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U.S. Government Accountability Office

Small Business Administration: Exploring Potential Use of Blockchain

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Why This Matters

Blockchain is an emerging technology that aims to provide a trusted, tamper-resistant record of transactions by multiple parties. Although widely known for its use in digital assets like Bitcoin, blockchain also has a wide range of nonfinancial applications. Some federal agencies are exploring ways to use blockchain in their own operations. Recently, Congress has expressed interest in encouraging more federal agencies to explore blockchain's potential benefits, which could include improving efficiency and reducing costs.

We were asked to examine blockchain's potential to address challenges faced by the Small Business Administration (SBA). In recent years, GAO and SBA's Office of Inspector General (OIG) have identified deficiencies in SBA programs, including delays in program reporting, fraud, and the lack of a monitoring system to track small businesses' performance in a contracting program. This report describes what blockchain is, examples of how selected federal agencies have used or considered using it, factors that entities including SBA could consider in assessing blockchain's potential use, and blockchain's potential uses and limitations in addressing selected SBA program challenges.

Key Takeaways

- Multiple federal agencies have explored blockchain's potential to enhance their operations. Most of these efforts have not progressed beyond initial pilot phases.
- The need for a distributed ledger with full transaction history, and transparency among multiple parties are among the factors entities including SBA might consider in assessing their potential use of blockchain.
- Experts described some potential uses and limitations of blockchain that may be applicable for SBA, but emphasized the importance of analyzing programs' processes, workflows, and underlying challenges before exploring the technology.

What is blockchain?

At its basic level, a blockchain enables a community of users to record transactions in a ledger shared within that community. Once a transaction is published, any changes are easily detectable.

Unlike traditional databases, blockchain ledgers do not require a central authority, such as a bank or government. This decentralization is possible because blockchain is an immutable ledger (i.e., a ledger that is challenging to alter undetected) due to (1) cryptographic techniques to verify transactions and (2) many computers, or peers, sharing copies of the transaction. When a new block is added to the blockchain, it includes a number known as the hash digest, which the blockchain mathematically derives from the data in the previous block. This has the effect of cryptographically "chaining" the blocks together and can be

validated by other peers. If a previous block is modified, it will change all subsequent blocks, making it easy to detect altered blocks and providing full transaction history (i.e., a historical data store).

How have federal agencies used or considered using blockchain?

Federal agencies including the Department of Homeland Security's (DHS) Customs and Border Protection (CBP), the Department of the Treasury, and the General Services Administration (GSA) have investigated whether blockchain could improve efficiency, accountability, or information sharing. However, these efforts have encountered similar challenges, such as technical complexity and data security compliance. As a result, some efforts have concluded and others have not yet progressed beyond initial pilot phases.

- **CBP**: CBP launched two blockchain proofs-of-concept (i.e., demonstrations to assess the potential of given concepts or products). These proofs-of-concept sought to evaluate blockchain's potential to (1) process trade-related documents and (2) increase the ability of CBP officers, retailers, and consumers to quickly and cost-effectively determine the legality of imported goods. CBP identified advantages of blockchain, including that it increased the speed of internal processes, and increased data transparency, security, and immutability. However, CBP did not implement blockchain due to issues such as cost and an inability to scale the technology as needed.

- **Treasury**: In 2017, Treasury launched a proof-of-concept project to explore blockchain's potential to manage and track government-issued mobile phones. Treasury reported that a blockchain-based system improved the operational efficiency of mobile phone inventories by automating certain manual processes. Officials said that this effort was intended to be an experimental use of blockchain to better understand the technology; as of April 2023, Treasury had not continued this effort beyond the proof-of-concept.

  In 2019, Treasury began to explore using an interagency blockchain to streamline grant payments. Specifically, this effort examined how blockchain might increase transparency in the grants process and allow for digital redemptions and transfers of grant payments. It also explored using blockchain to automate certain controls with smart contracts (programs stored on a blockchain that run automatically when predetermined conditions are met).[1] These controls, which are currently performed manually, include reconciliations, drawdown approvals, and drawdown limits. Treasury officials noted that automating these processes could help decrease the reporting burden for government agencies. Similar to the mobile phone inventory proof-of-concept, this effort was intended to help Treasury understand potential uses of blockchain in grants management, and as of April 2023, no further development beyond the proof-of-concept was planned.

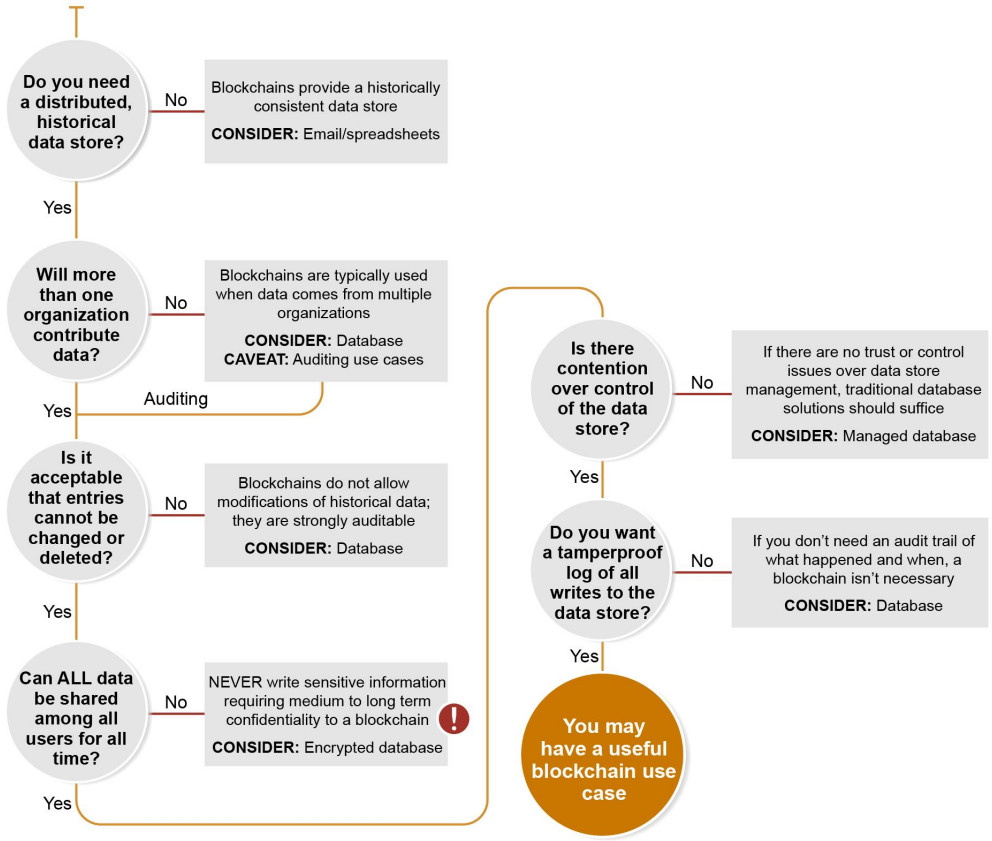
- **GSA**: In 2017, GSA piloted a blockchain solution for automating its contract review process. The effort aimed to reduce the staff time needed for reviewing proposal documents and improve a potential contractor's experience with the process. According to officials, this and other blockchain pilots did not come into production because they were overly complicated and created challenges complying with records retention requirements.

In 2017, GSA also launched the U.S. Federal Blockchain Program, where federal agencies and U.S. businesses could propose use cases for blockchain technology within the government. Officials told us approximately 200 use cases were submitted, but most were not pursued because blockchain was overly complicated for the use cases.

What questions should entities including SBA consider in assessing blockchain's potential use?

Several entities have issued guidance to assess the potential use of blockchain. DHS's Science and Technology Directorate outlines questions agencies should consider in a flowchart for determining whether blockchain may be useful, as shown in figure 1.

Figure 1: Flowchart for Determining Whether Blockchain May Be Useful



Source: Department of Homeland Security Science & Technology Directorate. | GAO-23-106051

Text of Figure 1: Flowchart for Determining Whether Blockchain May Be Useful

1) Do you need a distributed, historical data store?

   a) No: Blockchains provide a historically consistent data store CONSIDER: Email/spreadsheets

   b) Yes: Will more than one organization contribute data?

      i) No: Blockchains are typically used when data comes from multiple organizations CONSIDER: Database; CAVEAT: Auditing use cases

         (1) Auditing then to next step as if Yes.

      ii) Yes: Is it acceptable that entries cannot be changed or deleted?

(1) No: Blockchains do not allow modifications of historical data; they are strongly auditable; CONSIDER: Database

(2) Yes: Can ALL data be shared among all users for all time?

(a) No: NEVER write sensitive information requiring medium to long term confidentiality to a blockchain; CONSIDER: Encrypted database

(b) Is there contention over control of the data store?

(i) No: If there are no trust or control issues over data store management, traditional database solutions should suffice; CONSIDER: Managed database

(ii) Yes: Do you want a tamperproof log of all writes to the data store?

1. You may have a useful blockchain use case.

Source: Department of Homeland Security Science & Technology Directorate. | GAO-23-106051

Answering “yes” to all of the questions in the flowchart indicates that blockchain may be useful. This includes instances where more than one organization will contribute data, and all data can be shared among all users for all time. Answering “no” to any question indicates that alternative solutions may be more appropriate. For example, if a distributed historical data store is not needed, then spreadsheets may be a better option; if there are no trust or control issues over the data store management, then a traditional database could be considered.[2]

Similarly, the American Council for Technology-Industry Advisory Council (ACT-IAC) developed a playbook to support the federal government in its understanding and application of blockchain.[3] To determine if blockchain is the appropriate technology for solving a given problem, the playbook states organizations should answer questions that include the following:

- Would the organizations benefit from a shared governance and data standards approach?
- Is this a use case that can be more efficiently solved with other technologies? Specifically, could other technologies provide the same benefits as a blockchain solution?
- Are there existing inter-organization business process inefficiencies (e.g., an excessive amount of time spent on reconciliation)?

In addition, the Department of Commerce’s National Institute of Standards and Technology (NIST) noted that blockchain may be suitable if an organization’s activities require features such as

- a transactional workflow (e.g., transfer of information between parties);
- a need to reduce or eliminate manual efforts of reconciliation and dispute resolutions; and
- a need to enable real-time monitoring of activity between regulators and regulated entities.[4]

We convened a panel of blockchain experts and conducted interviews with agency officials to obtain perspectives on factors SBA could consider in assessing the potential use of blockchain, should it consider implementing the technology in the future. We provided the panel with information on challenges SBA has experienced, as previously identified by GAO and SBA OIG.

Panel experts emphasized that before exploring blockchain, SBA should analyze its programs' processes and work flows to determine the root causes underlying program challenges. One blockchain expert also noted that integrating blockchain into a legacy system (i.e., an older system still in use) can be complicated and expensive. Therefore, SBA should conduct a cost-benefit analysis before implementing any blockchain technology.

Both blockchain experts and agency officials noted unique factors that need to be considered when deploying technology in the federal government, which could add complexity to the process of adopting blockchain. These factors include the federal budget cycle, cybersecurity requirements, and oversight.

To what extent has SBA considered using blockchain, and what were expert views on its potential uses and limitations in addressing SBA challenges?

SBA officials told us the agency has not considered using blockchain. They said that, as with other suggestions for implementing new technology, if program officials were to identify a mission need for the technology, the Office of the Chief Information Officer would then conduct further analysis.

Blockchain experts we spoke with cited several potential uses of blockchain to address selected agency challenges. These include using a blockchain-based ledger to expedite SBA's reporting to Congress, assist in real-time data collection for determining program participants' eligibility, and facilitate program oversight. However, they also noted potential limitations, including blockchain's complexity and costliness and its inability to address workflow issues, such as burdensome documentation requirements. Experts also explained that blockchain may not be needed when information is already shared through a trusted network of entities or when alternative databases can be used to address these challenges. We presented four program challenges to the panel of blockchain experts and asked them to discuss blockchain's potential uses and limitations in addressing them.

Delays in annual reporting on SBIR and STTR programs

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs help federal agencies support research and development projects carried out by small businesses.[5] Although participating agencies must comply with certain application and funding process requirements in SBA's policy directive, each may have its own application and award processes. SBA is required to collect and analyze program implementation information from each agency and compile it into an annual report to Congress. However, in October 2022, we found that SBA had been between 6 and 16 months late in submitting each annual report during 2016–2021.[6] SBA officials said the cause was late data submissions by the participating agencies.

Blockchain's potential use and limitations. Expert panelists noted that if the application processes could be coordinated and consistent, a blockchain-based ledger might improve the timeliness of agency reporting for SBIR and STTR. Specifically, with a blockchain-based ledger, agencies participating in SBIR and STTR would enter their data in a standardized way, and the data would be reviewed and verified in an automated manner, reducing the need for SBA to manually clean and verify the data. In addition, because a blockchain-based ledger is decentralized with all users having a copy of it at all times, information can be shared in real time. This would allow SBA to view information as it is submitted by agencies. Such a ledger could also provide Congress with an alternative source of data before SBA submits its annual reports.

Experts also noted that this blockchain solution could provide the programs with a better audit trail, including the benefit of a built-in time stamp system. However, they said that blockchain is most useful for cases that involve multiple participants who do not necessarily trust each other. In the cases of the SBIR and STTR programs, information is already shared through a trusted network of agencies, potentially making the extra layer of blockchain verification unnecessarily complex.

Communication and timeliness in the Disaster Loan Program

The Disaster Loan Program provides low-interest loans to help businesses and homeowners recover from federally declared disasters.[7] According to our February 2020 report, program applicants experienced a number of challenges related to applying for and receiving loans following multiple hurricanes in 2017.[8] These challenges included time-consuming and burdensome loan documentation requirements, frequent changes in loan officers or case managers, delays in receiving subsequent disbursements following an initial disbursement, and communication issues about application requirements.

Blockchain's potential use and limitations. Expert panelists suggested that a blockchain-enabled dashboard might assist applicants during the application process. Blockchain allows for transaction transparency and immutability, thereby allowing applicants to view the real-time status of their application, including where in the process it is and where it goes next. This could reduce confusion about application requirements and require less communication between loan officers and applicants. Moreover, if other agencies that provide disaster funding, such as the Federal Emergency Management Agency, shared applicant and award information on the blockchain, it could further facilitate information sharing and help prevent duplication of benefits. However, the experts noted that workflow issues, such as burdensome documentation requirements and changes in loan officers, would not be solved by blockchain.

Monitoring participant progress in the 8(a) Business Development Program

The 8(a) Business Development Program is a 9-year program created to help small businesses owned and controlled by socially and economically disadvantaged people compete on an equal basis in the mainstream American economy.[9] Once certified, 8(a) businesses are eligible to receive training and technical assistance to strengthen their ability to compete in the marketplace. The primary tool for improving opportunities for these businesses is securing contracts in the federal procurement process.

In 2022, SBA's OIG found that SBA did not have an information technology system to track, measure, or monitor 8(a) progress and outcomes to determine if participants demonstrated the ability to compete in the marketplace without assistance.[10] SBA said it created the Business Opportunity Specialist Annual Review Workbook in fiscal year 2018. According to SBA officials, SBA enhanced the workbook in 2022 to track business development assistance provided to firms and firms' growth trends over the 9-year program term. However, we previously reported that the process required manual data collection and aggregation, which could take several months and cause delays.[11]

SBA program analysts conduct continuing eligibility reviews to verify and validate that program participants continue to meet eligibility requirements for participation in the 8(a) program, including meeting economic disadvantage criteria related to net worth, income, and total assets.

Blockchain's potential use and limitations. The expert panelists we spoke with noted that blockchain cannot streamline the subjective evaluations made by business opportunity specialists during annual reviews on whether a participant has made reasonable progress toward their development goals. However, the continuing eligibility review is based on participants' financial characteristics, and panelists suggested decentralized identifiers and verifiable credentials—which can be blockchain-based—could assist in real-time data collection for determining the continuing eligibility of 8(a) participants.

Decentralized identifiers are persistent and cryptographically secure unique identifiers that do not require a centralized registration authority. The owner of a decentralized identifier maintains control over the verifiable credentials, which may include identifying information and attributes or any other claims. Verifiable credentials may be issued by trusted third parties, such as financial institutions and government entities or other authorities. When a verifiable credential is issued, a decentralized identifier that references the issuing organization or the credential itself can be stored in a cryptographically secure manner on a blockchain. A verifying organization can check to see who issued it without contacting the issuing organization.

According to panelists, SBA could use such an approach for the 8(a) program to allow small businesses to submit financial information that is verified by trusted authorities, such as banks or the Internal Revenue Service. A business opportunity specialist could rely on this verified information to confirm the small business' continued eligibility for the program. Panelists we spoke with noted that because any tampering with verifiable credentials would be evident from the blockchain, the need to audit financial data provided by participants when determining the continuing eligibility of 8(a) participants, as it relates to economic disadvantage, would be eliminated. However, blockchain for these purposes may be overly complicated and costly. One expert noted that there would need to be a large volume of participants to make such an effort worthwhile. Another expert noted that decentralized identifiers and verifiable credentials can be implemented

using a traditional database. However, such a solution may not offer features inherent to blockchain, such as tamper evidence.

Fraud risk in the 7(a) Loan Program

The 7(a) Loan Program is SBA's primary loan guarantee program for providing financial assistance to small businesses that cannot obtain conventional credit at reasonable terms elsewhere.[12] Private lenders fund and service the loans and SBA guarantees them. Lender service providers are agents who carry out lender functions by originating, disbursing, servicing, or liquidating loans or loan portfolios for compensation from the lender.

In 2022, SBA OIG reported that some lender service providers fraudulently obtained guarantees for 7(a) loans during a 13-year period.[13] Since the OIG first reported the issues in 2015, SBA has implemented internal controls to track and monitor the involvement of lender service providers in guaranteed loans. SBA also conducted an analysis of lenders' portfolios that indicated that loans with service providers generally performed worse than those without provider involvement, based on more guaranty purchases and early defaults. As such, SBA OIG is continuing to monitor SBA's oversight of participating lenders' use of service providers and assess their risks.

Potential blockchain use and limitations. According to expert panelists, blockchain could facilitate SBA oversight if information about the 7(a) loans were stored on a blockchain-based ledger. In this case, the characteristics of the loans and borrowers could be verified by trusted sources. However, the experts noted that blockchain cannot prevent fraud by lender service providers.

Agency Comments

We provided a draft of this report to SBA, Treasury, GSA, DHS, and Commerce for review and comment. SBA provided technical comments, which we incorporated as appropriate.

How GAO Did This Study

To describe what blockchain is, how federal agencies have used or considered using blockchain, and factors that entities including SBA should consider in assessing blockchain's potential use, we reviewed a prior GAO report, publications by NIST, ACT-IAC, and other organizations on federal use of blockchain. We selected Treasury, GSA, and DHS as examples based on their consideration of blockchain for programs similar to those administered by SBA. We reviewed relevant documentation and interviewed officials from those agencies and blockchain experts on benefits, limitations, and drawbacks of the technology. We identified challenges that SBA faces in administering key programs by reviewing GAO and SBA OIG reports from 2013 through 2022.[14] For the scope of this review, we selected challenges from the SBIR/STTR Programs, the 7(a) Loan Program, the Disaster Loan Program, and the 8(a) Business Development Program to cover a range of SBA activities—awards, loans, and contracting. For each of these programs, we reviewed relevant program documentation, such as standard operating procedures, to gather details about program operations. We also interviewed SBA officials about their current approaches to addressing the identified program challenges.

To describe blockchain's potential uses and limitations in addressing the selected SBA program challenges, we held a virtual panel discussion on February 15, 2023 with blockchain experts from a range of stakeholder groups, including a federal agency academia, and private industry. To select these panelists, we reviewed prior GAO work on blockchain and recent publications on federal government use of blockchain, interviewed agency officials, and identified 36

potential panel participants.[15] From those 36 potential participants, we selected 16 panelists with blockchain expertise related to significant areas of our study, including use for non-digital asset purposes, applications to financial services, and use of solutions similar to those SBA might consider for its program challenges. Nine experts agreed to participate in our panel. (See app. I for a list of these experts and their affiliations.)

We prepared questions covering challenges from the SBIR/STTR Programs, the 7(a) Loan Program, the Disaster Loan Program, and the 8(a) Business Development Program to facilitate the discussion. We reviewed the panel transcript to identify common themes and key statements from participants. Consistent with our quality assurance framework, we provided the nine experts with a draft of our report and solicited their feedback, which we incorporated as appropriate.

We conducted this performance audit from May 2022 to July 2023 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

List of Addressees

The Honorable Nydia Velázquez
Ranking Member
Committee on Small Business
House of Representatives

The Honorable Troy A. Carter, Sr.
House of Representatives

The Honorable Jason Crow
House of Representatives

The Honorable Byron Donalds
House of Representatives

The Honorable Dean Phillips
House of Representatives

The Honorable Maria Elvira Salazar
House of Representatives

We are sending copies of this report to the House Small Business Committee, the Secretary of Commerce, the Administrator of the General Services Administration, the Secretary of Homeland Security, the Administrator of the Small Business Administration, and the Secretary of the Treasury. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

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Appendix I: Expert Panelists

We convened a virtual meeting of experts to inform our work on blockchain technology. The experts who participated in this meeting are listed below. Some of these experts gave us additional assistance throughout our work, including reviewing our draft report for accuracy and providing technical comments.

Christopher Allen
Founder and Executive Director, Blockchain Commons

Daniela Barbosa
General Manager, Blockchain and Identity, Linux Foundation
Executive Director, Hyperledger Foundation

Karyl Fowler
Chief Executive Officer and Co-Founder, Transmute

Joshua Hakakian
Program Specialist, Department of Veterans Affairs, National Artificial Intelligence Institute

Mary Lacity
David D. Glass Chair and Distinguished Professor of Information Systems
Director of the Blockchain Center of Excellence
Sam M. Walton College of Business, University of Arkansas

Steven Lupien
Director and Lecturer, University of Wyoming Center for Blockchain and Digital Innovation

Caroline Malcolm
Global Head of Public Policy, Chainalysis

Sandra Ro
Chief Executive Officer, Global Blockchain Business Council

Michael Youngdahl
Managing Consultant–Data and Technology Transformation Services, IBM Consulting–Federal

Endnotes

[1]Smart contracts are a tool to extend the functionality of a blockchain beyond recording transactions, although not all blockchains support them. Smart contracts are not contracts in the traditional legal sense of the term; rather, they are used to automate tasks such as transferring digital assets if certain conditions are met. U.S. jurisdictions vary on the recognition of smart contracts as legally binding contracts and the enforcement of smart contract terms.

[2]GAO, *Blockchain: Emerging Technology Offers Benefits for Some Applications but Faces Challenges*, GAO-22-104625 (Washington, D.C.: Mar. 23, 2022). For more information on blockchain and its use, see GAO, *Science & Tech Spotlight: Blockchain & Distributed Ledger Technologies*, GAO-19-704SP (Washington, D.C.: Sept. 16, 2019).

[3]The American Council for Technology and Industry Advisory Council, *Blockchain Playbook for the U.S. Federal Government*, (Fairfax, VA.: June 2019). The American Council for Technology and Industry Advisory Council is a public/private partnership that facilitates collaboration among government and industry experts, such as through its Emerging Technology Community of Interest Blockchain Working Group.

[4]National Institute of Standards and Technology, *Blockchain Technology Overview,* NISTIR 8202 (Oct. 2018).

[5]For more information on the SBIR and STTR programs, see GAO, *Small Business Research Programs: Reporting on Award Timeliness Could be Enhanced*, GAO-23-105591 (Washington, D.C.: Oct. 12, 2022).

[6]GAO-23-105591. We recommended that SBA (1) identify and implement actions to improve timely issuance of its annual report and (2) add SBIR and STTR award timeliness data to its website. SBA agreed with our recommendations but had not implemented them as of May 2023.

[7]For more information on the SBA Disaster Loan Program, see GAO, *Small Business Administration: Disaster Loan Processing Was Timelier, but Planning Improvements and Pilot Program Evaluation Needed*, GAO-20-168 (Washington, D.C.: Feb. 7, 2020). At the time of the report, SBA officials told us they were in the process of overhauling the delivery of disaster loans using technology adopted during the COVID-19 pandemic.

[8]GAO-20-168.

[9]For more information on the 8(a) Business Development Program, see GAO, *Small Business Administration: Recent Changes to the 8(a) Program's Financial Thresholds Need Evaluation*, GAO-22-104512 (Washington, D.C.: Aug. 30, 2022).

[10]Small Business Administration, Office of Inspector General, *Top Management and Performance Challenges Facing The Small Business Administration in Fiscal Year 2023*, Report 23-01 (Washington, D.C.: Oct. 14, 2022).

[11]GAO-22-104512.

[12]For more information on the 7(a) Loan Program, see GAO, *Small Business Loans: Additional Actions Needed to Improve Compliance with the Credit Elsewhere Requirement*, GAO-18-421 (Washington, D.C.: June 5, 2018).

[13]Small Business Administration, Office of Inspector General, *Top Management and Performance Challenges.*

[14]See for example, GAO-20-168; GAO-23-105591; Small Business Administration, Office of Inspector General, *Top Management and Performance Challenges.*

[15]GAO-22-104625; National Institute of Standards and Technology, *Blockchain Technology Overview*; American Council for Technology and Industry Advisory Council, *Blockchain Playbook*.