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## BLOCKCHAIN 101

**Presented by:**

Yvonne Castillo, Director of Risk Management, Victor  
Adam Wilbrecht, Chief Knowledge Officer, Cuningham Group

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# AIA**Trust**

Where smart architects  
manage risk<sup>®</sup>

# VOS638-DE, BLOCKCHAIN 101 - 1 LU

## Learning Objectives

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### Objective 1:

- Understand the role blockchain technology may play in transforming the services that design firms offer including how a new level of risk management is incorporated into the design and construction phases of a project.

### Objective 2:

- Gain a working knowledge of use cases in other sectors of business to better understand how the technology functions.

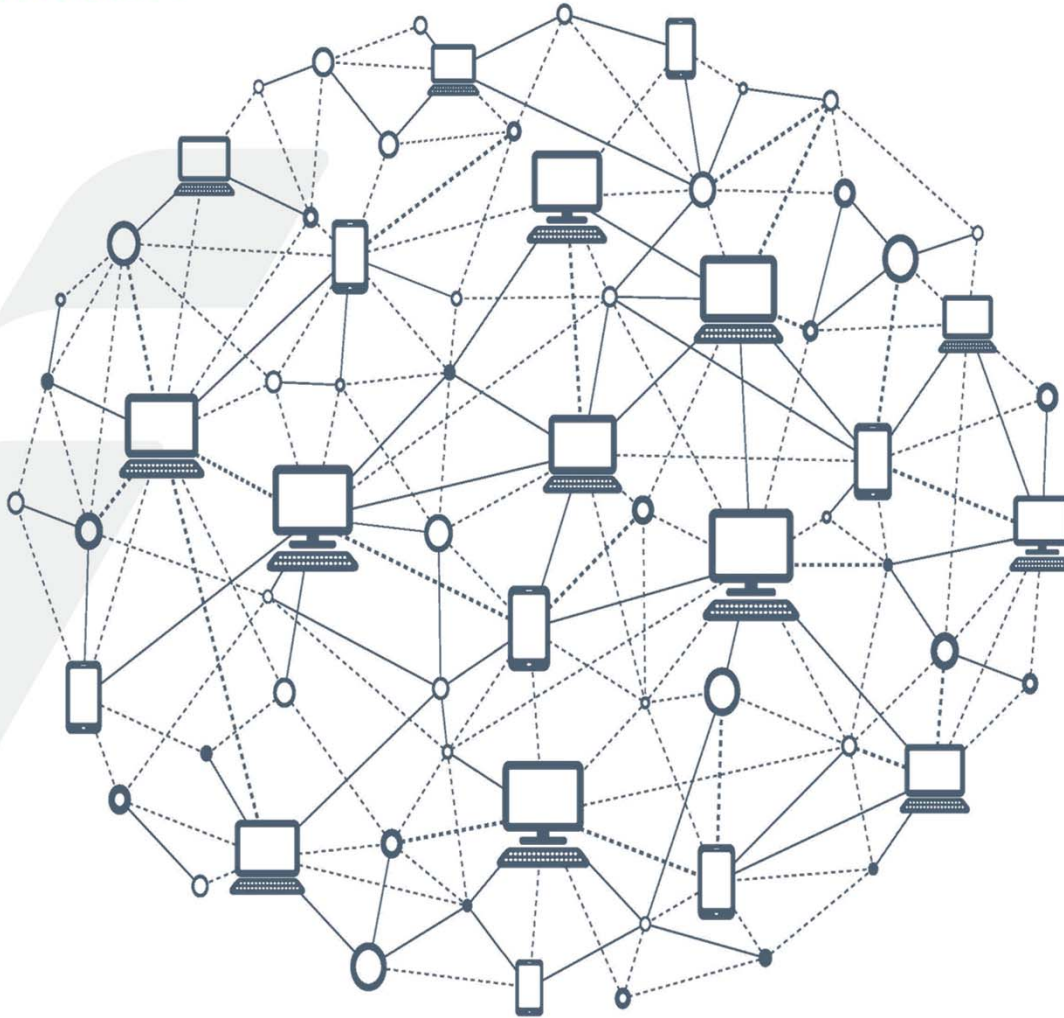
### Objective 3:

- Recognize the unique architecture and structure of the technology and application to the built environment.

### Objective 4:

- Appreciate how this technology dovetails with Integrated Project Delivery, BIM, and trends in decentralization/distributed networks.

## What is blockchain?



# AGENDA

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- Blockchain Technology
  - What is it?
  - How are other industries testing it (use cases)?
  - How might the AEC industry use it?
- Value Proposition in AEC
  - Trust mechanism
  - Supply chain management
  - Lifecycle operations management
  - Fractional ownership/investment model

# OVERVIEW

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What is blockchain?

How is it being used in the marketplace?

How might it be used in the AEC industry?

## FRAME OF REFERENCE

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## INTERNET APPLICATIONS IN THE 90'S



# EMAIL WAS THE KILLER APP

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# WHAT IS BLOCKCHAIN TECHNOLOGY?

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Distributed Database

Chronological  
Recordation

Peer to Peer Transaction  
Capability

# INTERMEDIARIES



# OTHER ECONOMIC SECTORS

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# Smart contracts

# The "Original" Smart Contract



# IF/THEN EXAMPLE

## Service Purchase

IF service is provided...

- ...**THEN** service provider requests inspection (or approval)

IF inspection meets standard (or approval granted for Task A)...

- ...**THEN** payment is triggered and lien rights released in proportion to payment and Task A-1 is triggered.

IF payment is completed for Task A...

- ...**THEN** notification is sent to responsible party for Task B that work may commence.

# IF/THEN EXAMPLE

Supply Purchase – Client purchases beams from supplier:

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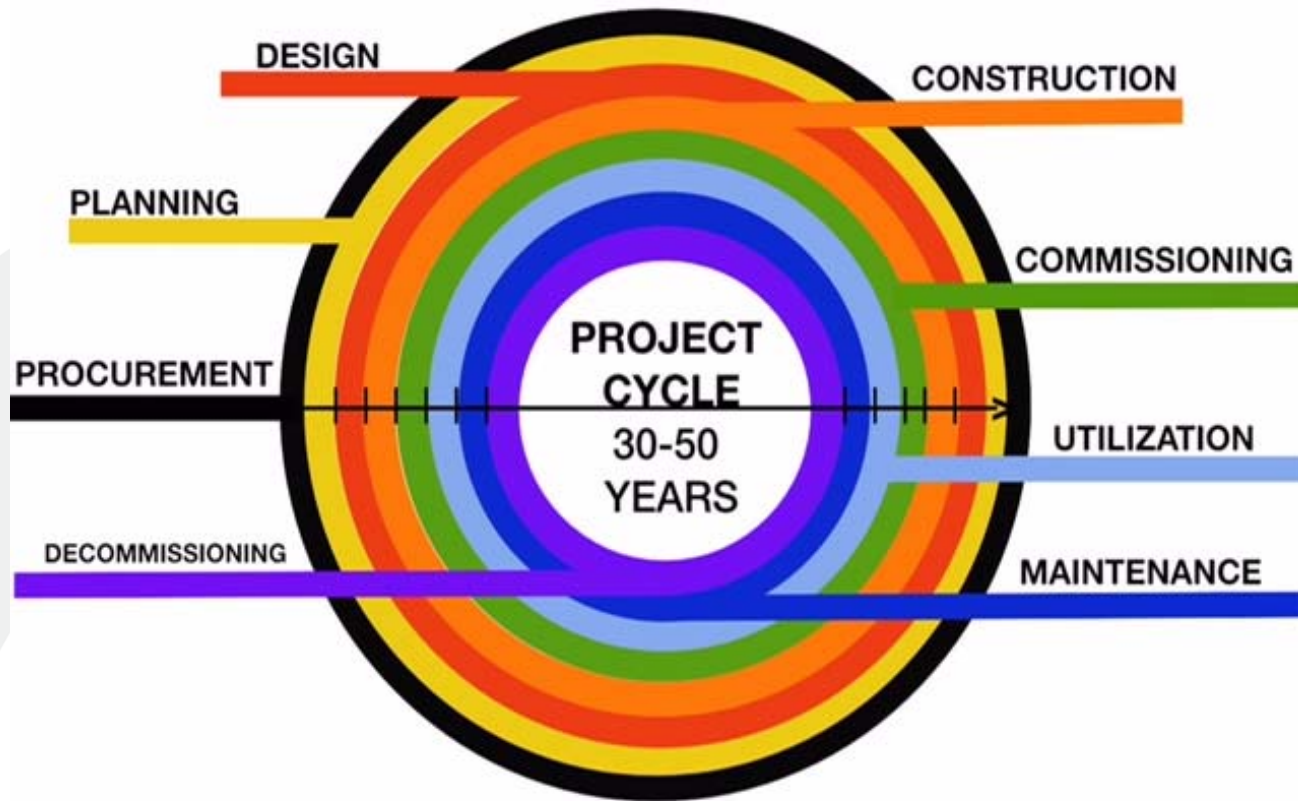
IF supply  
leave the  
supplier  
site...

- ...**THEN** partial payment is made to supplier and liability transferred to shipping company.

IF beams  
arrives on  
site...

- ...**THEN** remaining payment is made to supplier and liability transferred to contractor on arrival.

# DECENTRALIZED AUTONOMOUS ORGANIZATIONS







# TOKENIZATION


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A means to raise funds



Broadens pool of potential investors



Minimizes the costs of traditional bond issuance



**Adam Wilbrecht, Chief Knowledge Officer, Cuningham Group**



**“A Solution still seeking a Problem.”**

-Barclays Equity Gilt Study 2018 and many others...

# CONTEXT

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Our industry, by necessity, is moving to model based delivery



Reference:  
UK PAS 1192-2  
ISO 19650

We have come to understand:

- Drawings and specs are recognized as sub-optimal for communicating design intent and technical requirements
- Known clients and contractors are advocating for model based delivery to improve their own bottom line
- Model based delivery better facilitates new technology applications such as sensors and robotics
- Government authorities worldwide are moving to model based design, procurement and construction policies

# PROBLEM

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Model-based delivery is still considered a risk within professional practice



Reference:  
AIA E201-2007  
AIA E202-2008  
AIA E203-2013

We worry about:

- Intellectual property in the form of our designs and digital assets could be stolen and used without our permission
- Loss of model data or data fidelity could potentially result in lost revenue or damage to reputation
- There is no way to assure the integrity of digital model data and detect tampering
- Lack of precedent defending a digital design model in the context of a legal claim
- There is no established standard for certifying a digital model file

# PROBLEM

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Model-based delivery is still considered a risk within professional practice



We worry about:

- The traditionally adversarial relationship between design and construction





**“The culture change that we hear called for as a mantra of BIM can be considered a call for more **trust** among the stakeholders in the design, construction and building operations industry.”**

-Malachy Matthews, “BIM+Blockchain: A Solution to the Trust Problem in Collaboration?”  
Technical University Dublin

# OPPORTUNITY

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We have the unique opportunity to address the challenges of model-based delivery utilizing blockchain technology



Blockchain can leverage:

- Technology that will memorialize a design model as the trusted, bona-fide original
- Technology that permits professional certification to be applied to a design model in lieu of stamping printed documents
- Technology that allows a design model to be revised as part of the design, permitting, and construction process and be recertified
- Technology that securely maintains a record of all the release versions of a design



# BLOCKCHAIN KILLER USE CASES

It's not just about Bitcoin



## USE CASE #1: CRYPTOCURRENCY

- Like a physical asset: Like gold. Valuable because a community values it. No third party controls it. Verifiable scarcity.
- Anonymous: Owned only by having a 'private key' which can sign valid transactions in the ledger.

## USE CASE #2: TOKENS

- Analogous to existing 'cash-utility' offerings in our existing financial system: Tickets, coupons, Virtual goods in video games. Can sell and raise capital
- Verifiable quantity and use of tokens: Cannot be inflated or destroyed (like virtual gold in a video game).

## USE CASE #3: STABLE COINS

- Token which represents something: Can be traded on an exchange for something real, such as 1 #AECoin= 1 dollar.
- Can represent other assets, not just currencies: Interest in real estate, stocks, etc. Correlates to a real thing of value.

## USE CASE #4: SELF-SOVEREIGN IDENTITY

- Distributed ledger can hold identity information: One entry can hold lots of information about a 'thing.'
- "Digital Twin" is owned by the person (or entity) with access to the private key. Cannot be tampered with.

# SELF-SOVEREIGN IDENTITY

## THE DIGITAL TWIN USE CASE



### Virtual Professional Registration



Jurisdiction:  
Discipline:  
Registration #:  
Expiration:



### Virtual Professional Person



Name:  
Profession:  
Firm:  
Registration:  
Citizenship:  
Contact Info:



### Virtual Building / Project



Project Name:  
Location:  
Architect:  
Annual Taxes:  
Electrical Consumption:  
Waste Generated:

# SELF-SOVEREIGN IDENTITY

## THE LEDGER USE CASE – SIGNING A DATA FILE



#796756437c534  
864545e5752125  
75c314d21a1319  
6c8ad928e2f103



#864545e5752125  
75c314d79675643  
28e2f107c53421a  
13196c8ad93



15:23:12



# SELF-SOVEREIGN IDENTITY

THE LEDGER USE CASE – SIGNING A DATA FILE



# SOLUTION?

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Leverage the Sovereign Identity use-case for blockchain to permit iterative digital design files to be issued with digital signatures



Value propositions:

- Secure protection of design-side intellectual property and copyright
- Global functionality and utility decoupled from state-based or corporate governance
- Source-of-truth data certainty in claims
- Reliable transaction and iteration records
- Receptive marketplace within AECOO
- Solves the “how do I sign a model?” problem definitively

## ADDITIONAL APPLICATIONS

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AECOO requires a diverse and complex supply chain to design, construct, and operate a building



### Supply Chain Management potentials

- Enables “social network” of Consultants, Vendors, Sub-Contractors, etc.
- Automated agreements and contracts
- Automated payment mechanisms
- High fidelity record of delivery / completion / transaction

## ADDITIONAL APPLICATIONS

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AECOO requires a diverse and complex supply chain to design, construct, and operate a building



## Lifecycle operations & management uses

- Fabrication and Production
  - Production specifications
  - Scheduling
  - Delivery
  - Compensation
  
- Asset tracking
  - Procurement
  - Maintenance
  - Performance
  - End of Life / Replacement
  - Enables assets-as-a-service model

## ADDITIONAL APPLICATIONS

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Provide a mechanism for new means of acquiring capital to fund projects at any scale



Money may never be the same...

- Fractional Ownership
  - Allows for smaller capital contributions
  - Enables more diverse funding sources including crowd funding
  - Non-repudiable record of investment
  - Enable true sweat equity transactions
  
- “#AECoin” Concept
  - Facilitates a micro-economy for a project
  - Allows for compensation of actual work performed and contribution to a project rather than hours worked
  - Production of assets “mines” the currency on behalf of the person performing work



# RESOURCES

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- Victor

- <https://www.victorinsuranceus.com/school-of-risk-management/>
- <https://victorriskmanagement.blog/> (especially -- <https://victorriskmanagement.blog/2018/11/01/blockchain-collaboration-innovation-for-design-professionals/>)

## **theAIATrust.com**

- <https://www.theaiatrust.com/blockchain-5-things-to-know-now/>
- and sign-up for their free quarterly newsletter: <https://www.theaiatrust.com/newsletter-signup/>



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**THANK YOU**