At the Intersection of...

Blockchain Technology & RIM
WHAT DO RECORDS AND INFORMATION MANAGEMENT PROFESSIONALS NEED TO KNOW?
Today’s Agenda

- Blockchain: Basics
- Blockchain: Industry Use Cases
- Blockchain: Decision Tree
- Blockchain: Impact on RIM Programs
How the technology works!

BLOCKCHAIN BASICS
WHERE SHOULD WE FOCUS THIS YEAR?

“BLOCKCHAIN”

IT WILL CHANGE EVERYTHING.

EVERYBODY IS TALKING ABOUT IT.

THE POTENTIAL APPLICATIONS ARE ENDLESS.

WE DON’T WANT TO BE LEFT BEHIND.

WHAT EXACTLY IS BLOCKCHAIN?

ALSO, “ARTIFICIAL INTELLIGENCE”
There is no universal definition of blockchain
The blockchain is an *incorruptible digital ledger* of *economic transactions* that can be programmed to record not just financial transactions but virtually *everything of value*.

~Don & Alex Tapscott
Blockchain is a DLT – But not all DLs are Blockchain

Distributed Ledger

Blockchain

Types

Public

Private (Single Organization)

Private (Consortium)
Centralized Ledger

Decentralized Ledger

Peer to Peer
Chains = series of transactions (blocks)

Blocks = record of transactions

Distributed Networks
Nodes can be full (storing a complete list of every single transaction that has occurred on a blockchain) or light or lightweight (storing a partial list).

Miners (mining nodes) typically also run full nodes—but not all nodes are miners.
This is what a Cryptocurrency Mine really looks like.
<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
<th>Likely applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public</strong></td>
<td>Permissionless/trustless</td>
<td>Decentralized</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Likely applications: B2B and B2C use cases</td>
</tr>
<tr>
<td><strong>Private</strong></td>
<td>Permissioned/trusted</td>
<td>Single organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Likely applications: Internal database management &amp; auditing</td>
</tr>
<tr>
<td><strong>Consortium</strong></td>
<td>Permissioned/trusted</td>
<td>Multiple organizations</td>
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<td></td>
<td></td>
<td>Likely application: Cooperative initiatives such as consortium of banks.</td>
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3 Generations of Blockchain

**Blockchain 1.0:** Transactions and payments via cryptocurrency.

**Blockchain 2.0:** Decentralized applications and smart contracts that reside atop the blockchain.

**Blockchain 3.0:** Extensibility beyond the blockchain protocol—a connection with other systems, services, analytics, and more broadly, the outside world.
Private Key Storage

A wallet is an app, website, or device that manages private keys for you.
pragma solidity ^0.4.22;

/// @title Voting with delegation.
contract Ballot {
    // This declares a new complex type which will
    // be used for variables later.
    // It will represent a single voter.
    struct Voter {
        uint weight; // weight is accumulated by delegation
        bool voted; // if true, that person already voted
        address delegate; // person delegated to
        uint vote; // index of the voted proposal
    }

    // This is a type for a single proposal.
    struct Proposal {
        bytes32 name; // short name (up to 32 bytes)
        uint voteCount; // number of accumulated votes
    }

    address public chairperson;

    // This declares a state variable that
    // stores a 'Voter' struct for each possible address.
    mapping(address => Voter) public voters;

    // A dynamically-sized array of 'Proposal' structs.
    Proposal[] public proposals;

    /// Create a new ballot to choose one of 'proposalNames'.
    constructor(bytes32[] proposalNames) public {
        chairperson = msg.sender;
        uint48(1).unchain();
    }
The **oracle/oracle network** is the party in charge of connecting you to the data-source.
Blockchain-as-a-Service (BaaS)

BaaS is an offering that allows customers to leverage cloud-based solutions to build, host and use their own blockchain apps, smart contracts and functions on the blockchain while the cloud-based service provider manages all the necessary tasks and activities to keep the infrastructure agile and operational.

*Source: Investopedia*
Hyperledger Fabric on SAP Cloud Platform

3rd Generation = SaaS Providers

Benefits:
- Ease of use
- Efficient processes
- Transparency & visibility
- Security
- Access Control
- Connect your network to a blockchain
IN CODE WE TRUST
Blockchain: immutable but not infallible

The DAO Attacked: Code Issue Leads to $60 Million Ether Theft

$190 million gone forever? Crypto boss dies with passwords needed to unlock customer accounts
It’s all about trust!

BLOCKCHAIN: INDUSTRY USE CASES
Plateau of Productivity projected to be reached within 2-5 years (was 5-10 years just last year)
West Virginia Secretary of State Reports Successful Blockchain Voting in 2018 Midterm Elections


Denver Municipal Election: Another Small Stop on the Road to Universal Blockchain Voting

BeefChain Receives First USDA Certification For A Blockchain Company
April 25, 2019
Phase IV, Factom will deploy this technology in a realistic field environment with Customs and Border Protection (CBP) to understand its operational impacts when securing data collected by cameras and sensors.”

**News Release: DHS Awards Austin-Based Factom, Inc. $192k for Blockchain Tech**

June 15, 2018

DHS S&T has awarded $192,380 to Factom, Inc., a start-up based in Austin, Texas, to begin beta testing of a capability that uses blockchain technology to secure Internet of Things (IoT) data.
PayPal-backed blockchain aims to help banks verify digital IDs

• Car Maintenance Program (Renault, France)

• Blockchain enabled toll booth & cars (Tesla, US)

• Parts Authentication (innogy SE, Digital Twin Platform, Germany)

• Manufacturer, Sales & Service Finance (OEM Mahindra – focus on automotive financing, India)
Blockchain & the RIM Industry

Alfresco’s Document Authentication for Record Management and Compliance using Blockchain

• Sphereon offers 2 extensions to Alfresco’s Content Services & Processes Services:
  – Blockchain Audit Trail (Proof of Process)
  – Blockchain Authentication (Proof of Authenticity)

• SharePoint Add-in or SDKs (Software Development Kits) to add blockchain as part of workflows.
Recordkeeping as a Service

- Open Source
- Up & running within day
- Easy to update & maintain with APIs & Libraries
- High security with mining or permissioned configurations
- Anyone can get read-only access for data verification
- Integrates with other businesses for external use if needed

HOW DOES BLOCKCHAIN WORK?

One party requests a transaction.

Requested transactions are funneled into a P2P network and broadcast to each individual computer (or node).

Individual nodes receive the request and validate the transaction using an algorithm.

Once the block is added to an existing chain, transactions are complete and permanent.

Approved transactions are represented as blocks and added to a public ledger.
How do we know when we should use it?

BLOCKCHAIN DECISION TREE
Personnel Files

• **Use Case:**
  
  – Application/resume, new hire documentation, position description, personnel actions, training records, emergency contact information, letters of recommendation, policy acknowledgements, performance evaluations, disciplinary actions, separation records

• **Factors:**
  
  – Retention – 5 years (applications-hired)/75 years (ex. Employee pension records)
  – 2 files per employee (public and confidential)
  – Documents added throughout employment
    • Some may require purging
Personnel Files

Considerations for use of Blockchain:

• What information is recorded?

• Who is accessing the data?

• What are the pros and cons of using Blockchain for all or part of these records?

• What are the costs? Do the benefits justify the cost?

• Are there privacy or security concerns?

• What other considerations are there?
Blockchain DLT Decision Matrix

- Do you need a shared database for multiple users?
  - Yes
  - No
- Do you need an immutable, time-stamped log of all entries?
  - Yes
  - No
- Do trust issues exist among users?
  - Yes
  - No

A traditional database is all you need.

- Will any of the data stored need to be modified or deleted in the future?
  - Yes
  - No
- Will personal and/or sensitive data be stored?
  - Yes
  - No
- Will Big Data be stored?
  - Yes
  - No

Blockchain DLT may be right for you!

Consider other solutions—including storing a hash of data on chain and the data off chain.
What does it mean for our programs?

BLOCKCHAIN & RIM
Blockchain Technology is a Recordkeeping Technology—Not a Recordkeeping System
Characteristics of Trustworthy Records

- **Authenticity**: What it purports to be; created or sent by the agent purported to have created or sent it; created or sent when purported.

- **Reliability**: Trusted as a full and accurate representation of the transactions, activities or facts to which they attest; and can be depended upon in the course of subsequent transactions or activities.

- **Integrity**: Complete and unaltered.

- **Usability**: can be located, retrieved, presented and interpreted within a time period deemed reasonable by stakeholders. Connected to the business process or transaction that produced it. Linkages between records that document related business transactions should be maintained.
Archangel Project: Archive Management & Records Sharing & Keeping

“How can we demonstrate that the record you see today is the same record that was entrusted to the archive 20 years previously? ... How do we ensure that citizens continue to see archives as trusted custodians of the digital public record? ... Archangel is exploring how we can know that a digital record has been modified and whether it was legitimate...”

https://bitcoinexchangeguide.com/tna-starts-archangel-project-for-blockchain-record-sharing-keeping/

Blockchain Project for National Archives Reports Successful Trial for Audio-Visual Content

By IG GURU - July 2, 2019
ARCHANGEL Blockchain Platform

A document’s integrity and provenance can be checked by re-extracting and comparing the content evidence to that in the Blockchain.

(Source: Collomosse et al.) Full text available on ResearchGate.
2018 Blockchain-based document management system for PKO BP, a major Polish Bank

Every document recorded in the blockchain as irreversible hash signed with bank’s private key.

A client can verify remotely if files received are true, or if a modification of the document was attempted.”

Data Ownership, Provenance

Document, Record, File is created and uploaded to Trudatum

RegTech provider (Coinfirm) digitally signs document and…

Registers to the Dash public blockchain—a confirmation hash is generated

Using the Confirm hash, recipient checks contents against record Trudatum created on the Dash blockchain

Content match?

No – Recipient is notified.

Yes – Recipient has confidence in file’s authenticity and can use to make business decisions.

Owner sends file and hash to recipient

https://www.coinfirm.com/products/trudatum
MedicalChain – Pilot with Groves Medical Group, London, UK

<table>
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<th>Role</th>
<th>Permissions</th>
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<tr>
<td>Practitioner</td>
<td>• Read/Write on permissioned EHRs</td>
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<tr>
<td>Patient</td>
<td>• Read own EHR</td>
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<tr>
<td></td>
<td>• Permission Practitioner/Institution to Read/Write</td>
</tr>
<tr>
<td></td>
<td>• Revoke permission</td>
</tr>
<tr>
<td></td>
<td>• Permission next of kin/emergency contact to Read/Grant permission</td>
</tr>
<tr>
<td></td>
<td>• Write certain attributes to EHR (e.g. alcohol consumption, weekly exercise)</td>
</tr>
<tr>
<td></td>
<td>• Integrate IoT data into HER</td>
</tr>
<tr>
<td>Research Institution</td>
<td>• Read permissioned EHRs</td>
</tr>
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Access to EHRs on Blockchain

Doctor or patient requests data using a private key

Hash on ledger compare with hash of document in secure storage

Response

- No match: Request flagged
- Match: Verified data sent
Weigh the Strengths & Weaknesses

**Strengths**
- Immutability
- Redundancy
- Disintermediation
- Efficiency

**Weaknesses**
- Immutability
- Redundancy
- Loss of Context
- Privacy
- Regulatory Uncertainty
- New Technology
Security is a priority throughout the process.
ISO Blockchain Standards under development

**ISO/TC 307**
Blockchain and distributed ledger technologies

Filter: [ ] Published standards [ ] Standards under development [ ] Withdrawn standards [ ] Projects deleted

<table>
<thead>
<tr>
<th>Standard and/or project under the direct responsibility of ISO/TC 307 Secretariat (11)</th>
<th>Stage</th>
<th>ICS</th>
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<td>ISO/CD 22739 [Under development] Blockchain and distributed ledger technologies -- Terminology</td>
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<td>35.030 35.240.40 01.040.35 35.240.99</td>
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<tr>
<td>ISO/DTR 23244 [Under development] Blockchain and distributed ledger technologies -- Privacy and personally identifiable information protection considerations</td>
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<td>35.030 35.240.99 35.240.40</td>
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Information Governance Considerations

- There is still the question of governance over the blockchain.

- While it is intended to be run without a sole overseer, the technology itself is made up of machines and code developed by people.

- Resulting conflict resolution procedures are not solidified, and the entire system itself may not even technically be covered by existing laws.

- This could open up the possibility of fraudulent and unethical behavior if procedures and laws are not properly thought out prior to implementation.
Summary

• **Understand** the basics of Blockchain & Distributed Ledger Technology (DLT)

• **Become familiar with** the application of blockchain DLT to specific Uses Cases

• **Consider** the impact of blockchain & DLT on your own RIM Programs & Practices
Thank you!

Questions?

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