# P2145 Showcase

## Blockchain Governance Standards

***Goal:*** *To introduce Trust Over IP to the work of the IEEE's Blockchain standards community and the IEEE P2145 Working Group*

*Presented Thursday 08-Apr-2021 by:*

*Kirsten Pomales Langenbrunner, Savita Farooqui, Thomas Cox, Hayley Howe, Denise McCurdy*

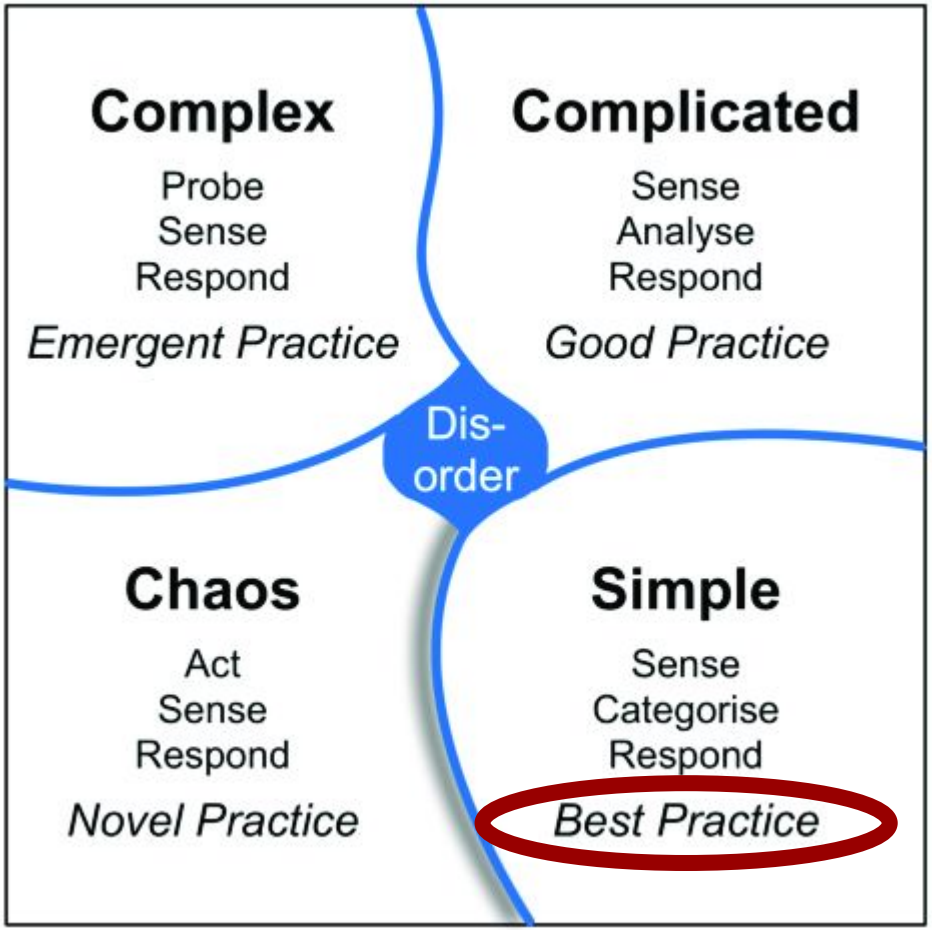
# Outline of the talk

1. Who is IEEE; the 6 types of standards (Thomas, 5min)
2. What is Open Standards (why we went Open; what it means for you) (Thomas, 1 min)
3. What's P2145 about; our deliverables (Thomas, 5 min)
4. Lexical subgroup - its purpose (also: design patterns) (KPL + Savita, 10 min)
5. Reputation - its purpose and deliverables (Hayley, 5 min)
6. Interop - its purpose and deliverables (Denise + Savita, 5 min)
7. Layer Model / Process Model / Maturity Model proto-subgroups (Thomas, 3 min)
8. Q&A

# Standards and the Cynefin Framework

Lowest level of standards is appropriate:

- Terminology



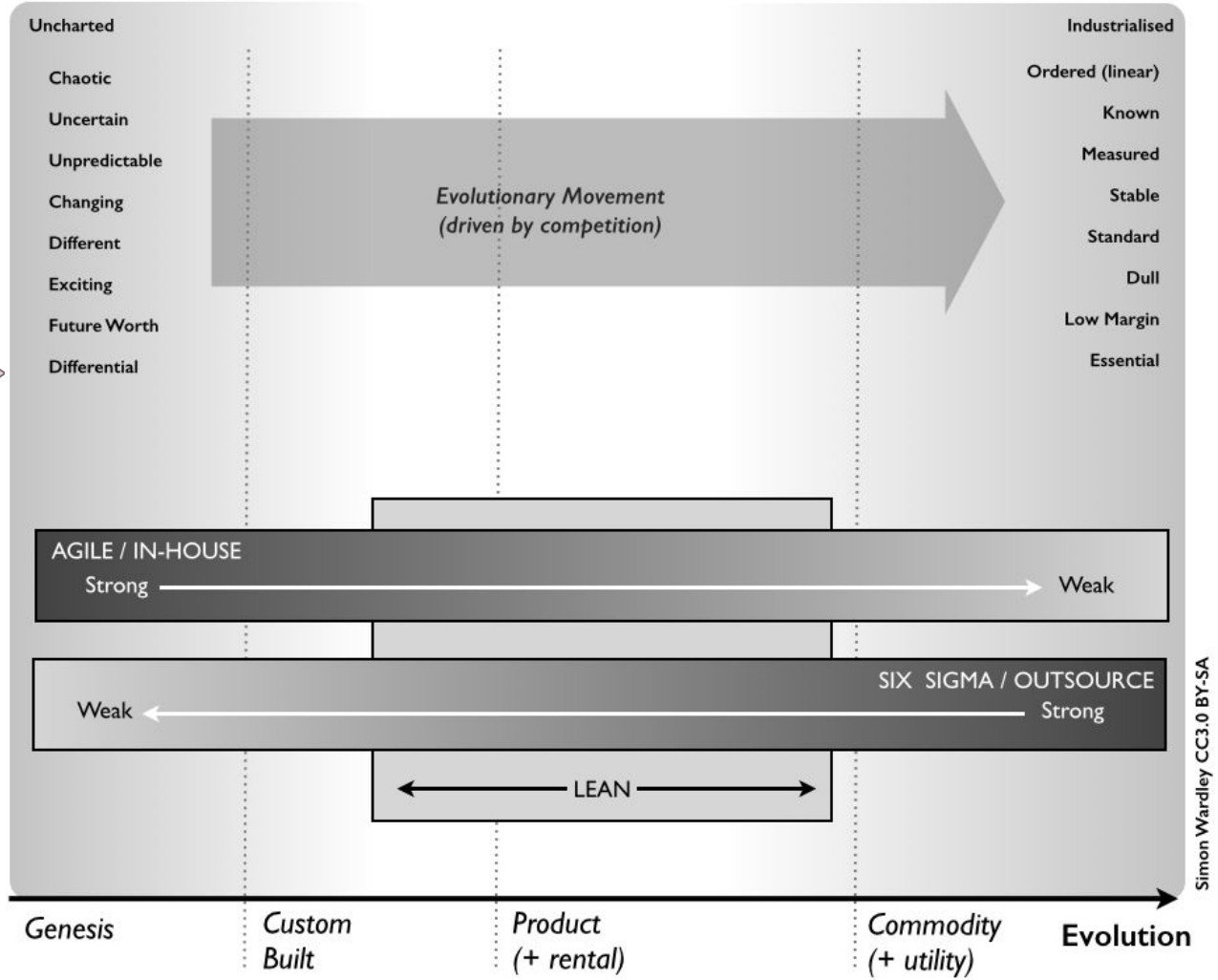

Modest level of standards are appropriate:

- Guides
- Practices
- ...plus Terminology

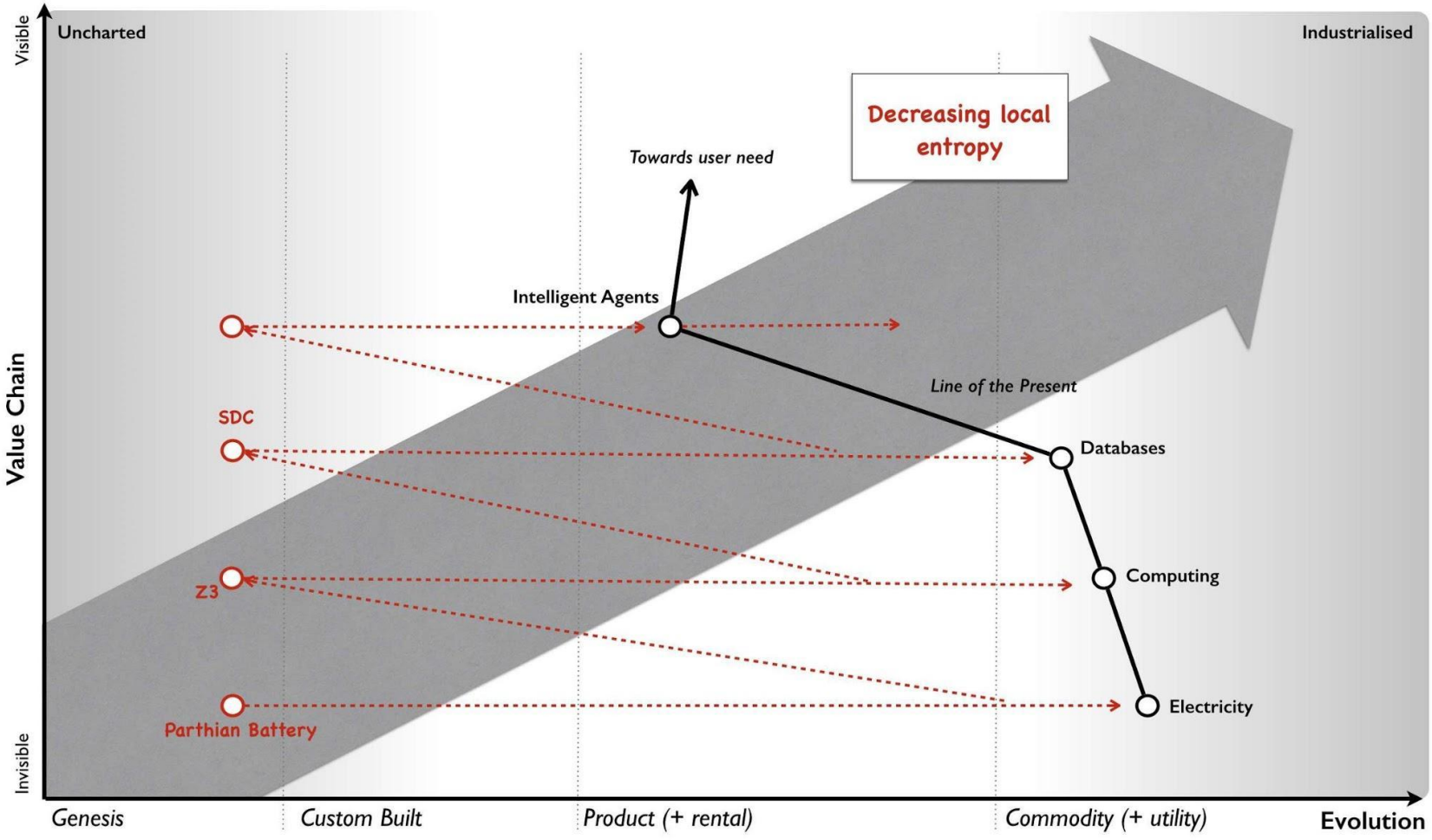
Highest level of standards are appropriate:

- Test method
- Specification
- Classification
- ...plus Guides, Practices, and Terminology

Product Standards can **Hurt** on this side




Product Standards mostly **Help** on this side




Source: Simon Wardley (here)

# The Role of IEEE-SA In Blockchain Standards

## IEEE is a Global Member Network

**423,000 Members in 180+ Countries across 6 Continents**

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Purpose: to foster technological innovation and excellence for the benefit of humanity

# IEEE: Institute of Electrical and Electronics Engineers

## IEEE Standards Association:

- A leading consensus building organization that nurtures, develops and advances global technologies, through IEEE
- Over 1,200 active standards under development
- Standards development process is open to members and non-members

Examples:

- Electrical Safety codes
- USB connectors
- 802.11 WiFi, 802.3 Ethernet
- Aerospace, Antennas, AI, Engineering in Medicine, Information Theory, Nuclear and Plasma Sciences, Robotics, Ultrasonics…

# IEEE-SA: 55+ Standards Efforts in Blockchain/DLT



## Published Blockchain/DLT Standards:

- P2140.1-2020 - IEEE Standard for General Requirements for Cryptocurrency Exchanges
- 2140.5-2020 - IEEE Standard for a Custodian Framework of Cryptocurrency
- 2143.1-2020 - IEEE Standard for General Process of Cryptocurrency Payment
- 2418.2-2020 - IEEE Approved Draft Standard Data Format for Blockchain Systems
- P2144.1-2020 - IEEE Standard for Framework of Blockchain-based Internet of Things (IoT) Data Management

# IEEE-SA: 55+ Standards Efforts in Blockchain/DLT



## Standards Under Development (1/3):

- P2140.2 - Standard for Security Management for Customer Cryptographic Assets on Cryptocurrency Exchanges
- P2140.3 - Standard for User Identification and Anti-Money Laundering on Cryptocurrency Exchanges
- P2140.4 - Standard for Distributed/Decentralized Exchange Framework using DLT (Distributed Ledger Technology)
- P2141.1 - Standard for the Use of Blockchain in Anti-Corruption Applications for Centralized Organizations
- P2141.2 - Standard for Transforming Enterprise Information Systems from Centralized Architecture into Blockchain-based Decentralized Architecture
- P2141.3 - Standard for Transforming Enterprise Information Systems from Distributed Architecture into Blockchain-based Decentralized Architecture
- P2142.1 - Recommended Practice for E-Invoice Business Using Blockchain Technology
- P2143.2 - Standard for Cryptocurrency Payment Performance Metrics
- P2143.3 - Standard for Risk Control Requirements for Cryptocurrency Payment
- P2144.2 - Standard for Functional Requirements in Blockchain-based Internet of Things (IoT) Data Management
- P2144.3 - Standard for Assessment of Blockchain-based Internet of Things (IoT) Data Management
- P2145 - Standard for Framework and Definitions for Blockchain Governance
- P2146.1 - Standard for Entity-Based Risk Mutual Assistance Model through Blockchain Technology
- P2146.2 - Standard for External Data Retrieval of Blockchain for Risk Mutual Assistance Model
- P2418.1 - Standard for the Framework of Blockchain Use in Internet of Things (IoT)
- P2418.3 - Standard for the Framework of Distributed Ledger Technology (DLT) Use in Agriculture
- P2418.4 - Standard for the Framework of Distributed Ledger Technology (DLT) Use in Connected and Autonomous Vehicles (CAVs)
- P2418.5 - Standard for Blockchain in Energy
- P2418.6 - Standard for the Framework of Distributed Ledger Technology (DLT) Use in Healthcare and the Life and Social Sciences

# IEEE-SA: 55+ Standards Efforts in Blockchain/DLT

## Standards Under Development (2/3):

- P2418.7 - Standard for the Use of Blockchain in Supply Chain Finance
- P2418.8 - Standard for Blockchain Applications in Governments
- P2418.9 - Standard for Cryptocurrency Based Security Tokens
- P2418.10 - Standard for Blockchain-based Digital Asset Management
- P2677.1 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Overarching Framework
- P2677.10 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Access to Personal Data
- P2677.11 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Access to Telecommunications Data
- P2677.12 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Access to Transportation Data
- P2677.20 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Requirements for Blockchain Infrastructure
- P2677.21 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Requirements for Peer-to-Peer Storage Infrastructure
- P2677.22 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Requirements for Grid Computing Infrastructure
- P2677.30 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Personal Application Programming Interface
- P2677.31 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Healthcare Application Programming Interface
- P2677.32 - Standard for Blockchain-based Omnidirectional Pandemic/epidemic Surveillance: Government Application Programming Interface

# IEEE-SA: 55+ Standards Efforts in Blockchain/DLT

## Standards Under Development (3/3):

- P3201 - Standard for Blockchain Access Control
- P3202 - Standard for Capability Evaluation Requirements of Blockchain Practitioners
- P3203 - Standard for Blockchain Interoperability Naming Protocol
- P3204 - Standard for Blockchain Interoperability - Cross Chain Transaction Consistency Protocol
- P3205 - Standard for Blockchain Interoperability - Data Authentication and Communication Protocol
- P3206 - Standard for Blockchain-based Digital Asset Classification
- P3207 - Standard for Blockchain-based Digital Asset Identification
- P3208 - Standard for Blockchain-based Digital Asset Exchange Model
- P3209 - Standard for Blockchain Identity Key Management
- P3210 - Standard for Blockchain-based Digital Identity System Framework
- P3211 - Standard for Blockchain-based Electronic Evidence Interface Specification
- P3212 - Standard for Blockchain System Governance Specification
- P3214 - Standard for Testing Specification of Blockchain Systems
- P3800 - Standard for a data-trading system: overview, terminology and reference model
- P3801 - Standard for Blockchain-based Electronic Contracts
- P3802 - Standard for Application Technical Specification of Blockchain-based E-Commerce Transaction Evidence Collecting
- P3803 - Standard for Household Appliance Customer Data Assetization and Commercialization Requirements
- P3806 - Standard for Blockchain-based Hepatobiliary Disease Data Extraction and Exchange

# P2145's Mission

1. Research and publish a definitive set of terms (vocabulary) for discussing **"Blockchain / DLT Governance"** with rigor and shared meaning
2. Research and publish standards on DLT Governance **practices, maturity levels, and processes**
3. **Coordinate** all standards work with other SDOs
4. **Communicate** DLT Governance standards and practices to the wider community of developers and users

# Open Source Standards

Via IEEE SA Open, a GitLab program

- Free standards
- Transparent standards development process
- Anyone globally can contribute, view, and use

## Sub-Group on

# Governance and Lexical Standards

To **identify and share a common vocabulary** and to define **Lexical Standards** for Blockchain Governance terms and identify **DLT Governance Design Patterns** across public, private, permissioned, permissionless, and hybrid blockchain ecosystems.

*Standards bodies this sub-group is coordinating with:*
***ISO, INATBA***

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# Lexical Sub-Group's First Publication

**Phase 1:**

## Scoping & Requirements Gathering

Produce first lexical publication

**Phase 2:**

## Research & Development

Definitions

- Bottom up
- Top down

Design Patterns

- Comparative analysis

**Phase 3:**

## Peer Review & Public Release

Internal review

External review

Public release

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**Lexical Subgroup:**

# DLT Governance Design Patterns

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## Objectives

1. Explore possible design patterns along **6 blockchain aspects**:
   - Human
   - Smart contract
   - Network
   - Tokenomic / Incentive
   - Source code
   - System configuration
2. Study **existing chains and protocols** to understand how governance is implemented today
3. Propose patterns to be included in the standard

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3. Propose patterns to be included in the standard

## So Far

- Data collected on **13** chains
- Each governance aspects covered (**>80%**)
- ~**3/4** permissionless chains

## Chains Studied

- Bitcoin
- Dash
- Ethereum 2
- Ethereum Mainnet
- Hyperledger Fabric 2
- Hyperledger Iroha
- Hyperledger Sawtooth
- IOTA Tangle
- Lumedic
- Matic
- Nano
- Polkadot
- R3 Corda
- Near
- More...

Lexical Subgroup:

# DLT Governance Terms

To **identify and standardize a common vocabulary** for terms related to the governance of blockchain and distributed ledger systems.

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Approach

**Lexical Subgroup:**

# DLT Governance Terms

## Bottom up

- Review of terms and definitions that are already published, or commonly used in the industry, to identify Blockchain Governance terms

## Top-down

- Create a conceptual framework / categories for Blockchain Governance, Identify terms within those categories

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Lexical Subgroup:

# Our process

**Compile terms**

- Standards bodies' publicly available sources
- Design patterns research
- Other independent research

**Filter terms using following criteria for inclusion**

- Terms that are not sufficiently defined by other standards bodies
- Terms that are essential to understanding of governance

**Review term definitions, update if needed**

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**Lexical Subgroup:**

# Numbers

- **528** terms
- **12+** Sources including
  - ISO/TC 307/WG 1 Foundations
  - ANSI X9.138-2020
  - Various Glossaries
  - 13 chains from the Design Pattern Research
  - Interoperability Group
- **150** terms reviewed
  - **18** terms marked to be adopted
  - **15** terms are under discussion
  - Remaining terms are excluded

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| | Contributor | Def Finder | Term Evaluator | Include, Unsure, Don't Include | Term | Definition / Comment | Related/dependent terms | Topic | Governance Aspect |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Francis | | Meeting Feb 11 | Don't include | transaction | Whole of the exchange of information between nodes. A transaction is uniquely identified by a transaction identifier. | | Tokenomic | Tokenomic Incentive |
| 3 | Val | | Meeting Feb 11 | Include | **Governing Body Selection (Method of participation, Selection of representatives / delegates)** | While the terms below are categorized under "Human Governance Aspect", some of the DLT/Blockchain systems may use the DLT/Blockchain technology itself for Governance activities | | Governing body, Governance process | Human |
| 4 | Joseph | | Meeting Feb 11 | Don't Include | home Member State | where the issuer of crypto-assets, other than asset-referenced tokens or electronic money tokens, has its registered office or a branch in the Union, the Member State where the issuer of crypto-assets has its registered office or a branch; | | | |
| 5 | Savita | | Meeting Feb 11 | Include | off-chain push model | when smart contracts are pushed to all nodes by a central authority | | Concensus, Governance | Network |
| 6 | Savita | | Meeting Feb 11 | Include | Participant roles (Must be included with specific participant roles EX: operators, on-chain roles) | We need not have these exact words to be used, but some way of defining the “governing body”, and different roles might be useful. | | Request that main group picks up | |
| 7 | Savita | | Meeting Feb 11 | Don't Include | DLT address | value that identifies a DLT account (3.24) participating in a transaction (3.77) | DLT account, transaction | Identity | |
| 8 | Val | | Meeting Feb 11 | Unsure | UASF | User Activated Softfork. | | Concensus, Governance, Deployment | Network |
| 9 | Michael | | Meeting Feb 11 | Don't Include | Transaction state (Useful in coordinating cross-entity transaction handling) | Used to coordinate cross-context transaction handling (i.e. ready, in process, committed, complete, error, etc.) | | Interoperability | |
| 10 | Savita | | Meeting Feb 11 | Don't Include | Merkle tree | tree data structure in which every leaf node (3.42) is labelled with the hash value (3.39) of a data element | hash value, leaf node, node | | |
| 11 | Savita | | Meeting Feb 11 | Don't Include | confirmed transaction | transatransaction (3.77) that has been confirmed (3.8)ction that has been confirmed | confirmed, transaction | | |
| 12 | Noel | | Meeting Feb 11 | Don't Include | TT Systems (Trustworthy Technology Systems) | Transaction systems which allow for the secure transfer and storage of Tokens and the rendering of services based on this by means of trustworthy technology; | | tokenomics | Tokenomic Incentive |
| 13 | Savita | | Meeting Feb 11 | Don't Include | timestamp | time variant parameter which denotes a point in time with respect to a common time reference<br>[SOURCE: ISO/IEC 18014-1:2008, 3.12, modified - The space between "time" and "stamp" has been<br>removed.] | | | |
| 14 | Robin | | Meeting Feb 11 | Don't Include | Implicit Interoperability | This occurs when the smart contracts that specify conditionsunder which a particular transaction (or event) is to take place can be written in a Turing-complete blockchain script language. In this context, implicitly any kind of conditioncan be specified, even those involving specific statuses in other systems. This implies an(albeit cumbersome) way of interaction between a blockchain solution and any API toolor interface. | | Request that main group picks up | |
| 15 | Robin | | Meeting Feb 11 | Don't Include | Implicit Intraoperability. | This occurs when the smart contracts that specify conditionsunder which a particular transaction (or event) is to take place can be written in a Turing-complete blockchain script language. In this context, implicitly any kind of condition canbe specified, even those involving specific statuses in other blockchains. | | Request that main group picks up | |

Approach

**Lexical Subgroup:**

# DLT Governance Terms

## Top-down

- What is Blockchain Governance?
  - Create a conceptual framework / categories for Blockchain Governance, Identify terms within those categories
- Different aspects of Blockchain Governance
  - e.g. system lifecycle, system layers, off-chain vs. on-chain
- Different features of Blockchain system
  - e.g. consensus, incentives, security, immutability

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# “Governance” Definitions

| | |
|---|---|
| Merriam-Webster | the act or process of governing or overseeing the control and direction of something (such as a country or an organization) |
| Institute on Governance | Governance is how society or groups within it, organize to make decisions |
| DLT Governance Lexical Framework DRAFT PROPOSAL | Governance is the method by which a collective makes decisions for its members |
| Governance of the Internet's Second Era | When we use the word "governance" we mean stewardship, which involves collaborating, identifying common interests, and creating incentives to act on them. We do not mean government, which involves legislating and regulating behavior and punishing those who misbehave. |

Key Takeaways

# Governance Definition

1. Governance is needed for **Dynamic Systems**
2. Governance is about providing **control/direction**
3. Governance is about **decision (rule) making**
4. Governance is about **organizing, coordinating, collaborating** to make decisions (rules)

The entities involved may be humans or machines

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# Governance Key Questions

1. What is the Governance for?
2. Who are governed, who makes decisions)?
3. How are decisions made, what is the process?
4. How are the decisions codified?
5. How are decisions executed and enforced?
6. Why it matters?

Also:

7. What are the incentives for decision makers / followers?
8. What could go wrong? Risk/issue management

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# Governance Dimensions

**Membership, Responsibility, Accountability, Incentives**

- Who makes decisions, who is impacted

**People**

**Process**

- How are decisions made

**Consensus mechanism**

**Practice**

**Policy**

**Rewards, Consequences, Risk, Issue management**

- How are decisions executed, enforced

How decisions are codified

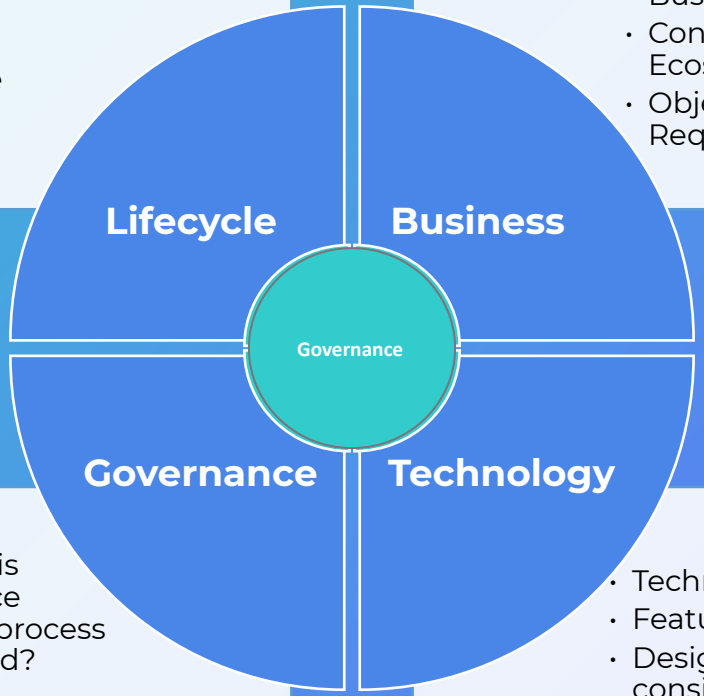
**Standards, Policies, Legal Contracts, Informal agreements**

# Governance Application to various areas

- Envision
- Execute
- Enhance

- Business model
- Consortium, Ecosystem
- Objectives / Requirements

Governance for / by infrastructure (off-chain vs. on-chain)




Regulations, Compliance, Risks, Issue

- Who/how is Governance structure, process etc. defined?

- Technology Layers
- Features
- Design considerations

**Envision – Business Model, Product Definition**

**External Influences**
Regulations, Agreements between parties
Other external factors

**Business Strategy**
Business objectives, Stakeholder groups, their needs, Product Idea, Business Model, Partners/alliances collaboration strategy

**Technology Strategy**
Platform selection, Solution Architecture, Design, Feature selection to meet business needs, business process definition, interoperability, decentralization

**Governance / Operations Strategy**
Governing rules for system including operating rules, stakeholder participation, voting rules, monitoring, control, risk, issue management

**Optimization Strategy**
Identify issues / opportunities for improvements (if any), propose and vet enhancements

**Governance**
*System, act or process of governing*
*How society or groups within it (collective, entities), organize to make decisions (processes)*

Who has voice in making decisions? - Authority
How are decisions made? – Decision-making
Who is accountable? – Accountability

What is being governed?
Who does it impact?
Governance Rules Definition?
How/where are the rules implemented?

**Enhance – Change Management**

**Business, Technology Related**

**Governance Related**

**Proposed Changes**

**Research, Assessment, Standardization**

**Product / Solution Definition**

**Business Model, Technology Solution, Business Process**

**Governance / Operating rules**
Rules for Business, Stakeholder engagement, Technology Operations etc. (On-chain, Off-chain rules)

**Solution Development**

**Execute – Operations, On-chain and off-chain Governance Decisions**

Decentralization, Consensus, Incentives, Cryptoeconomics

Cryptography / Hashing functions

Immutability / Auditability

Features of System

**Interoperable Blockchain / DLT solution**

**Decentralized Applications (Dapps)**

CryptoKitties
Gnosis
Civic

District0X, Sapien

Dapp frameworks (e.g., Aragon, DAOStack)

Blockchain networks (e.g., Bitcoin, Ethereum)

Internet protocols (e.g., TCP / IP)

DLT/Blockchain System layers

## Sub-Group on
# Reputation

To ident**ify and share a common vocabulary** for **Reputation** in the context of Blockchain Governance – including terms across public, private, permissioned, permissionless, and hybrid blockchain ecosystems.

**Approach and Deliverables**

- Refining terms
- Scope video
  - Will be seeking feedback

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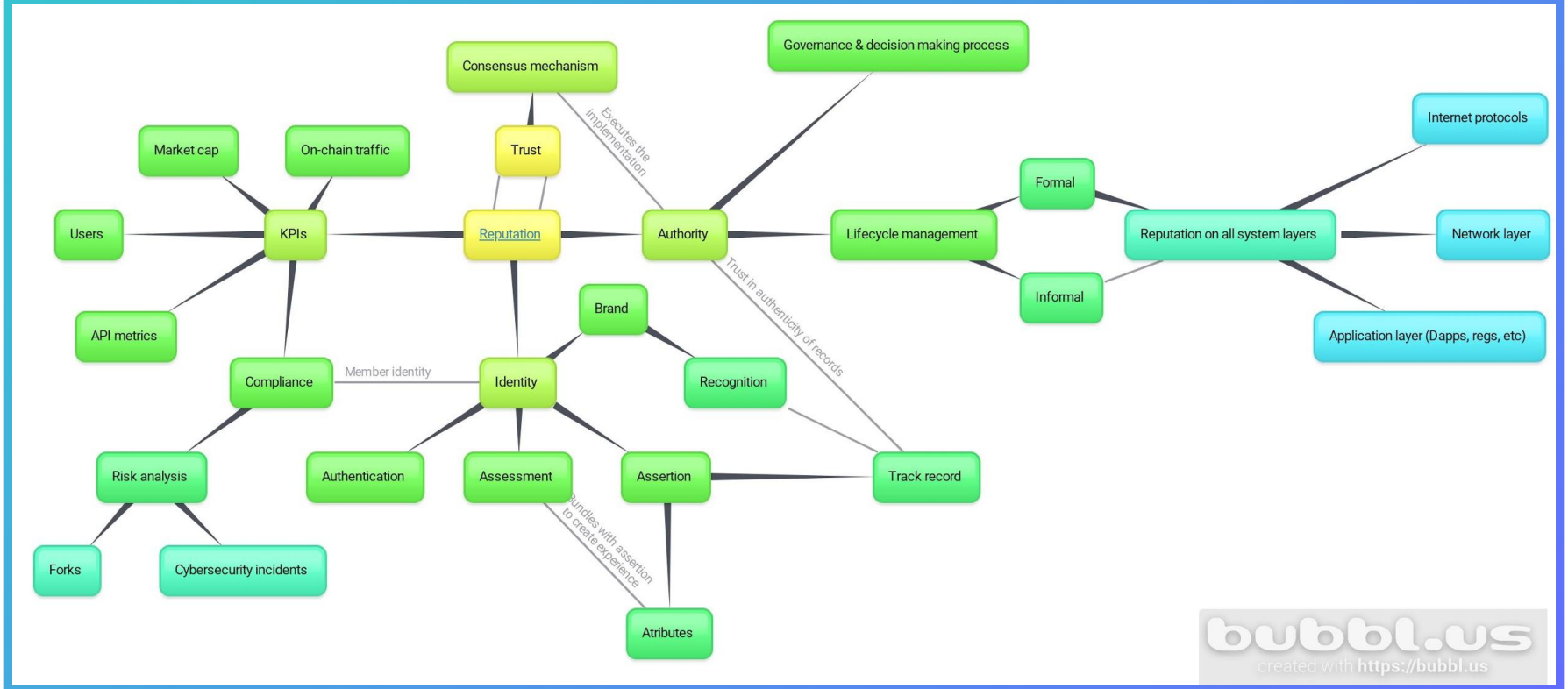
Consensus mechanism
Governance & decision making process
Internet protocols
Market cap
On-chain traffic
Trust
Executes the implementation
Formal
Users
KPIs
Reputation
Authority
Lifecycle management
Reputation on all system layers
Network layer
Informal
Trust in authenticity of records
API metrics
Brand
Application layer (Dapps, regs, etc)
Compliance
Member identity
Identity
Recognition
Risk analysis
Authentication
Assessment
Assertion
Track record
Bundles with assertion to create experience
Forks
Cybersecurity incidents
Atributes
bubbl.us
created with https://bubbl.us


Governance & decision making process
Consensus mechanism
Executes the implementation
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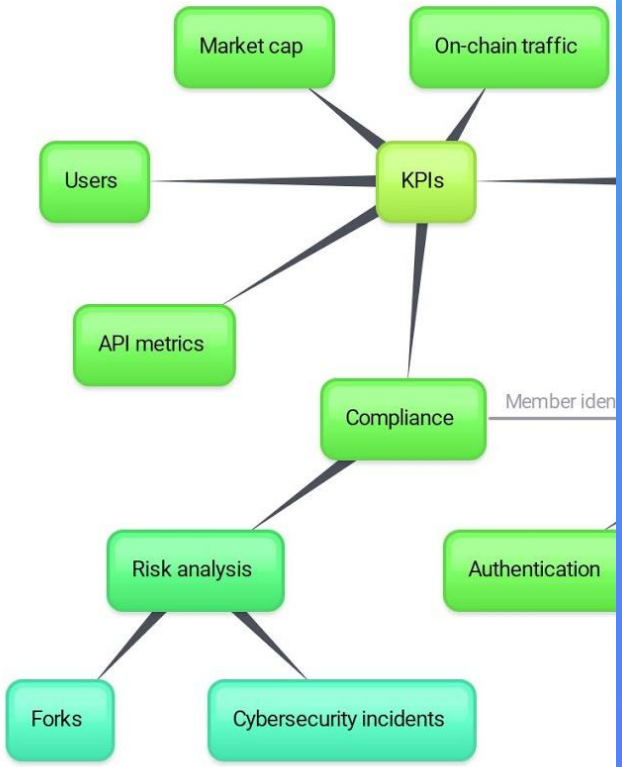
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Governance & decision making process

Internet protocols

Formal

Authority

Lifecycle management

Reputation on all system layers

Network layer

Informal

Application layer (Dapps, regs, etc)

Trust in authenticity of records

Recognition

Assertion

Track record

Atributes

## Sub-Group on

# Governance and Interoperability

To **identify and share a common vocabulary** for Blockchain Governance **Interoperability** terms across public, private, permissioned, permissionless, and hybrid blockchain ecosystems.

*Coordinating with: **IEEE Work Group 1** (Foundations), **Work Group 5** (Governance) and **Study Group 7** (Interoperability)*

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## Interoperability:
# Our Process

- **How did we gather terms?**
- **Criteria**
  - Our desired term is something we would need if exploring blockchain/governance/interoperability
  - Our desired term is not defined elsewhere, by another standards body
  - Share short list with the main group, WG5/Governance, WG1/Foundations, SG7/Interoperability, etc.
- **Stats**
  - Identified **54** candidate terms, **30** to the main group, **23** for our group. All submitted to the Lexical Sub Working group for consideration/publication

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# Visual of Interoperability Terms Spreadsheet

| Name | Term | Member Definition | Team Definition | Bucket: process, technical, governance? | Comments |
|---|---|---|---|---|---|
| Pierre Marie | Blockchain platform | | Request that main group picks up | | |
| Pierre Marie | Interledger Event | A notification of update(s) and/or action(s) on the blockchain | keep; no ISO definition | Technical | |
| Michael | Identity (Associating a digital entity with a physical entity) / token | A unique entity (person, group, or thing that possesses one or more attributes that make one distinct from another) | Will use defintion by ISO or other standard body; ours to reuse. | | reviewed Oct 28; Found in ISO 31320-2:2012(E): The inheren an instance that distinguishes other instances. Identity is intr instance and independent of t property values or the classes instance belongs. |
| Michael | Identity map (Association of identities across contexts) | An association of an identity in one context with a corresponding identity in another context | keep for now; use this def or use another? | | Perhaps extend to 'identity ass map'? Context is important, c interoperability. Expand this te to Identity as a first instance. attributes of identity map? Ac blockchains, transactions can b a particular identity, this may a human. |
| Michael | Transaction owner (Account that owns a transaction) / private key | Identifier that specifies the identity of a transaction's originator | keep for now; context is fork | | Owner implies some level of a authority. Perhaps 'transactior |
| Michael | Transaction scope (Inter-context transaction map) | Collection of transaction identifiers in one context that represents a single transaction in another context (used in cases where contexts define transaction atomicity differently). An example may be contexts that define more or fewer operations per transaction than other contexts. | keep for now; context is fork | | Perhaps 'transaction context n who participates in the transa |
| Michael | Transaction role (initiator/subordinate) | For hierarchical transaction structures, the transaction role defines the contextual transaction flow, w.r.t. the order in which transactions are committed in different contexts. | keep for now | Technical and potentially business process | This could be redefined as 'tra commit order' if the order in w must/should occur among dis environments is material. |
| Michael | Transaction state (Useful in coordinating cross-entity transaction handling) | Used to coordinate cross-context transaction handling (i.e. ready, in process, committed, complete, error, etc.) | keep for now; what are R&R, how to apply to technical implementation | Technical and potentially business process | Keep if 'transaction commit or |

# Interoperability:
# Mindmap - Interoperability Governance

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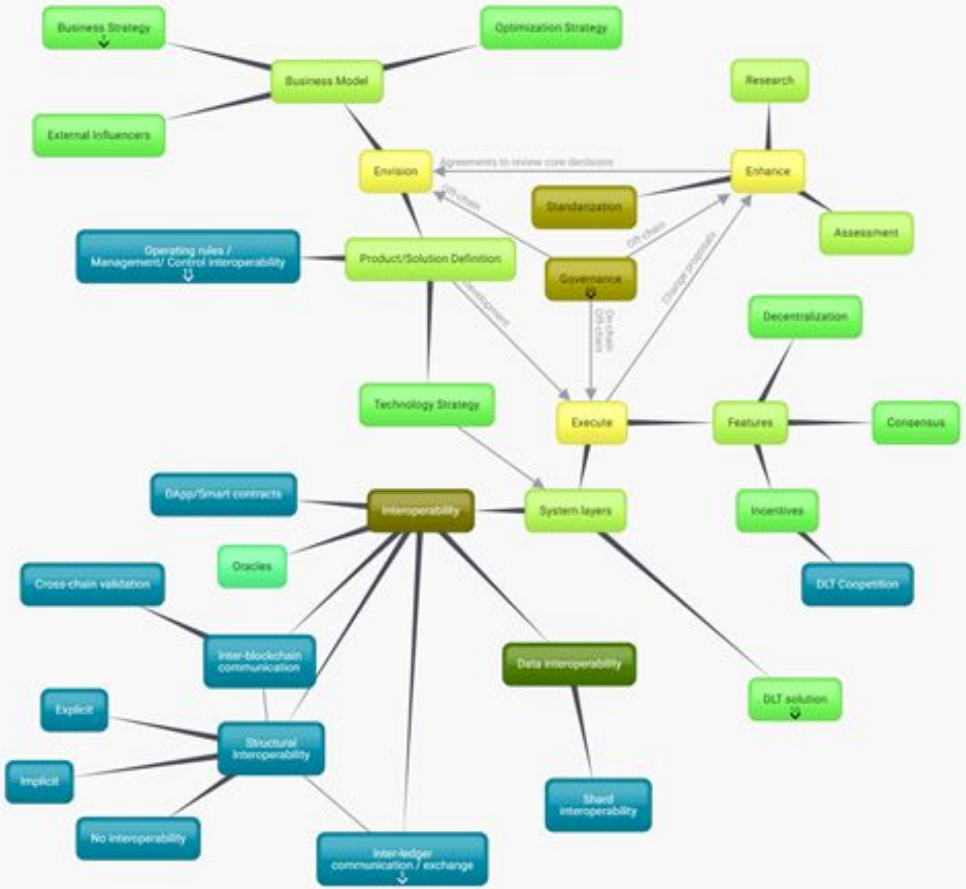

# Thank you!

# Questions, please.