Grants Management Blockchain Demonstration Project

November 2020
Government-wide Grants Management Problem

The Federal grants management process is burdensome, inefficient, and hampers the ability to see how Federal dollars are spent

- Federal grants are subject to a complex and burdensome reporting model for grant recipients who receive funds from multiple sources
- Lack of timely, accurate, and complete data hampers the ability for sound oversight over Federal funds in the multi-tier grants ecosystem

<table>
<thead>
<tr>
<th>Federal Agency</th>
<th>Grant Dollars* (in B)</th>
<th># of Grant Awards* (in K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHS</td>
<td>$509.2</td>
<td>83.2</td>
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<td>DoT</td>
<td>$65.1</td>
<td>86.6</td>
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<td>Education</td>
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<td>17.8</td>
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<td>USDA</td>
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<td>HUD</td>
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<td>DHS</td>
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<td>5.4</td>
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<td>$7</td>
<td>21.7</td>
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<tr>
<td>DOJ</td>
<td>$6.1</td>
<td>8.5</td>
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<tr>
<td>VA</td>
<td>$1.76</td>
<td>.7</td>
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<td>NASA</td>
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<td>6.2</td>
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<tr>
<td>All Agencies</td>
<td>$754.3B</td>
<td>343k</td>
</tr>
</tbody>
</table>

* FY18 (pre COVID-19)
Solution Requires Federal and Non-Federal Action

The future Federal grants management processes and technology solution will reduce recipient burden, be more efficient, and enable better oversight of Federal government dollars

- Less burdensome reporting, more timely payments, and greater availability of comparative financial and performance information
- More transparent, timely, and complete grants financial and performance information for all tiers of grants recipients

Future state has been validated through:
- MITRE-funded FY19 research study
- Interviews and discussions
  - Federal Government Agencies
  - State and Local Government
  - Universities
  - Community-based Organizations
  - Inspectors General
  - Independent Auditors
MITRE-Funded FY19 Research Study

As a not-for-profit operator of federally funded research and development centers (FFRDCs), MITRE conducted a study in FY19 on improving grants management by using blockchain technology. The study concluded that:

1. Improvements in grants management for Federal agencies and grant recipients could be enabled with a modified grants management business operating model

2. Distributed ledger technology ("blockchain") offers capabilities that are well-suited to implementing the future state business operating model

And made a recommendation to:

Execute a grants management blockchain demonstration project (proof of concept) to validate a subset of benefits and further explore actions needed, challenges, and mitigation actions

MITRE study participants identified the following benefits of a modified grants management business operating model and use of blockchain technology:

**Federal Agencies: Improved decision making** through improved transparency, quality, and timeliness of grant financial and performance information

**Grant Recipients: Reduced redundant reporting** to multiple grantmaking entities and auditors; and payment efficiency for second- and third-tier grant recipients

**Public: Improved transparency, quality, and timeliness of grant financial and performance information** made available by the Federal Government in addition to the current award information

**IG Community: Improved ability to detect fraud, waste, and abuse** and improved ability to efficiently conduct audits
Grants Management Blockchain Demonstration Project – Phase 1

Phase 1
March 2020 – September 2020 (complete)

Solution Business Needs Definition and Architecture/Design

Over 20 organizations representing:
• Federal, State, and Local Government
• Universities
• Community-based organizations
  Inspectors general
• Independent auditors
• Industry blockchain and grants management solution providers
• Professional associations

Participants

Workstream

Work Products
• Functional and Technical Definition
• Business Use Cases (User Stories)
• Conceptual Architecture
• Information Flow Diagrams
• Data Element and Business Rules Specifications
Federal Grants Management Lifecycle* Demonstration Project Focus Areas

* The Federal government defined the Grants Management business lifecycle as part of its Federal Integrated Business Framework (FIBF) for shared services (https://ussm.gsa.gov/fibf/)

**Demonstration Project Focus Areas**

**Other Grants Management Lifecycle Functions/Activities**

**Legend**

- GRM.010 Grant Program Administration
  - GRM.010.010 Grant Program Set-up and Maintenance
  - GRM.010.020 Grant Program Funding Opportunity

- GRM.020 Grant Pre-Award Management
  - GRM.020.010 Grant Application Support and Receipt
  - GRM.020.020 Grant Application Review and Selection

- GRM.030 Grant Award Management
  - GRM.030.010 Grant Award Issuance
  - GRM.030.020 Grant Award Payment Processing

- GRM.040 Grant Post-Award Management and Closeout
  - GRM.040.010 Grant Award Modification
  - GRM.040.020 Grant Award Performance Review
  - GRM.040.030 Grant Award Financial Review
  - GRM.040.040 Grant Award Compliance Review
  - GRM.040.050 Grant Award Closeout

- GRM.050 Grant Program Oversight
  - GRM.050.010 Grant Program Reporting and Review
  - GRM.050.020 Grant Program Closeout

- GRM.060 Grant Recipient Oversight
  - GRM.060.010 Grant Recipient Indirect Cost Rate Negotiation
  - GRM.060.020 Grant Recipient Single Audit

**NSF blockchain project: grant application cross-agency review**

**HHS blockchain project: pre-award applicant risk evaluation**

**Treasury blockchain project: grant payment tokenization**

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Future State Business Operating Model Example
Discretionary Multi-Tier Grant Award with Reimbursement Payment

Step 1 - Federal agency determines award agreements for University award recipients, and issues grant award agreements.

Step 2 - Federal agency posts award information to Distributed Grants Ledger/blockchain.

Step 3 - Federal agency publishes award agreement information to government Spending Information Website.

Step 4 - Universities recipients post reimbursement payment request information to cover their administrative costs to Distributed Grants Ledger/blockchain.

Step 5 - Federal agency posts reimbursement payment request approval and secondary review results to Distributed Grants Ledger/blockchain.

Step 6 - CHANGE TO EXISTING GRANTS PROCESS: Federal government disburses funds to Universities sub-award recipients only for their administrative costs.

Step 7 - Universities recipients post notice of additional funding opportunity for community-based award recipients.

Step 8 - Universities select and issue sub-awards to community-based organizations and post award agreement information to Distributed Grants Ledger/blockchain.

Step 9 - Community-based organizations post periodic reimbursement payment request to Distributed Grants Ledger/blockchain.

Step 10 - Universities post reimbursement payment requests approval and secondary review results to Distributed Grants Ledger/blockchain.

Step 11 - CHANGE TO EXISTING GRANTS PROCESS: Federal government disburses funds directly to community-based organizations.

Step 12 - Community-based organizations post financial reports and performance information to Distributed Grants Ledger/blockchain.

Step 13 - Universities post budget, spending, and performance information to Distributed Grants Ledger/blockchain.

Step 14 - Universities retrieve, review, and aggregate community-based organizations’ financial and performance information.

Step 15 - CHANGE TO EXISTING GRANTS PROCESS: Federal agency retrieves and reviews Universities well as community-based organization financial and performance information.

Step 16 - Inspectors General retrieve Universities’ and community-based organizations’ award recipient and award information.

Step 17 - Financial reports and performance reports are retrieved by community-based organizations and Universities to identify opportunities for program improvements

Step 18 - Universities post award administrative and financial closeout information to Distributed Grants Ledger/blockchain.

Step 19 - Federal agency posts award financial and administrative closeout information to Distributed Grants Ledger/blockchain.
Future State Solution Conceptual Architecture

**Grants management ecosystem characteristics**

- Grants management is a decentralized set of business processes managed autonomously by Federal, state, and local government agencies, universities, tribal nations, and community-based organizations, each with their own regulations, policies, and procedures.
- Award (contract), financial, and performance information are the assets to which all parties agree they need more timely and accurate access as they execute grants management business processes.

**Blockchain (distributed ledger) technology characteristics**

- Decentralized solution operations management to align with decentralized business processing (e.g., self-determination of what information to share and when during the grants management process).
- Information integrity assurance among the grants management ecosystem entities (i.e., digitally signed and tamper-resistant history of grants information).
- Incremental scalability as grants management entities enter and leave the ecosystem.

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**Legend**

- **Blockchain (DLT)**
- **Validator Node**
- **Replicator Node**
- **Supporting Information Repository**

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Grants Management Blockchain Demonstration Project – Phase 2

Phase 1
March 2020 – September 2020 (complete)

Solution Business Needs Definition and Architecture/Design

Workstream

Over 20 organizations representing:
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• Universities
• Community-based organizations
• Inspectors general
• Independent auditors
• Industry blockchain and grants management solution providers
• Professional associations

Participants

• Functional and Technical Definition
• Business Use Cases (User Stories)
• Conceptual Architecture
• Information Flow Diagrams
• Data Element and Business Rules Specifications

Work Products

Phase 2
October 2020 – September 2021

Solution Development, Demonstration, and Evaluation

Teams consisting of experts in:
• Grants management lifecycle solutions
• Blockchain technologies
• Federal payment processing solutions
• Reporting and analytics technologies
• Grants management user experience

Solution Adoption Analyses

Working Groups with expertise in:
• Public-private partnerships
• Funding, cost sharing, and revenue models
• Federal and State regulation
• Organizational transformation
• Data use, security, and privacy

Proof of concept demonstrating end-to-end business use cases of the future state operating model

Recommended approaches to address solution adoption challenges
• Governance model
• Economic model
• Regulations and policy
• Organizational and workforce impact
• Data use by public and other stakeholders

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Additional Information
Blockchain Basics

What makes blockchain different?
• Transactions are recorded into an electronic ledger that is decentralized and replicated
• It is open and distributed, which allows anyone with the proper access permissions to the ledger to update and/or view it
• Each transaction is digitally signed
• Each transaction has one or more addresses (“to” and “from” endpoints for the transaction) and a record of what happened

Why is this distributed, decentralized ledger called a blockchain?
• Transactions are grouped together into a block
• A new cryptographic hash (unique key) is created for each new block and recorded within the block’s header data
• Each block is chained to the previous block by adding the hash of the previous block to the header of the new block, forming an immutable chain

Who gets to read or write to these blocks?
• Some blockchain systems are permission-less, meaning anyone can read and write to them
• Other implementations limit participation to specific people or organizations and provide finer grained controls

Who manages a blockchain?
• Information is accessed and/or updated using one or more “nodes”
• Nodes may be managed by a central entity or separately by multiple entities that have a documented agreement of how they will jointly manage the blockchain and its nodes
Alignment to Federal Government Objectives

P.O1: Further achievement of the President’s Management Agenda (PMA) Cross-Agency Priority (CAP) Goal #8, “Results-oriented Accountability for Grants”, in particular, “standardizing grant reporting data and improve data collection in ways that will increase efficiency, promote evaluation, reduce reporting burden, and benefit the American taxpayer”

P.O2: Further achievement of the Grant Reporting Efficiency and Agreements Transparency Act of 2019 (GREAT Act), in particular:
  – “Reduce burden and compliance costs of recipients of Federal grants and cooperative agreements by enabling technology solutions, existing or yet to be developed, for use in both the public and private sectors to better manage the data that recipients already provide to the Federal Government”
  – “Strengthen oversight and management of Federal grants and cooperative agreements by agencies by consolidating the collection and display of and access to open data that has been standardized and, where appropriate, increasing transparency to the public”
  – “…require audit-related information reported…to be reported in an electronic form in accordance with the data standards”

P.O3: Further achievement of PMA CAP Goal #5, “Sharing Quality Services”, in particular, “improving the effectiveness and efficiency of Federal administrative services”

P.O4: Further achievement of PMA CAP Goal #2, “Leveraging Data as a Strategic Asset”, in particular:
  – “Enable government data to be accessible and useful for the American public, businesses, and researchers.”
  – “Improve the use of data for decision-making and accountability for the Federal Government”

P.O5: Further achievement of the Foundations for Evidenced-Based Policymaking Act of 2018 (which incorporates the Open, Public, Electronic, and Necessary (OPEN) Government Data Act), in particular:
  – The requirement for agencies to submit annually to OMB and Congress a plan that includes among other things “data the agency intends to collect, use, or acquire to facilitate the use of evidence in policymaking”
  – The requirement for “public government data assets to be published as machine-readable data”
MITRE’s mission-driven teams are dedicated to solving problems for a safer world. Through our federally funded R&D centers and public-private partnerships, we work across government to tackle challenges to the safety, stability, and well-being of our nation.

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