

Calendar No. 451

119TH CONGRESS
2D SESSION**S. 3468****[Report No. 119–129]**

To establish a national programmable cloud laboratories network to enhance research efficiency, innovation, and collaboration, and for other purposes.

IN THE SENATE OF THE UNITED STATES

DECEMBER 11, 2025

Mr. FETTERMAN (for himself and Mr. BUDD) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

JULY 13, 2026

Reported by Mr. CRUZ, with amendments

[Omit the parts struck through and insert the parts printed in italic]

A BILL

To establish a national programmable cloud laboratories network to enhance research efficiency, innovation, and collaboration, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “National Program-
5 mable Cloud Laboratories Network Act of 2025”.

1 **SEC. 2. DEFINITIONS.**

2 (a) DEFINITIONS.—In this Act:

3 (1) ARTIFICIAL INTELLIGENCE.—The term “ar-
4 tificial intelligence” has the meaning given such
5 term in section 5002 of the William M. (Mac)
6 Thornberry National Defense Authorization Act for
7 Fiscal Year 2021 (15 U.S.C. 9401).

8 (2) *BIOLOGICAL DATA*.—*The term “biological*
9 *data” means the information, including associated*
10 *descriptors, derived from the structure, function, or*
11 *process of a biological system that is either measured,*
12 *collected, or aggregated for analysis.*

13 (3) DIRECTOR.—Unless otherwise provided,
14 the term “Director” means the Director of the Na-
15 tional Science Foundation.

16 (4) INSTITUTION OF HIGHER EDUCATION.—
17 The term “institution of higher education” has the
18 meaning given the term in section 101 of the Higher
19 Education Act of 1965 (20 U.S.C. 1001).

20 (5) NETWORK.—The term “Network” means
21 the National Programmable Cloud Laboratories Net-
22 work.

23 (6) NODE.—The term “node” means a pro-
24 grammable cloud laboratory designated as part of
25 the Network.

1 (67) NON-DESIGNATED LABORATORY.—The
 2 term “non-designated laboratory” means any Fed-
 3 eral, academic, nonprofit, or private industry pro-
 4 grammable cloud laboratory not selected as a node
 5 under section 3.

6 (78) PROGRAMMABLE CLOUD LABORATORY.—
 7 The term “programmable cloud laboratory” means a
 8 physical laboratory that is equipped with research
 9 instrumentation and advanced manufacturing capa-
 10 bilities, including robotics and artificial intelligence,
 11 that can be securely and remotely programmed and
 12 controlled in order to conduct experiments and col-
 13 lect associated data.

14 **SEC. 3. NATIONAL PROGRAMMABLE CLOUD LABORATORIES**
 15 **NETWORK.**

16 (a) PURPOSES.—The purposes of the Network estab-
 17 lished under this Act are—

18 (1) to maintain leadership by the United States
 19 in advanced experimentation, *biotechnology*, labora-
 20 tory automation, and artificial intelligence for sci-
 21 entific research, advanced manufacturing, long-term
 22 economic competitiveness, and national security;

23 (2) to reduce the cost of federally funded re-
 24 search through automation and reproducibility;

1 (3) to accelerate national competitiveness by
 2 transferring government-funded research to private-
 3 sector commercial applications;

4 (4) to improve collaboration among federally
 5 funded national laboratories, institutions of higher
 6 education, and private industry;

7 (5) to ensure that investment in programmable
 8 cloud laboratories results in measurable cost savings,
 9 efficiencies, and long-term fiscal sustainability;

10 (6) to incentivize private-sector cost-sharing in
 11 research infrastructure and equipment;

12 (7) to support workforce development aligned
 13 with the technical needs of industry in the United
 14 States;

15 (8) *to provide funding for nodes;*

16 (89) to advance the development of a domestic
 17 industrial base for scientific automation tools, *bio-*
 18 *technology*, artificial intelligence systems for experi-
 19 mentation, and robotics platforms for use in labora-
 20 tory settings; and

21 (910) to further programmable cloud laboratory
 22 research in areas such as materials science, bio-
 23 technology, chemistry, and other scientific or engi-
 24 neering disciplines where automation and cloud-en-
 25 abled experimentation can deliver transformative re-

sults, including advanced materials synthesis and characterization, scalable biotechnology experimentation, and high-throughput chemical catalyst development.

~~(b) ESTABLISHMENT.—~~

~~(1) IN GENERAL.—Not later~~

(b) ESTABLISHMENT; AWARDS.—

(1) IN GENERAL.—

(A) ESTABLISHMENT.—Not later than 1 year after the date of enactment of this Act, the Director, in consultation with the Director of the National Institute of Standards and Technology, shall designate and oversee a National Programmable Cloud Laboratories Network of not more than 6 nodes to support secure, standards-based, and cost-effective remote experimentation and automated research.

(B) AWARDS.—The Director shall award a grant to each node, in an amount not greater than \$5,000,000 per fiscal year for a period of not more than 5 years, to support the National Programmable Cloud Laboratories Network.

(2) ASSESSMENT SEQUENCING.—The assessment required under section 5 shall be conducted

1 only after the final designation of nodes under para-
2 graph (1).

3 (3) NODES.—The Network shall consist of
4 nodes that—

5 (A) enable programmable workflows and
6 automated science;

7 (B) provide access to advanced scientific
8 and manufacturing instruments, including arti-
9 ficial intelligence-enabled tools;

10 (C) collaborate to establish and adopt com-
11 mon standards, protocols, and best practices;
12 and

13 (D) support interoperability across and be-
14 tween nodes.

15 (c) APPLICATION AND SELECTION.—

16 (1) IN GENERAL.—The Director shall issue a
17 public solicitation for eligible entities to apply for
18 node designation.

19 (2) ELIGIBLE ENTITIES.—Eligible entities that
20 may apply for designation as a node include—

21 (A) institutions of higher education;

22 (B) nonprofit research organizations;

23 (C) private - sector research entities; and

1 (D) consortia or collaborations of the enti-
 2 ties described in subparagraphs (A) through
 3 (C).

4 (d) APPLICATIONS FOR DESIGNATION.—An eligible
 5 entity that desires to apply for designation as a node in
 6 the Network shall submit an application to the Director
 7 at such time and in such manner as the Director may re-
 8 quire. The application shall include—

9 (1) a technical and programmatic plan for lab-
 10 oratory operations, automation capabilities, and data
 11 integration;

12 (2) a plan to achieve long-term self-sustain-
 13 ability, including metrics, interim milestones, and a
 14 timeline for reducing reliance on Federal funding;
 15 and

16 (3) evidence of non-Federal cost share, private
 17 capital, or other third-party contributions dem-
 18 onstrating self-sustainability potential.

19 (e) EVALUATION OF APPLICANTS.—The Director
 20 shall ensure that the process for selecting eligible entities
 21 for designation in the Network *is competitive, merit-based,*
 22 *and transparent, through the evaluation of, with respect to*
 23 *each entity—* ~~shall be competitive, merit-reviewed, and~~
 24 ~~transparent, evaluating—~~

1 (1) pre-existing laboratory infrastructure and
2 suitability for automated science;

3 (2) capacity to support distributed, cloud-en-
4 abled programmable workflows for multiple users;

5 (3) likelihood of achieving long-term sustain-
6 ability without continued Federal funding;

7 (4) demonstrated ability to collaborate with
8 other nodes, academic partners, industry partners,
9 or other Federal research agencies (as defined in
10 section 10002 of the Research and Development,
11 Competition, and Innovation Act (42 U.S.C.
12 18901));

13 (5) protocols for research security, cybersecu-
14 rity, and responsible access; and

15 (6) demonstration of user interest and research
16 needs.

17 ~~(f) DESIGNATION.—In designating nodes, the Direc-~~
18 ~~tor shall provide preference for applications demonstrating~~
19 ~~meaningful third-party cost share and pre-existing infra-~~
20 ~~structure.~~

21 (f) *DESIGNATION.—In designating nodes, the Director*
22 *shall—*

23 (1) *give preference to applicants demonstrating*
24 *meaningful third-party cost share and pre-existing*
25 *infrastructure; and*

1 (2) *to the extent practicable, ensure that at least*
2 *1 node demonstrates the capability to support cloud-*
3 *enabled biotechnology research, including automated*
4 *experimentation or quality control workflows.*

5 (g) RESPONSIBILITIES.—Each node selected by the
6 Director shall—

7 (1) support the purposes described in sub-
8 section (a)(9);

9 (2) facilitate collaboration among Network
10 members to expand and integrate automated science
11 capabilities and best practices;

12 (3) actively participate with the Director of *the*
13 National Institute of Standards and Technology in
14 developing network-wide interoperability, data-shar-
15 ing, cybersecurity, and artificial intelligence-assisted
16 experimentation standards;

17 (4) support secure sharing of experimental
18 data, *including biological data*, models, and results
19 across institutions of higher education participating
20 in the Network, if applicable;

21 (5) provide a secure digital infrastructure to en-
22 able remote experimentation, artificial intelligence-
23 assisted analysis, and reproducible science;

1 (6) engage in public-private partnerships to
 2 streamline the transfer of technology developed
 3 using Network infrastructure;

4 (7) develop and maintain a financial sustain-
 5 ability plan to reduce long-term reliance on Federal
 6 funds, including through user fees, licensing, con-
 7 sortia membership, or other revenue-generating mod-
 8 els;

9 (8) establish performance metrics, including sci-
 10 entific output, cost-effectiveness, academic engage-
 11 ment, private-sector engagement, user satisfaction,
 12 and reproducibility of results; and

13 (9) where practicable, leverage commercially
 14 available hardware and software solutions to mini-
 15 mize cost and accelerate deployment of automated
 16 science capabilities.

17 **SEC. 4. INTERAGENCY COLLABORATION.**

18 Not later than 180 days after all nodes of the Net-
 19 work are designated, the Director of the National Institute
 20 of Standards and Technology, in cooperation with the Di-
 21 rector and participating eligible entities (including institu-
 22 tions of higher education), shall—

23 (1) develop and promulgate standards to ensure
 24 interoperability across Network nodes, including lab-
 25 oratory instrumentation, data infrastructure, com-

1 munication protocols, and experiment execution sys-
2 tems;

3 (2) establish protocols for secure, seamless, and
4 standardized data-sharing among all members of the
5 Network, *including sharing of biological data*,
6 aligned with node-level cybersecurity and research
7 security protocols;

8 (3) define minimum technical requirements and
9 operating procedures to support remote experimen-
10 tation, experiment reproducibility, and artificial in-
11 telligence-assisted workflows; and

12 (4) periodically update such standards in con-
13 sultation with private - sector partners and nodes of
14 the Network to reflect advancements in hardware,
15 software, and automation technology.

16 **SEC. 5. ASSESSMENT OF NON-DESIGNATED LABORATORIES.**

17 (a) **ASSESSMENT REQUIREMENT.**—Not later than
18 180 days after the Director designates the final node of
19 the Network under section 3, the Director, in consultation
20 with the Secretary of Energy and the Director of the Na-
21 tional Institute of Standards and Technology, shall con-
22 duct and submit to the appropriate committees of Con-
23 gress, a comprehensive assessment of non-designated lab-
24 oratories.

1 (b) SCOPE.—The assessment shall identify, to the ex-
2 tent practicable—

3 (1) Federal laboratories, institutions of higher
4 education, nonprofit organizations, and private-sec-
5 tor laboratories that possess or are developing pro-
6 grammable, automated, or remotely accessible re-
7 search infrastructure;

8 (2) the instrumentation, automation, and data
9 capabilities of such laboratories;

10 (3) cybersecurity and research security meas-
11 ures relevant to interoperability;

12 (4) existing or potential pathways for such lab-
13 oratories to coordinate with Network nodes in areas
14 such as data-sharing, standards adoption, or pilot
15 interoperability projects; and

16 (5) legal, contractual, or intellectual property
17 considerations that may affect participation *in the*
18 *Network*.

19 (c) CONFIDENTIALITY AND SECURITY.—Proprietary
20 information shall be protected from public disclosure con-
21 sistent with applicable law. The Director shall publish a
22 nonproprietary public summary of the assessment and
23 may submit a proprietary annex to the congressional com-
24 mittees of jurisdiction.

1 **SEC. 6. REPORTING AND OVERSIGHT.**

2 (a) ANNUAL BRIEFINGS.—Not later than 1 year after
 3 the date of enactment of this Act, and annually thereafter,
 4 the Director shall brief the Committee on Commerce,
 5 Science, and Transportation of the Senate and the Com-
 6 mittee on Science, Space, and Technology of the House
 7 of Representatives on the status of the Network.

8 (b) CONTENTS.—Each briefing required under sub-
 9 section (a) shall include an assessment of—

10 (1) the alignment of supported research with
 11 national scientific and economic priorities;

12 (2) the progress each node of the Network has
 13 made toward achieving self-sustainability as de-
 14 scribed in section 3(d)(2); and

15 (3) the performance metrics established in sec-
 16 tion 3(g)(8).

17 **SEC. 7. FUNDING.**

18 *From amounts appropriated or otherwise made avail-*
 19 *able to the National Science Foundation, the Director shall*
 20 *allocate \$30,000,000 for each of the fiscal years 2026*
 21 *through 2030 to carry out this Act, subject to the avail-*
 22 *ability of appropriations.*

23 **SEC. 78. SUNSET.**

24 The National Programmable Cloud Laboratories Net-
 25 work, including all authorities, programs, and funding

1 provided under this Act, shall terminate on September 30,
2 2031.

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