Congressional Budget Office
Cost Estimate

September 15, 2020

At a Glance

S. 3891, Advancing Artificial Intelligence Research Act of 2020

As ordered reported by the Senate Committee on Commerce, Science, and Transportation on July 22, 2020

By Fiscal Year, Millions of Dollars	2020	2020-2025	2020-2030
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	0	2,050	not estimated

Statutory pay-as-you-go procedures apply?	No	**Mandate Effects**	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2031?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

The bill would

- Authorize the annual appropriation of $250 million over the 2021-2025 period for the National Institute of Standards and Technology to establish an artificial intelligence (AI) research program
- Direct the National Science Foundation (NSF) to designate up to six centers for AI research and obligate up to $50 million annually over the 2021-2025 period, subject to the availability of appropriations, for each center
- Authorize the appropriation of such sums as may be necessary for the NSF to award grants and scholarships to increase the number of students pursuing degrees in AI

Estimated budgetary effects would primarily stem from

- Implementing the required programs
- Spending the authorized appropriations

Detailed estimate begins on the next page.

Bill Summary

S. 3891 would authorize the annual appropriation of $250 million over the 2021-2025 period for the National Institute of Standards and Technology (NIST) to establish an artificial intelligence (AI) research program. The bill also would direct the National Science Foundation (NSF) to designate up to six centers for AI research and, subject to the availability of appropriations, to obligate up to $50 million annually over the same period for each center. Finally, S. 3891 would authorize the appropriation of such sums as may be necessary for the NSF to award grants and scholarships to increase enrollment in AI degree programs.

Estimated Federal Cost

The estimated budgetary effect of S. 3891 is shown in Table 1. The costs of the legislation fall within budget functions 250 (general science, space, and technology) and 370 (commerce and housing credit).

Table 1.
Estimated Increases in Spending Subject to Appropriation Under S. 3891

	By Fiscal Year, Millions of Dollars						
	2020	2021	2022	2023	2024	2025	2020-2025
AI Standards							
Estimated Authorization	0	4	4	4	4	4	20
Estimated Outlays	0	3	4	4	4	4	19
NIST Research Program							
Authorization	0	250	250	250	250	250	1,250
Estimated Outlays	0	63	150	225	250	250	938
National AI Research Institutes							
Estimated Authorization	0	300	300	300	300	300	1,500
Estimated Outlays	0	43	150	217	248	270	928
AI Traineeships							
Estimated Authorization	0	15	15	15	15	15	75
Estimated Outlays	0	2	7	11	13	15	48
Scholarship-for-Service Program							
Estimated Authorization	0	30	35	40	45	50	200
Estimated Outlays	0	4	15	25	33	40	117
Total Changes							
Estimated Authorization	0	599	604	609	614	619	3,045
Estimated Outlays	0	115	326	482	548	579	2,050

AI = artificial intelligence; NIST = National Institute of Standards and Technology.

Basis of Estimate

For this estimate, CBO assumes that the legislation will be enacted early in fiscal year 2021 and that the authorized and estimated amounts will be appropriated each year. Estimated outlays are based on historical spending patterns for similar programs.

CBO estimates that implementing S. 3891 would cost roughly $2.1 billion over the 2021-2025 period.

AI Standards
Section 2 would direct NIST to develop AI standards and specifications. Using information from the agency, CBO estimates that NIST would require 20 additional employees at an average annual cost of $200,000 each to conduct those activities. CBO estimates that implementing section 2 would cost $19 million over the 2021-2025 period.

NIST Research Program
Section 3 would direct NIST to establish a research program to advance AI and would authorize the annual appropriation of $250 million over the 2021-2025 period for that purpose. CBO estimates that implementing section 3 would cost $938 million over the 2021-2025 period.

National AI Research Institutes
Section 4 would require the NSF to designate at least six centers for AI research and award grants to entities to establish and operate them. S. 3891 would direct the NSF to obligate up to $50 million annually over the 2021-2025 period, subject to the availability of appropriations, for each center. Assuming that six centers would be established, CBO estimates that implementing section 4 would cost $928 million over the 2021-2025 period.

AI Traineeships
Section 5 would direct the NSF to award grants to institutions of higher education to establish AI traineeship programs. Those grants could be used for curriculum development, tuition, and stipends. In 2019, the NSF spent $54 million for its existing traineeship program, which is open to all areas of science and engineering. Using information from the agency, CBO estimates that expanding the program under the bill would require an additional $15 million annually over the 2021-2025 period; that amount reflects an annual increase of about 30 percent over the amount allocated for the program in 2019. We estimate that implementing section 5 would cost $48 million over the 2021-2025 period.

Scholarship-for-Service Program
Section 7 would direct the NSF to establish a scholarship-for-service program for students in AI degree programs that would lead to students' placement in jobs with federal, state, local, or tribal agencies. S. 3891 would authorize the appropriation of whatever amounts are necessary to carry out the program. CBO expects that the program would be similar to NSF's

CyberCorps Scholarship for Service program, which received an allocation of $55 million in 2020. CBO anticipates that it would take several years to reach that level of funding and we estimate that implementing section 7 would cost $117 million over the 2021-2025 period.

Other Costs
Section 6 would require the NSF to establish a pilot program to assess the feasibility of awarding research grants in rapidly evolving areas such as AI. Using information about similar tasks, CBO estimates that any costs incurred to implement section 6 would be insignificant; any spending would be subject to the availability of appropriated funds.

Pay-As-You-Go Considerations: None.

Increase in Long-Term Deficits: None.

Mandates: None.

Estimate Prepared By

Federal Costs:

Janani Shankaran (National Science Foundation)
David Hughes (National Institute of Standards and Technology)

Mandates: Brandon Lever

Estimate Reviewed By

Susan Willie
Chief, Natural and Physical Resources Cost Estimates Unit

H. Samuel Papenfuss
Deputy Director of Budget Analysis

Theresa Gullo
Director of Budget Analysis