



Distributed Ledgers

Ashish Antal

Director, Engineering Architecture at MLSListings, Inc.

Mark Lesswing

SVP at T3 Sixty & Founder of Lesswing, LLC

About

Applying standards to distributed real estate data systems

Workgroup Chairs - Mark Lesswing and Ashish Antal

Meetings - **4th Tuesday** of every month from **12:00 – 1:00 PM EST**

Agenda

The State of Blockchain - How the technology has evolved in recent years

Case Study - A close look at event catalog reference implementation

Progress Update - An update on the progress on event model

Ongoing Efforts - Event Catalog and Digital Identities

The State of Blockchain

Distributed Ledgers

The State of Blockchain

Technology

Has evolved to become more efficient and **cost effective**

Is suitable for **intelligence gathering, data security, traceability** and data exchange systems

Supported by network of distributed blockchain nodes using **distributed consensus methods** to trust and manage shared ledgers

Distributed Ledgers

The State of Blockchain

Solutions offered by cloud service providers

VENDORS

AWS

Microsoft

IBM

Google

Oracle

Hyperledger
Corda
Ethereum
Quorum
Ripple

PLATFORMS

Distributed Ledgers

The State of Blockchain

Adoption

Growers, processors, wholesalers, distributors, retailers and others are **enhancing visibility and accountability** throughout the food supply

Countries are working toward implementing blockchain **solutions that benefit their citizens, societies and economies**

Governments are leveraging the technology behind decentralized ledgers in order to modernize military warehousing, help law enforcement, **validate** government contract bids **and promote transparency** of government grants

Distributed Ledgers

Authorities and health institutions battling the ongoing Coronavirus pandemic



Powered by Blockchain, Driven by Care

MiPasa is a global-scale control and communication system that enables a swift and more precise early detection of COVID-19 carriers and infection hotspots through seamless and fully private information sharing between individuals, state authorities and health institutions such as hospitals and HMOs, utilizing advanced technological tools and a dedicated user app.



No-One is Looking over Your Shoulder / No “Need” for Government Surveillance

MiPasa is the first tool to securely and democratically manage COVID-19 outbreaks by crossing siloed health and location data, while fully and unwaveringly protecting the privacy of its users.



Outsmarting Coronavirus using Crowd Data (the Intelligence of the Crowd)

MiPasa can help monitor and foresee local and global epidemiological trends and detect likely asymptomatic carriers by feeding big data on infection routes and occurrences to powerful AI processors around the world.



100% Audited and Verifiable Data-Workflows

We are utilizing advanced technologies that were developed to comply with the strictest privacy regulations and were up until now only available to leading financial institutions.



Battle-tested, Proven Underlying Technology

We are using privacy and cryptography modules that have not just been scientifically proven academically, but ones that have been implemented by the world's top applied cryptographers and these modules are being used by certified mission-critical systems, in production, today.

Distributed Ledgers

The State of Blockchain

Challenges

Adoption is limited by a number of factors, including **infrastructure** development, local resources and **regulation**

To support an enterprise-grade platform aligned with the regulatory and fiduciary responsibilities of its participants, enterprise blockchains **must be designed around the principle of permissioned and trusted access**

Common **standards** are needed to help **streamline access across** multiple blockchain **networks**

Before we dive deeper...

RESO Contributor Awards!

DISTRIBUTED
LEDGER



#RESOremote
REAL ESTATE STANDARDS ORGANIZATION



Claudio
Ceballos Paz
ReConsortia



Imran Kasam
eXp Realty

Referral Tracking
ReConsortia

Agent Onboarding
eXp Realty

Case Study

Education and Certification

Document an Event

Member ID

urn:reso:uaid:900765912

Type of Event

Education

Organization

Kitchener-Waterloo

Course Code

E-23456

Completion Date

2020-04-09

Description

Intro to Ethics

Create

Reference Key

INFORMATION: Offchain material

INFORMATION: Not active

Member Activity Report

Member: urn:reso:uaid:900765912

Date: Thu Apr 09 2020 14:17:40

#	Event Type	Details	Transaction Information
1	Education	<p><i>Organization:</i> OREA</p> <p><i>Year:</i> 2020</p> <p><i>Course Code:</i> I-567</p> <p><i>Completion Date:</i> 2020-04-09</p> <p><i>Offchain Address:</i> urn:ipfs:QmXyS6Cj6PMpRfkRcfve1FykDdC2tdL8N4tkkWvt6yuiqA</p> <p><i>Description:</i> Compliance Management</p>	<p><i>Recorder:</i> urn:reso:recorder:org1:999888777666</p> <p><i>Application:</i> API Server</p> <p><i>System:</i> AMS</p> <p><i>Identifier:</i> b38f91a1-0b79-4f97-a2c8-21feb0eee251</p> <p><i>Recorded:</i> Apr-09-20 14:17:35</p>
2	Education	<p><i>Organization:</i> Kitchener-Waterloo</p> <p><i>Year:</i> 2020</p> <p><i>Course Code:</i> E-23456</p> <p><i>Completion Date:</i> 2020-04-09</p> <p><i>Offchain Address:</i> urn:ipfs:QmZWwV5DydtkkY1sid4vSg6UB3tDWmTvhHVBjw6KNX9vP</p> <p><i>Description:</i> Intro to Ethics</p>	<p><i>Recorder:</i> urn:reso:recorder:org1:999888777666</p> <p><i>Application:</i> API Server</p> <p><i>System:</i> AMS</p> <p><i>Identifier:</i> f3bf7a16-f667-425f-b198-4ef5083cd7a8</p> <p><i>Recorded:</i> Apr-09-20 14:17:11</p>

Progress Update

Event Model

An event

A **change notification** conveyed via an API or an immutable ledger.

Event Model

Main components (**Who** **Where** **What**)

A. Association Who

Subject Person or Property

Recorder Operator

Audience Recipient

B. Source Where

Entity Publisher

System Process

Application Product

C. Message What

Event Change

State Action

Context Payload

Event Model

Main components (**Who** **Where** **What**)

A. Association Who

Recorder: urn:reso:recorder:org1:999888777666

Application: API Server

System: AMS

Identifier: b38f91a1-0b79-4f97-a2c8-21feb0eee251

Recorded: Apr-09-20 14:17:35

B. Source Where

Organization: OREA

Year: 2020

Course Code: I-567

Completion Date: 2020-04-09

Offchain Address:

urn:ipfs:QmXyS6Cj6PMpRfkRcfve1FykDdC2tdL8N4tkkWvt6yuiqA

Description: Compliance Management

C. Message What

Event Ledger

TransactionId	EventSubject	System	SubjectType	Entity	Event	State	Recorder	Timestamp	Application
4b46aadd-0f2a-4e79-b3a6-e2e45927d2a2	urn:reso:ulid:900765912	Association Management System	Member	Association	Appointment	Recorded	urn:reso:recorder:org1:ae1643	Sun, 03 Jun 2018 13:04:05 GMT	87478-a43
c7e5a353f-d3b4-2f48-8f02-604bbe507805	urn:reso:ulid:900765912	Association Management System	Member	Association	Education	Recorded	urn:reso:recorder:org2:lae643	Sat, 21 Jul 2018 18:34:22 GMT	15435-dd6
cd7a53f-d3b4-4e48-845b-604bbe507805	urn:reso:ulid:900765912	Association Management System	Member	Association	Education	Recorded	urn:reso:recorder:org2:lae643	Sun, 19 Aug 2018 12:01:45 GMT	15435-dd6
2ad753f4-d3b4-4e47-8402-604bbe7886434	urn:reso:ulid:900765912	Association Management System	Member	Association	Election	Recorded	urn:reso:recorder:org1:ae1643	Tue, 28 Aug 2018 18:11:22 GMT	87478-a43
e27a353f-d3b4-32e8-8629-604bbe237802	urn:reso:ulid:900765912	Association Management System	Member	Association	Appointment	Recorded	urn:reso:recorder:org3:76pae989	Wed, 03 Oct 2018 12:011:48 GMT	438-f32

90% Done !

Multiple reference implementations on way to production.

Draft 1.5 in progress...

Event Model

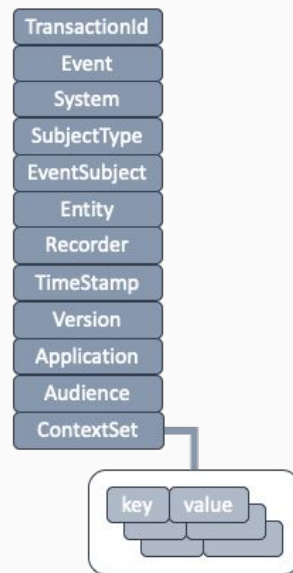
Our First Effort

Conveys changes to documents and records using standardized fields which can be delivered through a traditional API or a decentralized system.

Version 1.3



Version 1.4



Version 1.5



Event Model

Business Considerations

Tracks “what happened” events

No Personally Identifying Information

No detailed information

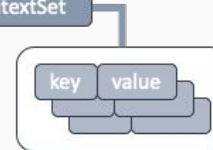
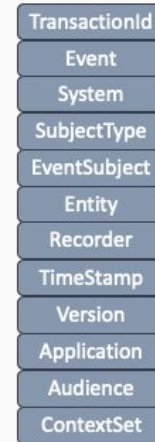
Cross-system references

REST API

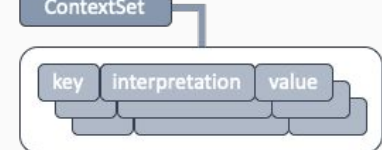
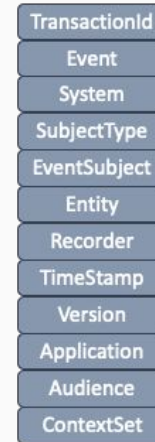
Version 1.3



Version 1.4



Version 1.5



Event Model for Distributed Ledgers

Permanent record

Information instantly distributed

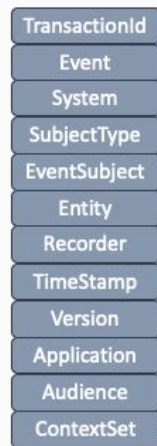
Application can “listen” for changes

Always available

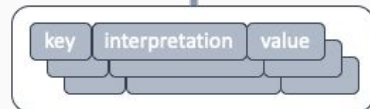
Version 1.3



Version 1.4



Version 1.5



Reference Implementations

- Brokerage
- Association
- MLS
- Cross-Ledger

Technologies Used to Date

- CouchDB (NoSQL)
- Docker (Containers)
- Ethereum
- Go
- Hyperledger Fabric
- IPFS
- Javascript
- Kubernetes (Containers)
- Node.js
- Salesforce
- Solidity
- X.509 (Certificates)

Extensive Workgroup Effort

What's Next

Decentralized Identities



“Blockchain by itself isn't transformational,
however it is foundational.

**As a foundational innovation, Blockchain's
value can only be fully realized when the
business process is transformed to take
advantage of its capabilities,** leading to ROI for
existing business models and the ability to
create value through new ones.”

- Tom Golway, Planning and Managing ATM Networks

Business Transformation Candidates

WORKFLOWS

Credentialing

Asset Ownership

Ownership Assertion

**These can all be done
today but consider the cost**

What do the workflows have in common?

WORKFLOWS

Credentialing

Asset Ownership

Ownership Assertion

Identity

Summary

- Easy to contribute
- Business impactful
- Hands-on

Digital Identities



Information about **who** has done **what**



Event Model

Always looking for collaboration

The workgroup meets 4th Tuesday of every month from 12:00 – 1:00 PM EST

Thanks!

Contact us:

Mark Lesswing

mark@lesswing.com

Ashish Antal

aantal@mlslistings.com

