing space at UM, provided that LANL has a need to use such space; DOE/NNSA real estate regulatory requirements are met; and UM can provide space that meets LANL's requirements; and
- v. Gaining Operational Efficiencies by leveraging the strengths of both institutions to achieve operational efficiencies, particularly in areas like facility management,

shared resources, and administrative processes.

The Center for HPC is currently planned to be a central feature of the Innovation Campus. The Participants anticipate that the HPC platforms housed within the Center for HPC will support innovative, cutting-edge research, advance breakthrough discoveries, and fulfill LANL's mission-critical computational requirements by enabling computationally intensive research efforts as well such as AI Scientific Foundation Models. The Participants also anticipate that the Center for HPC will require the implementation of state-of-the-art technologies for secure operations, high-performance network communications, and energy-efficient power utilization. Subject to the availability of NNSA funds for the Center for HPC, LANL anticipates approximately 200 LANL jobs will be created at UM over the next 10 years. LANL and UM aspire to build a larger effort engaging industry and other DOE/NNSA labs which would increase the total number of jobs created and will work together to pursue opportunities to foster this growth. UM presently intends to seek Michigan state assistance for the construction of the Center for HPC to aid with costs of construction and initial operation.

The Parties presently intend to work together toward gaining the necessary legal and regulatory approvals, designing, securing funding, and eventually establishing a Center for HPC near UM's Ann Arbor campus. This effort may include LANL requiring the use of office space or facilities within the Innovation Campus, provided that the Participants gain the relevant approvals and enter into an agreement covering such use. Once established each partner will retain responsibility for the operations, maintenance, and support of their respective computing platforms deployed at the site. Access and management of the facility will be accomplished through a mutually negotiated access agreement or similar contracting mechanism.

6. Mechanisms of Collaboration

This MOU does not authorize work nor performance under the projects identified in Section 5, Identified Areas of Collaboration. All such activities require a separate agreement that will govern specific terms, conditions, funding, and any other contractual obligations between the Participants.

The Participants anticipate using a variety of cooperative research and development agreements (CRADAs), special partnership projects (SPPs), institutional agreements, and subcontracts as contracting vehicles to govern and fund the research collaborations identified under this MOU. The Participants will use joint appointment agreements, guest agreements, and other similar contracting vehicles to assign personnel, interns, researchers and faculty to specific collaborations at each organization's facilities. The Participants will also work to negotiate the appropriate form of agreement(s) necessary to authorize access to any existing or anticipated facilities made available through the envisioned collaborations.

7. Management, Planning, and Resourcing

- a. **Director Level Collaboration Managers:** Each Participant has designated the senior director-level employee identified below to serve as their organization's "Collaboration Manager" for the collaborations envisioned under this MOU as the Participants work toward their mutual goals. The Collaboration Managers shall serve as a central point of contact between the organizations to effectively manage each Participant's progress toward the goals set out under this MOU. Each Collaboration Manager will determine their respective organization's strategy with implementation of each of the collaborative projects, identify available resources (e.g., personnel, funding, materials, and space) for collaborative activities, form committees and management teams as necessary to assist with planning and implementation, and delegate authority to specific management personnel to oversee implementation of collaborative projects. Each Participant's Collaboration Manager will meet at least quarterly to discuss progress toward goals, statuses of in-progress collaborations, plan for upcoming collaborations, and identify any needs or risks associated with planned projects.
 - i. **LANL's Collaboration Manager:**
 Charles W. Nakhleh
 Associate Laboratory Director
cnakhleh@lanl.gov
 505-667-0184
 - ii. **UM's Collaboration Manager:**
 Steven Ceccio
 Special Advisor for Strategic Initiatives,
 Office of the Provost and the Chief Financial Officer
ceccio@umich.edu
 734-764-7272
- b. **Additional Personnel and Resourcing:** Each Participant, in their sole discretion, will allocate commercially reasonable technical and organizational resources to further the collaborative efforts identified under this MOU. Each Participant's Collaboration Manager will be responsible for assigning the appropriate mix of management, technical, and administrative personnel necessary to successfully implement the collaboration projects and realize the goals of this MOU. These personnel will be responsible for ensuring seamless communication between sites in New Mexico and Michigan, coordinating with their counterparts at the other Participant organizations to manage and implement R&D projects in accordance with established contractual requirements, ensure that projects are adequately resourced, and reporting on the progress of collaborative projects against the Participants' goals. Additionally, each Participant will use commercially reasonable efforts to allocate collaboration workspace, secure funding, assign support personnel, and address project needs.

- c. **Disputes, Risks, and Needs:** The Participants will work together to address potential risks and needs for collaboration projects as they arise. This includes, but is not limited to potentially providing each other with mutual support in formulating any future budget, contractual, or regulatory justifications with respect to the undertakings and activities on which the Participants may decide to collaborate under this MOU. The Collaboration Managers will use their best efforts to mutually resolve any potential disputes, mitigate collaboration risk, and resolve project issues. The Participants recognize that they are subject to specific contractual, regulatory, and legal requirements that may impact the implementation plans for current and future collaborative projects.

8. General Provisions

- a. **Program Funding and Legal Obligations:**

This MOU does not obligate funds nor create any legal obligations. Binding commitments or funding for any activities discussed in this MOU must be established through a separate agreement or contract. Each Participant will adhere to existing contractual requirements and applicable laws and regulations. Each Participant is responsible for its own costs incurred in furthering the intent of this MOU unless other arrangements are made in writing such as, without limitation, subcontracts for goods/services, CRADAs, SPPs, other contractual arrangements.

- b. **Public Information Coordination:**

The Participants understand it is in their mutual interest to consult with each other prior to any advertising, news release or promotional activity related to this MOU. However, nothing in this paragraph requires the Participants to violate applicable Federal or State law. Moreover, this paragraph does not preclude providing any information regarding this MOU to the U.S. Government.

- c. **Modification, Effective Date, and Termination:**

The Participants intend that this MOU will be in effect for ten (10) years from the date of the last signature and may be extended or modified by mutual written agreement. Either Participant may terminate this MOU with at least 30 days' prior written notice to the other Participant.

- d. **Representations:**

Each Participant represents that it has full authority to enter into this MOU.

- e. **Agency:**

The Participants hereto, and their respective employees, do not intend to be the agent, employer or representative of the other, nor to have an expressed or implied right of authority to assume or create any obligation or responsibility on behalf of or in the name of the other Participant. The Participants do not intend that this MOU be construed to establish a partnership, joint venture, or other similar relationship between the Participants.

f. No Third-Party Rights:

Nothing in this MOU, express or implied, is intended to confer any rights, remedies, claims, or interests upon any third party.

g. Assignment:

This MOU will not be assigned without the consent of both Participants, except that LANL may assign its responsibilities under this MOU to a follow-on prime contractor, but only if the current prime contract between Triad and the DOE/NNSA is not renewed or extended during the life of this MOU, provided the follow-on prime contractor agrees to the terms of this MOU.

h. Safety and Security Requirements:

The following activities require prior approval through the LANL Unclassified Foreign National Access Program's (UFNAP) Foreign Visitor Tracking System (FVTS):

- i. All LANL site visits by uncleared foreign nationals including visiting scientists, engineers, professors, students, etc.;
- ii. Foreign National access to non-public non-publishable DOE/NNSA or LANL information or technology (Including off-site access or within General Access Areas);
- iii. Access to DOE Sensitive Subject or export-controlled information; and
- iv. Access to Lab networked cyber systems.

i. Issues Resolution:

Unresolved issues between project personnel should be escalated to supervisory or managerial personnel for direct communication between the Participants. Notice of such issues shall be provided to each Participant's Collaboration Manager, who shall be entitled to engage and resolve such issues at their discretion.

j. Liability:

Neither Participant shall be liable to the other for any direct, consequential, indirect, incidental, special, exemplary, punitive or enhanced damages, or any lost profits or revenues, arising out of, relating to, or in connection with the performance of, or any breach of, this MOU. This limitation of liability applies only to this MOU; separate agreements shall govern formal engagements stemming from this MOU, such as research projects and licensing agreements. The foregoing limitation shall not apply to damages or liabilities arising from third party claims, personal injury, death, or damage to any real or tangible personal property caused by a Participant's grossly negligent acts or omissions or willful misconduct.

k. Periodic Review:

The Participants will conduct annual reviews of this MOU to determine whether modifications are necessary or if discontinuation is appropriate.

9. Other Terms and Conditions

a. Export Control:

Each Participant is responsible for complying with all U.S. export control laws and

regulations. The providing Participant must notify the receiving Participant in writing before providing any export-controlled hardware, software, or technical data under this MOU and must obtain the receiving Participant's written consent prior to transfer.

b. Environment, Safety, Health, and Security:

For activities and operations at LANL, UM personnel will follow LANL's environment, safety, health, and security requirements. For activities and operations at the UM, LANL personnel will follow the UM's site-specific requirements.

10. Proprietary Information

a. Proprietary Information:

To the extent that collaboration under this MOU requires a Participant or their representatives be given access to or be furnished with confidential or proprietary business, technical, or financial information or data belonging to a Participant or other entities that is confidential or proprietary, the Participant receiving the information shall treat such information in confidence and protect such information as if it were its own, provided that it exercises at least a reasonable standard of care. The receiving Participant also agrees not to appropriate such information to its own use or to disclose such information to third parties unless specifically authorized in writing by the disclosing Participant.

Notwithstanding the foregoing, Triad may disclose confidential or proprietary business, technical, financial, or any other type of information to the DOE/NNSA as required under its prime contract. Unless covered by other existing confidentiality requirements, the foregoing obligations shall not apply to:

- i. Information or data that is in the public domain at the time of receipt by a Participant;
- ii. Information or data that is published or otherwise subsequently becomes part of the public domain through no fault of Participant; and
- iii. Confidential or proprietary information or data owned by a third party that has expressly authorized unlimited distribution.

Signatures

For Triad National Security, LLC:

Name: _____ Digitally signed by
THOMAS MASON
Title: Thomas Mason (Affiliate)
Date: 2024.11.26
14:35:56 -07'00'

For the Regents of the University of Michigan:

Name: [Signature]
Title: PRESIDENT
Date: 11/25/2024