Blockchain for the Accountability Community

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Key Trends

Trends in Internet access, use:

Ubiquitous U.S. access, mobile use, and increasing global coverage[a]

- Location data—movement of persons, vehicles—based on GPS,[b] other location sensors
- Communications—e-mails, voice communications, text messaging; tweets, social-media postings
- Purchases and sales—retail, ratings of products and services, selling (eBay, Etsy)
- Searches
- Online banking, billing and payment, use of budgeting apps
- Many new apps
- Digital photographs taken with smartphones
- Entertainment online (for example, Netflix, Pandora radio)
- The gig economy (online platforms through which individuals earn income[c])

Public area data collection:

Sensor-based developments create marketing, surveillance data

- Video-recording in malls or near stores; also airports, other locations (may connect to facial recognition software)
- Identifying individuals' presence in certain areas via signals from their devices (e.g., WiFi)
- Drones with cameras or other sensors

Extensive datafication:

Documents, records, maps that are searchable, analyzable[d]

- Electronic health records (EHR)
- Detailed maps for navigation
- Indexed documents and websites (to allow searches)
- Real-estate market information (Zillow, Trulia, etc.)

The open data trend:

Trend toward new releases of data to the public

- Pre-existing information (such as detailed weather data from Department of Commerce and crop-yield data from Department of Agriculture)
- Data from cities in areas such as public health and transportation, including real-time data (such as city data on open parking spots)

Connected sensors:

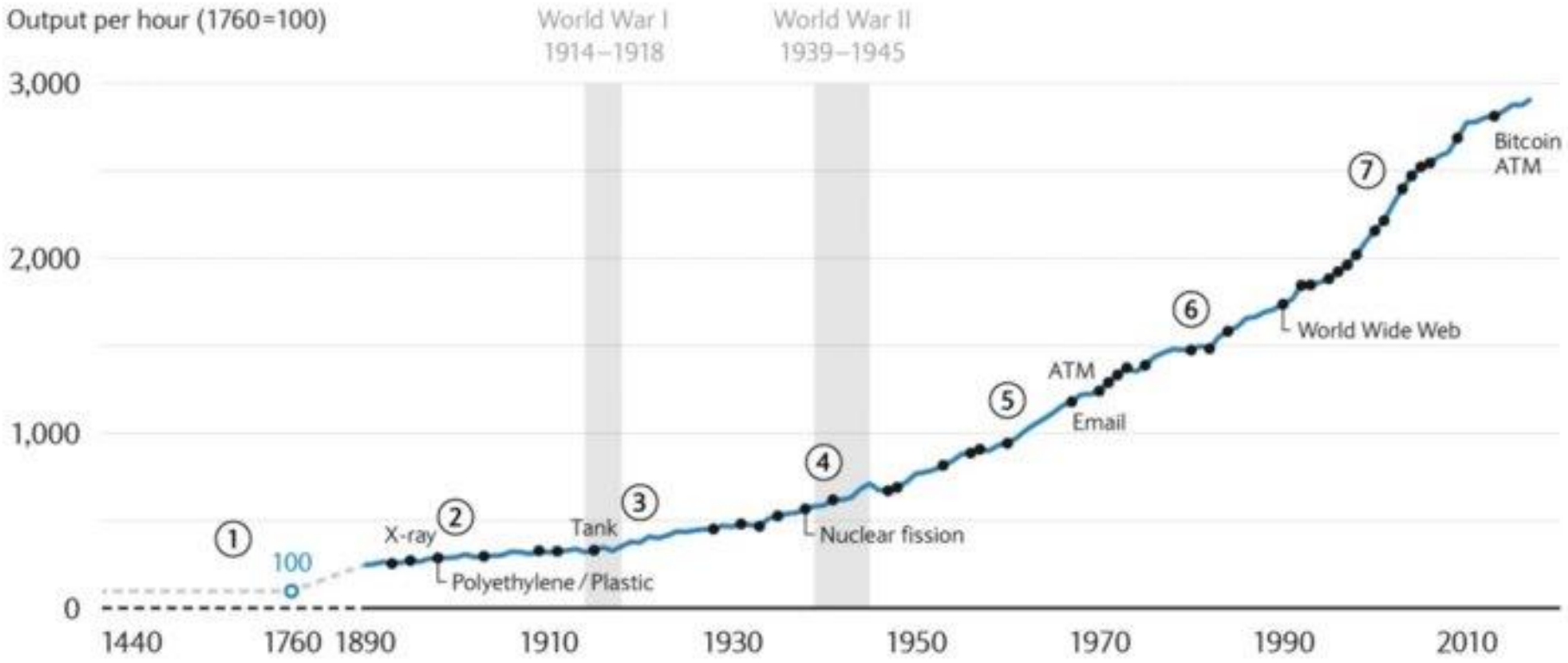
Internet of Things (IoT), Industrial Internet, and cyber-physical systems (CPS)[e]

- Consumer items—wearables such as exercise trackers; connected vehicles; connected home items, such as smart thermostats[f]
- Connected supply chains in manufacturing; connected sensors in agribusiness
- Connected government or public utilities—electricity, water
- Intelligent transportation—connected vehicles, smart traffic lights[g]

Major technological innovations in the last 150 years and their impact on productivity

FIGURE 1

From the printing press to the global internet, technology has evolved, and human societies with it



Source: Barclays

Blockchain: Solution to the Double-Spend

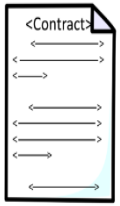
1. **Public Key Cryptography** – Peer-to- peer transactions are made through cryptography (e.g., public-private key)

2. **Distributed Public ledger** – Everyone "can" have a copy of the ledger creating a shared record of activity among all network participants

3. **Timestamped Transaction History**– Transactions are timestamped and "append only," which are linked to every transaction record that came before it

4. **Network Consensus** – Math and network participants validate transactions instead of a trusted third party

5. **Programmable** – Transactions can be programmed (i.e., Smart Contracts)



Source: U.S. Department of Treasury

Blockchain Technical Stack Considerations

Blockchain Protocol
The blockchain protocol chosen is going to depend on the needs of a particular project.

Consensus Mechanism
Consensus determines the process by which blocks are validated and get added to the blockchain.

Client Selection
This is what allows for communication with the blockchain.

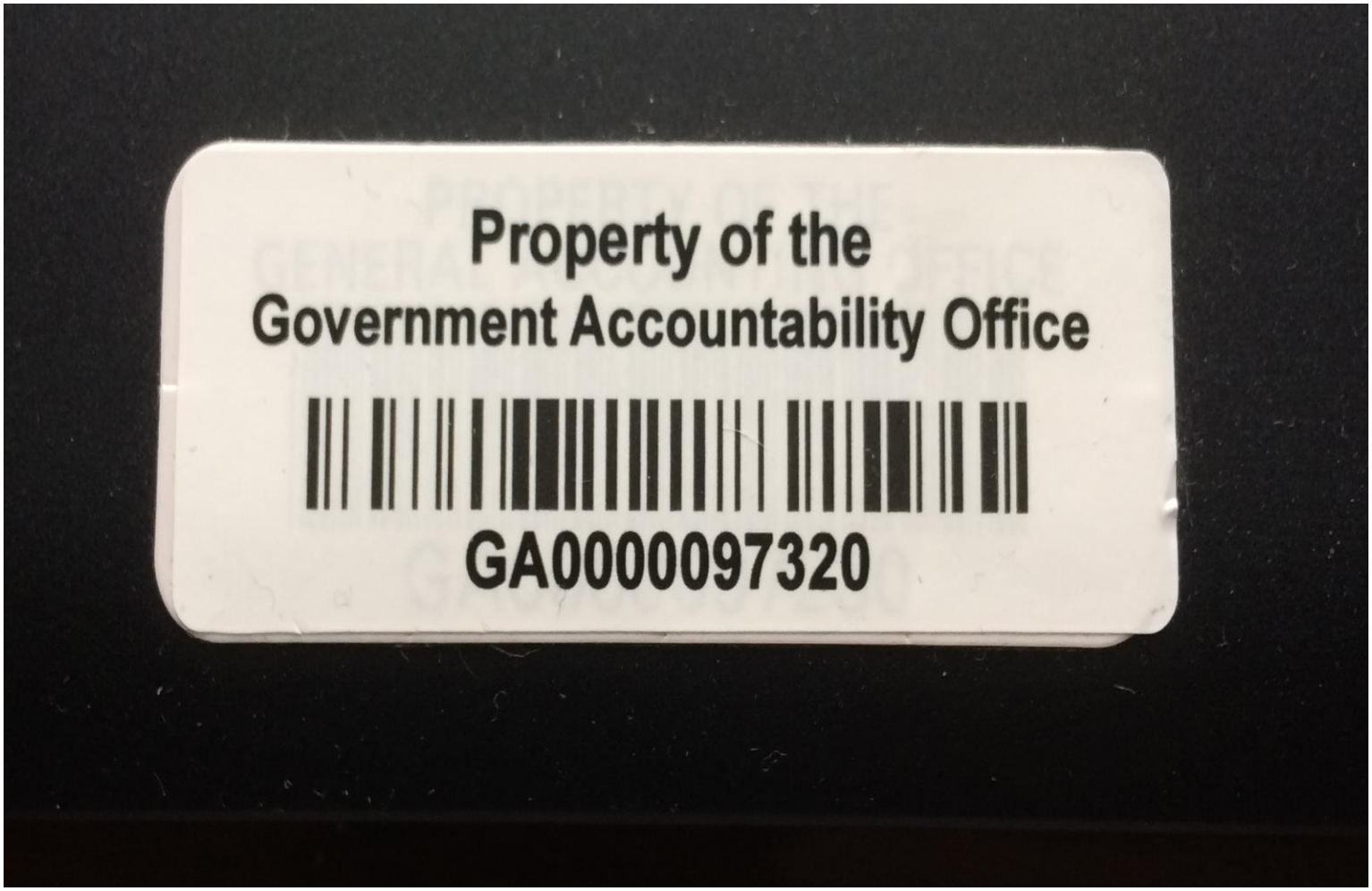
Infrastructure: Compute/Storage
The infrastructure component provides the compute and storage needed to run a blockchain application.

External Database
External databases hold data stored off-chain. Supplementing the blockchain with an external database allows us to achieve greater network speeds on the blockchain.

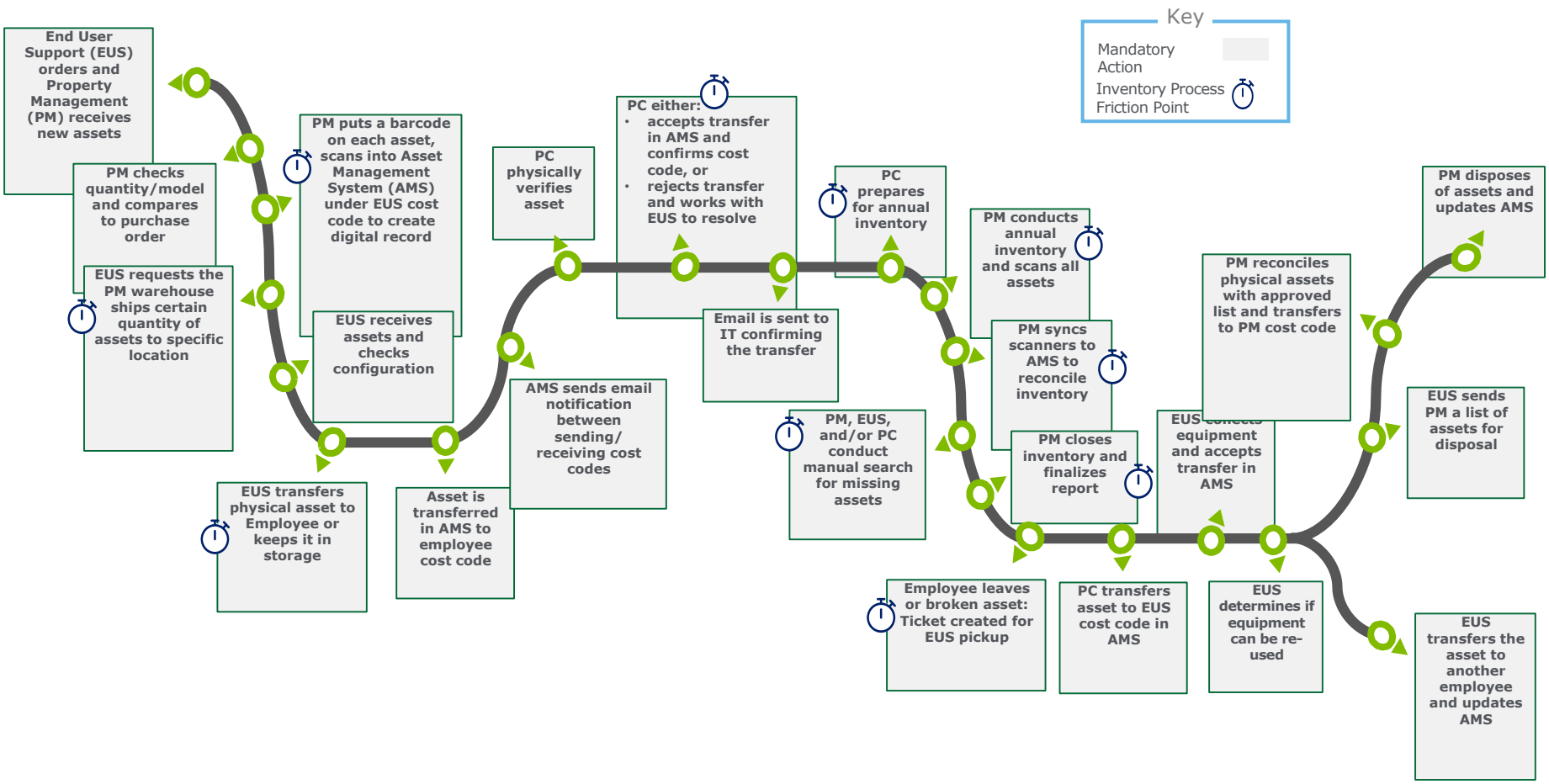
Potential Benefits for Financial Management

	Feature	Original Purpose	FM Potential Benefits
1	**Public Key Cryptography**	Proof of Ownership	Secure Transactions
2	**Distributed Public ledger**	Transparency	Transaction Transparency Resiliency
3	**Timestamped History**	Order of Transactions	Robust Audit Trail Permanent Record of Transactions
4	**Network Consensus**	Validating Transactions	Efficiency Near Real-Time Transaction Clearing and Settlement
5	**Programmable**	N/A	Automation

Asset Inventory Example



Asset Inventory Management (baseline)



Source: U.S. Department of Treasury

Stakeholder Pain Points

Five primary stakeholder groups identified their unique pain points in order to design a system that provides a distinct value for users

Property Management

- Manual, labor intensive, and time consuming inventory process
- Difficult to track and enforce asset ownership
- Lack of reliable reporting functions

End User Support

- Difficulty reporting on assets
- Ordering assets
- Validating disposal list

Leadership

- Lack of real-time visibility of state of the inventory

Property Custodians

- Validating transfers to/from employees
- Manual, labor intensive, and time consuming inventory process
- Majority of responsibility as asset owner for several devices

Employees

- No transparency regarding assigned equipment

Asset Management Proof of Concept

1 Assess how blockchain technology could be used to:

- **Register, track, and manage** asset inventory
- Provide **near real-time validation** of asset transfers and disposals **without the need of an intermediary**
- **Streamline and automate** large-scale inventory processes and reporting
- Provide **end-to-end visibility** over the state of the inventory

2 Provide an understanding of:

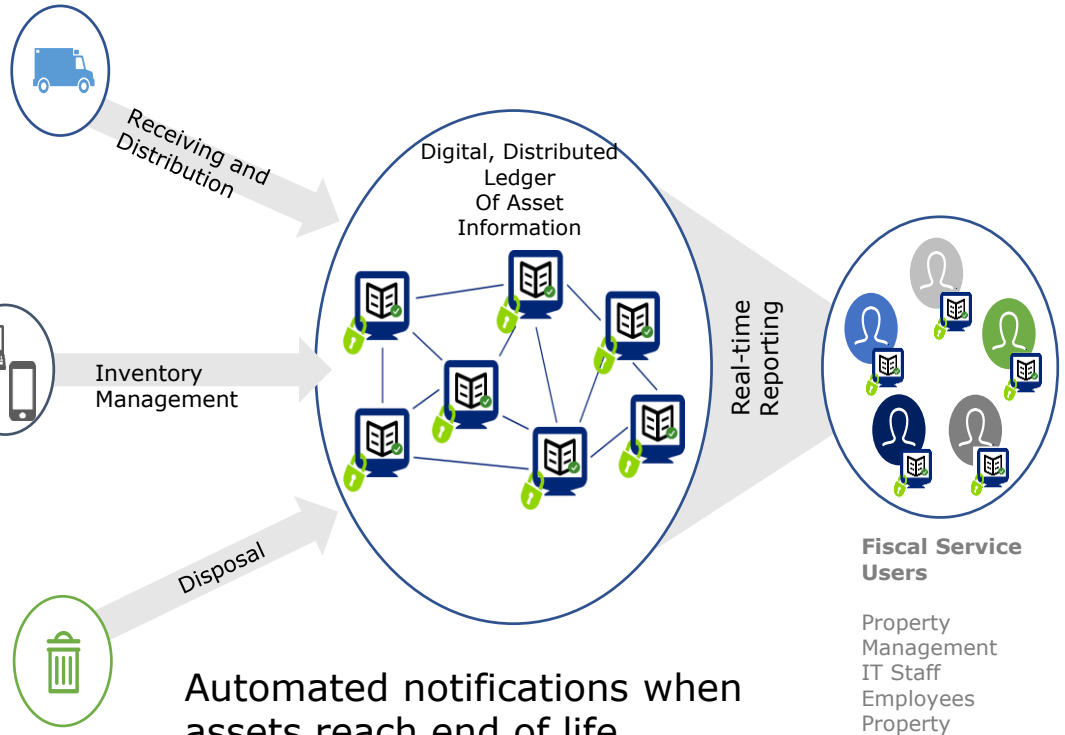
- The degree to which **policies, oversight, and governance** will need to evolve in a blockchain ecosystem
- How this proof of concept can be applied to **additional use cases in Federal** financial management
- The degree to which a production-ready asset management solution could **save the government money**

Asset Inventory Management (Blockchain)

End-to-end asset lifecycle transactions and state changes are recorded on a distributed ledger and shared among users, providing a single source of truth for asset information

Scan and tokenize assets
Electronic transfer of ownership between users
Automatic notifications to users sending and receiving asset transfers

Automated initiation of inventory process
Electronic verification of asset ownership



Automated notifications when assets reach end of life
Electronic transfer of ownership between users

DESIRED OUTCOMES

- Complete, accurate, immutable records
- Real-time visibility of asset inventory
- Reduction in manual process time
- Trusted, efficient peer-to-peer transfers
- Understanding of DLT's applicability to financial management

Source: U.S. Department of Treasury

When is Blockchain the Right Fit?

Use case criteria for evaluating possible fit:

Source: U.S. Department of Treasury

Benefits of Blockchain

- Disintermediation via collaborative, yet untrusted community
- Increases transaction speed/value transfer and reduces time conventional intermediary delays (i.e., “friction reduction”)
- Value transfer network/infrastructure
  - Procurement
  - Supply chain management
  - Smart contracts (i.e., “if, then, else” preconditioned transactions)
  - Patents, Trademarks, Copyrights, Royalties
  - Federal personnel workforce data
  - Appropriated funds
- Transparency, authentication, and auditing
- Reduced risk of fraud, error, or invalid transactions

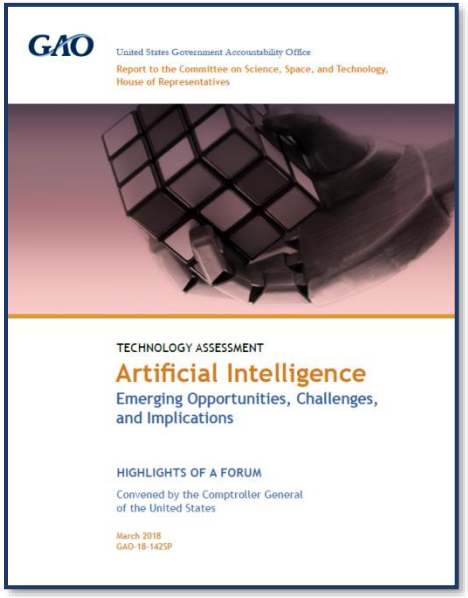
Challenges of Blockchain

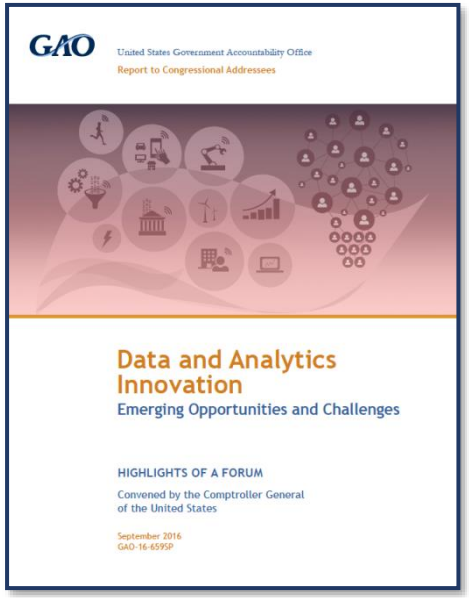
- Proof of Resilience via Disintermediation
- Upskilling/re-skilling existing workforce and training future one will be required
- Intensive computational requirements at large scale
- Risk of silos remains
- Culture/social risk
- Greater collaboration among business sectors is required
- Privacy and security
- Regulatory reform

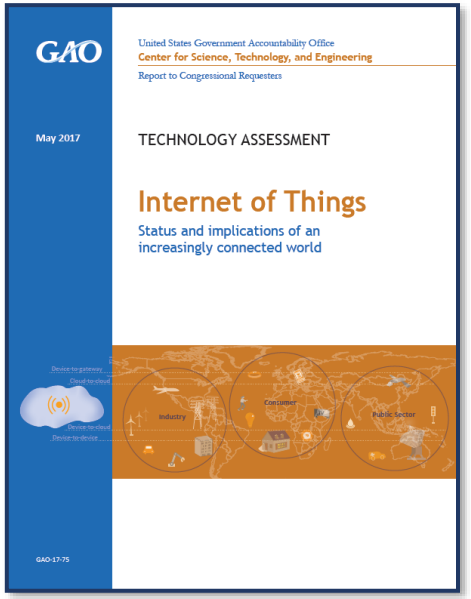
Implications of Blockchain

- For some sectors, a radical rethinking of the business model (*i.e.*, the value proposition for customers) will be required
- For the most part, rumors of the deaths of institutions and vocations are greatly exaggerated…jobs will be lost, but others gained (possibly a net gain)
- Human capital development will require fundamental reconsideration and will need transformation to meet the future demands of many, if not most professions
- Regulatory "sandboxes" will be needed for regulators to identify issues and test the technology in a more native environment
- Key business mechanisms will change, however, core business principles will not

Thank you







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