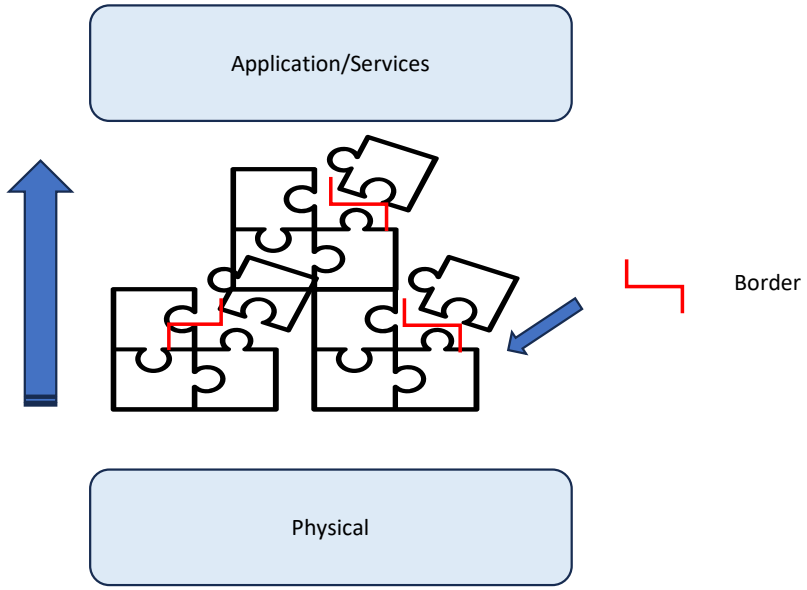
データ連携の国際標準化
IEEE SA　DTS WG

IEEE DTS WG Chair/ex 802.11ai TG Chair
IEEE SASB , RevCom, NesCom, PatCom member

眞野　浩

The essential point of developing standard



- 1. Design the layered model
- 2. Specify the border to avoid layer violation

Type of Joint work for standardization and requirement

DATA-EX

Principle of standard design

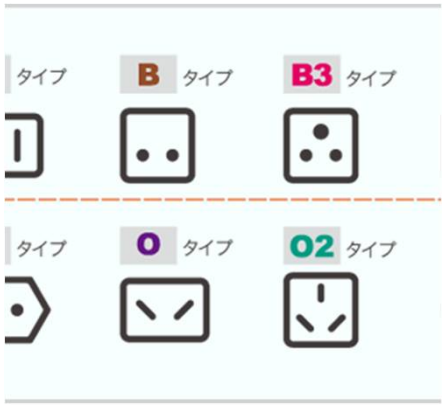
DATA-EX

Discours de la méthode (Descartes Introduction to Method Four Rules)	Rules of Clarity Rules of Analysis Rules of Synthesis Rules of enumeration

Essential things for standard development	Clarify the scope of work to avoid layer violation Minimizing external dependencies to Increase availability

Layer model and Technical dependency

- Standardization eliminates specific technology dependencies and increases product availability.



Successful standardization

Leading the market and creating a **blue ocean**.

Demonstrate a market growth model as a global trend-setting leader.

Interoperability is essential of ICT technology

Driving business growth by creating and leading the market will strengthen the foundation of technology.

IEEE Standard Association

IEEE Standards span a broad spectrum of technologies, such as:

- Aerospace Electronics
- Broadband Over Power Lines
- Broadcast Technology
- Clean Technology
- Cognitive Radio
- Design Automation
- Electromagnetic Compatibility
- Green Technology
- Ethernet/WLAN
- Medical Device Communications
- Nanotechnology
- Organic Components
- Portable Battery Technology
- Power Electronics
- Power & Energy
- Radiation/Nuclear
- Reliability
- Transportation Technology

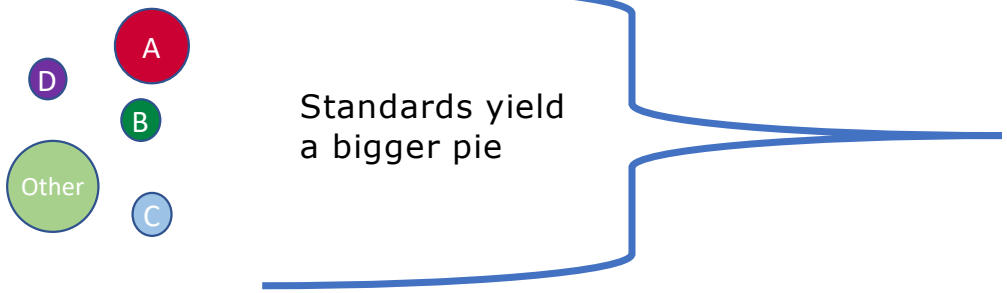
生活環境

医療分野

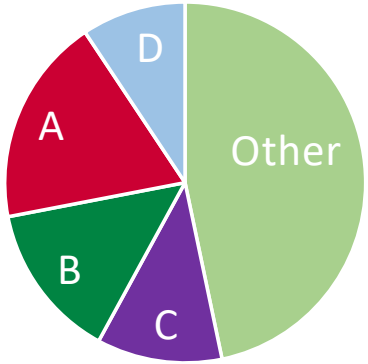
Standards Create Demand

DANCE WITH COMPETITORS

Market for Proprietary Technology



Market for Standardized Technology

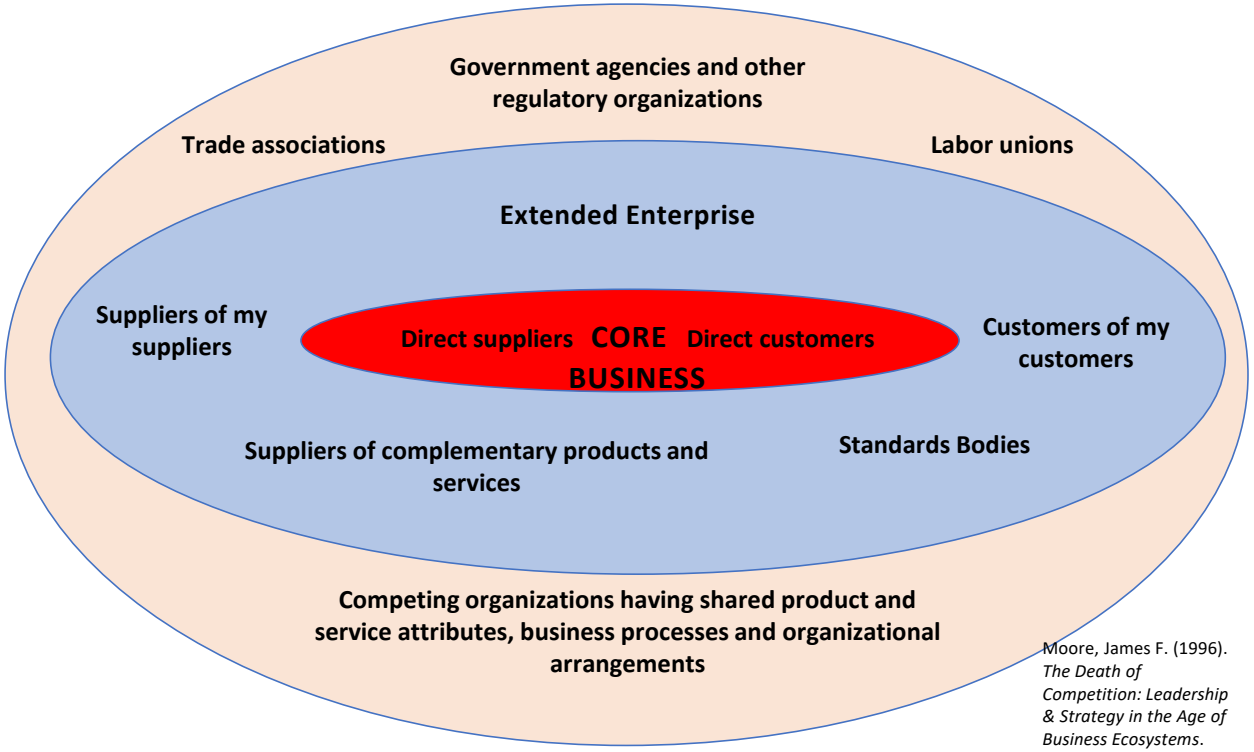


- **If you are hungry, how does the value of a whole personal pie compare to a slice of a much larger pie?**
- **In many industries, customers are increasingly reluctant to invest in equipment with proprietary standards. The market (pie) will get much bigger after a global standard is adopted.**

Best Practice for Developing Global Standards

Be Open and Inclusive

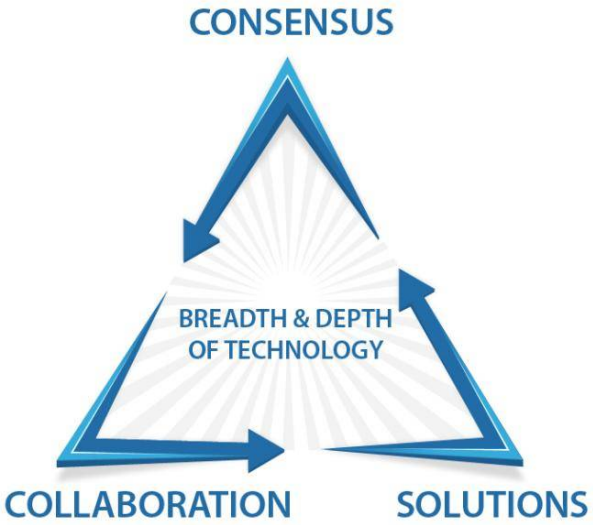
- The **whole ecosystem**, the community, promotes demand.
- "Which technology is better?" may be the wrong question.
  - Betamax or VHS
  - 802.11 or HyperLAN2
  - PHS or GSM
- Rather, what goes into the "whole product"? Which offer to the market is better?



Moore, James F. (1996). *The Death of Competition: Leadership & Strategy in the Age of Business Ecosystems.*

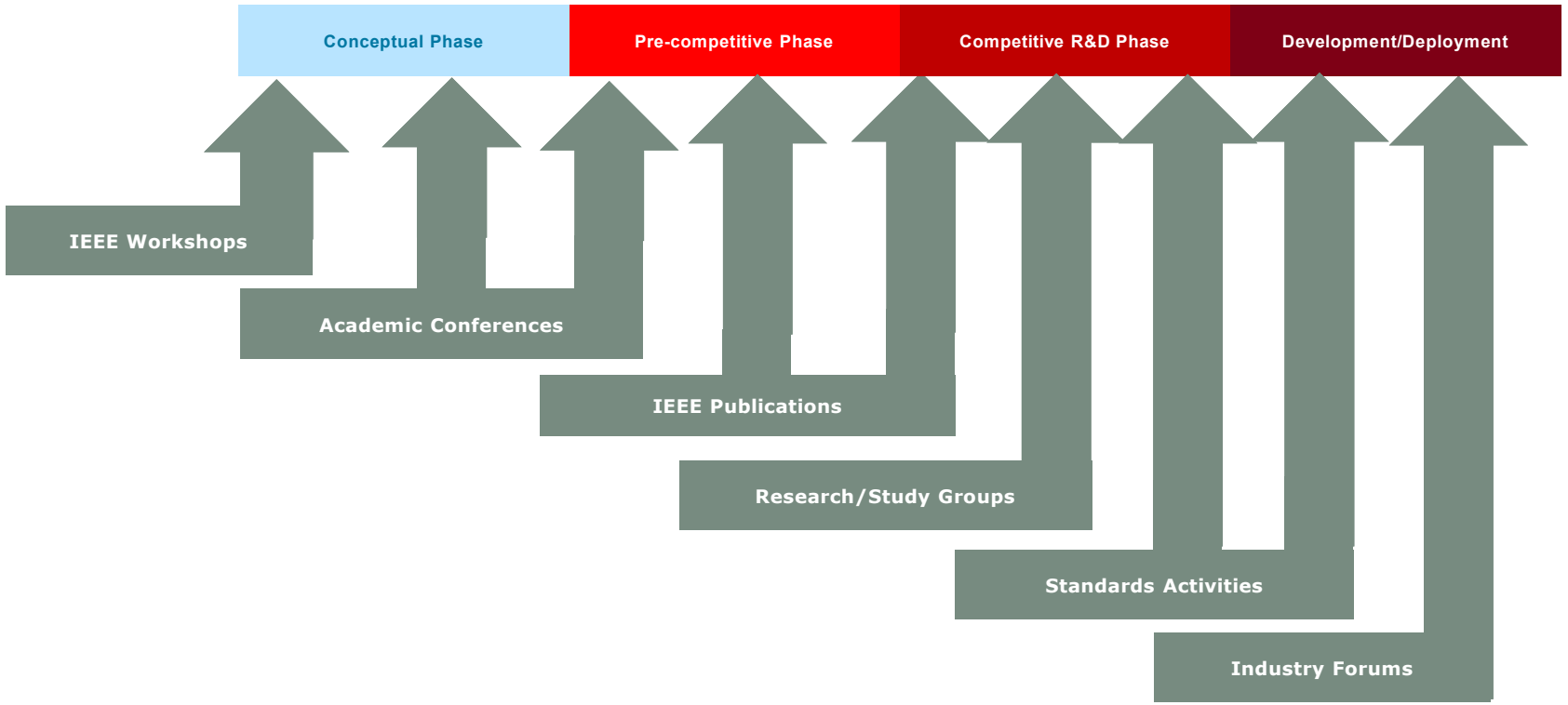
Globally Respected Standards Process

- Consensus
- Due Process
- Openness
- Right of Appeal
- Balance



- Adheres to the WTO/TBT Principles
- Based on rigorous peer-review
- Reflects the collective consensus view of participants
- Results in high quality globally relevant technical standards

IEEE Innovation/Standardization Platform



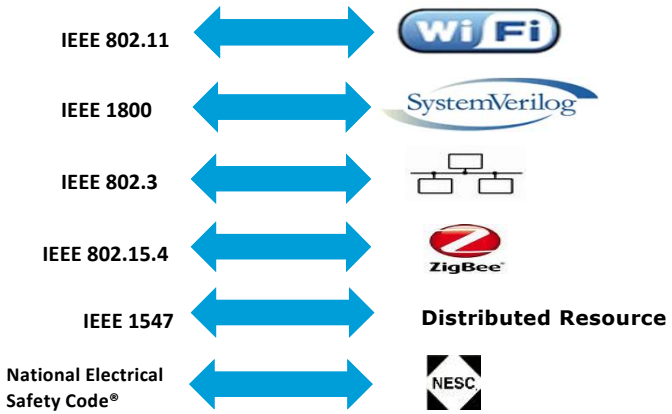
IEEE Standards Association (IEEE-SA)

Mission
Enable and promote the collaborative application of technical knowledge to advance economic and social well-being through the development of technical standards and related activities

Vision
Be recognized as a preferred global provider of high-quality, market-relevant technology standards and of services that promote their universal adoption

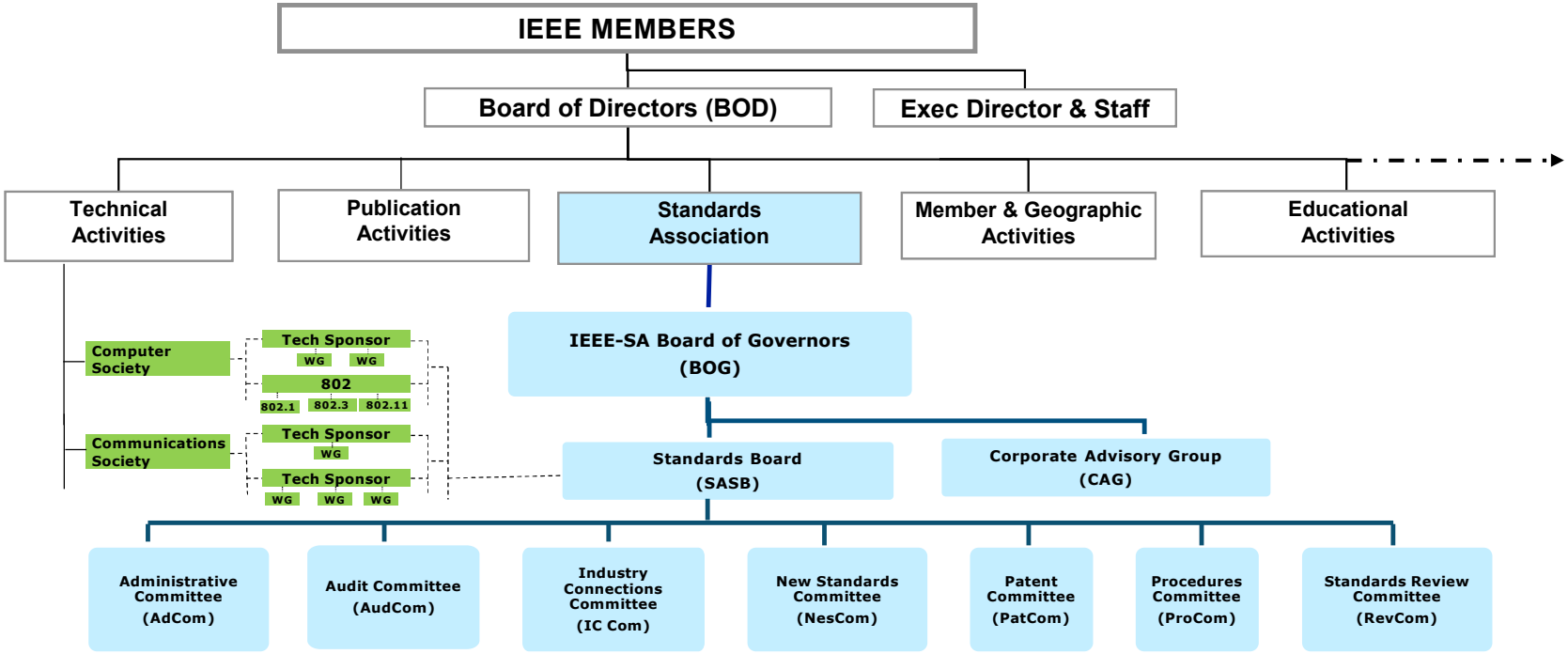
IEEE Standards span a broad spectrum of technologies

- **Aerospace Electronics**
- **Broadband Over Power Lines**
- **Broadcast Technology**
- **Clean Technology**
- **Cognitive Radio**
- **Design Automation**
- **Electromagnetic Compatibility**
- **Green Technology**
- **Ethernet/Wi-Fi**
- **Medical Device Communications**
- **Nanotechnology**
- **Organic Components**
- **Portable Battery Technology**
- **Power Electronics**
- **Power & Energy**
- **Radiation/Nuclear**
- **Reliability**
- **Transportation Technology**



1,250+ Active standards (**139** approved in 2017)
650+ projects in progress (**198** initiated in 2017)
7,150+ IEEE-SA Individual Members
215 IEEE-SA Corporate Members
20,000+ participants

IEEE Standards Association (IEEE-SA)



IEEE Standards Development Process

Identify Technical Committee(s) & Format

Project approval

Develop draft standard

Consensus ballot & Public Review

Standards Board approval

Editorial Review

Publish Standard

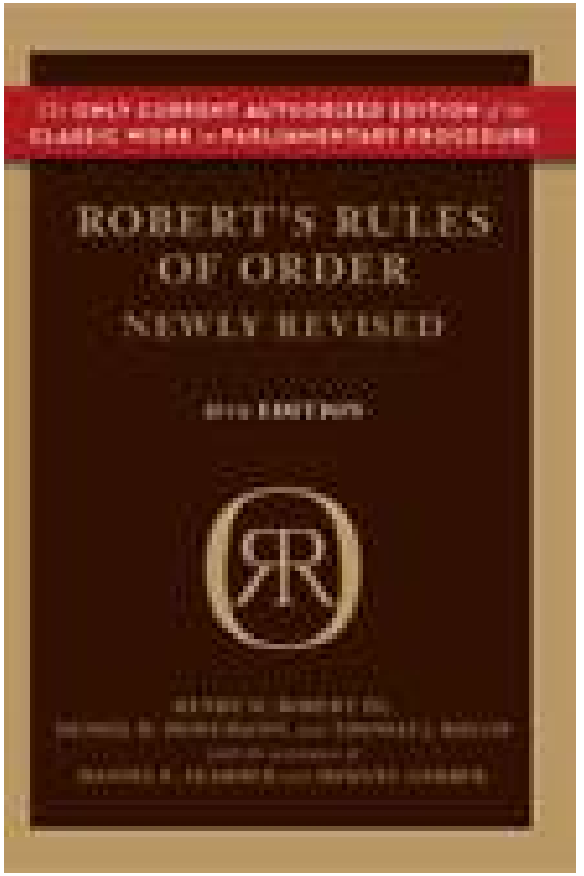
Amend & Revise standard

Develop Certification Tests

- SASB **meets 4 times a year** to approve new PARs submitted by technical sponsors.
- Average time from PAR to SASB Approval is about **39 months**

Robert’s Rules of Order

- What is Robert's Rules of Conference?
  - It was created by General Henry Robert of the U.S. Army in 1876.
- **The Rules of the conference protect to**
  - (1) Rights of the majority (majority approval)
  - (2) Minority rights (respect for minority opinions)
  - (3) Rights of the individual (protection of the right to privacy)
  - (4) Absentee rights (absentee voting)
- **For examples**
  - Prohibition of local talk
  - Proposal of a motion
    - Requires approval of at least 2 people
  - Motion to the table
    - Unsatisfactory motions are tabled
    - It will expire at the end of the session
  - A motion may not be repeated
    - Once a motion has been passed, it cannot be considered again during the session.



Different Development Paths. Same Openness

- Open membership, participation, and governance
- No restrictions
- Any individual or organization
- Includes academia
- Any industry or size of company

Individual Method

- Participants are individual technical experts
- Individuals represent themselves
- **Each individual participant has 1 vote**
- Ballot groups are made up of a minimum of 10 individuals
- Ballot group participants must be IEEE-SA individual members

Entity (Corporate) Method

Participants are "entities," i.e., companies, universities, government bodies, etc.

Designated representative and alternate represent the entity

Each entity has 1 vote

Requires 3 entities

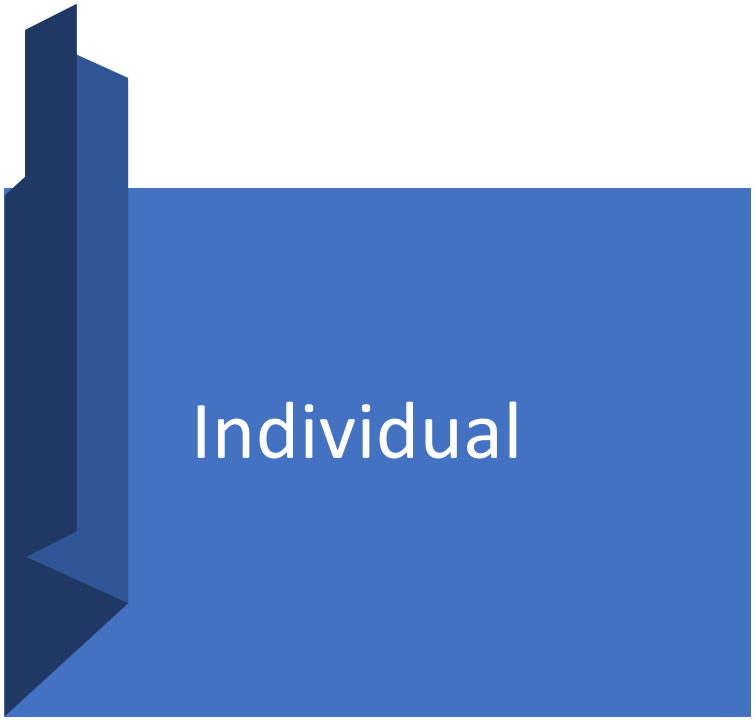
Entity sends representatives to meetings

The IEEE-SA Standards Board Bylaws require that "participants in the IEEE standards development individual process shall act based on their qualifications and experience"

This means participants:

- **Shall act & vote** based on their personal & independent opinions derived from their expertise, knowledge, and qualifications
- **Shall not act or vote** based on any obligation to or any direction from any other person or organization, including an employer or client, regardless of any external commitments, agreements, contracts, or orders
- **Shall not direct** the actions or votes of other participants or retaliate against other participants for fulfilling their responsibility to act & vote based on their personal & independently developed opinions

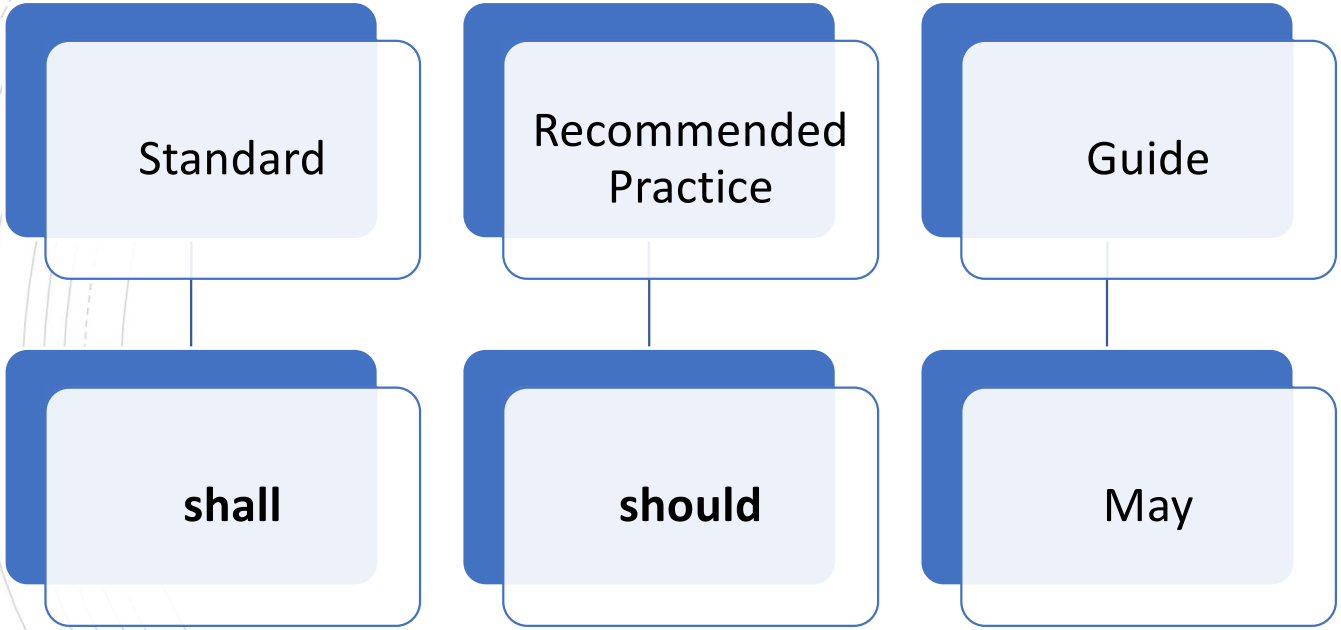
By participating in standards activities using the "*individual process*", you are deemed to accept these requirements; if you are unable to satisfy these requirements then you shall immediately cease any participation



IEEE SA IPR

- FRAND: Fair, Reasonable And Non-Discriminatory
  - A standard essentiality patent grants a fair, reasonable, and nondiscriminatory license to anyone who uses the standard.
  - However, the license use terms are to be adjusted between the parties and are not required to be provided for free.
- *If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair.*

IEEE Standard’s normative experession



IEEE Standard document structure

Normative

- Information that is required in order to implement the standard
- The text that establishes requirements, recommendations, or alternative approach.

Informative

- Informative text is provided for background only and is therefore not officially part of the standard.
- Text that puts the processes and procedures in context, illustrates them, explains them

IEEE-SA等における DTS WG活動状況

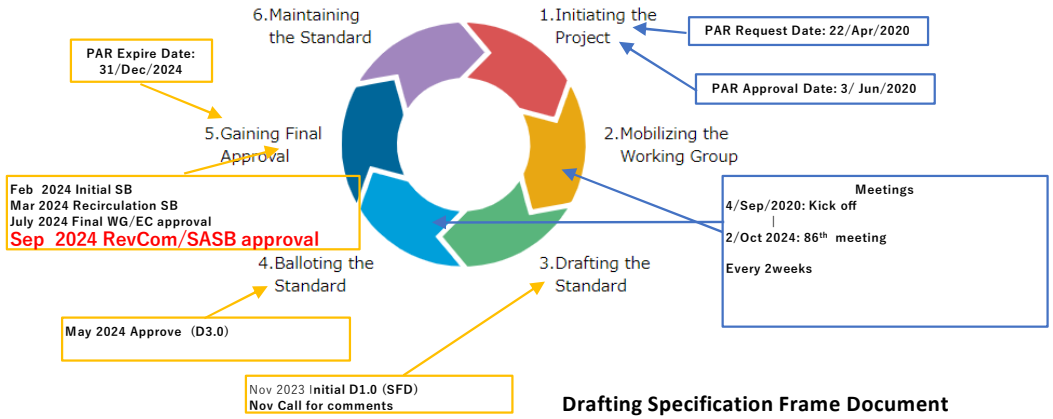
Hiroshi Mano
Data Society Alliance
IEEE SASB, IEEE DTSWG chair

IEEE DTS (Data Trading System) WG

- IEEE 3800-2024の策定に対し、IEEE SA Emergent Technology Awardを受賞
- 日本としては初

IEEE DTS WG status P3800

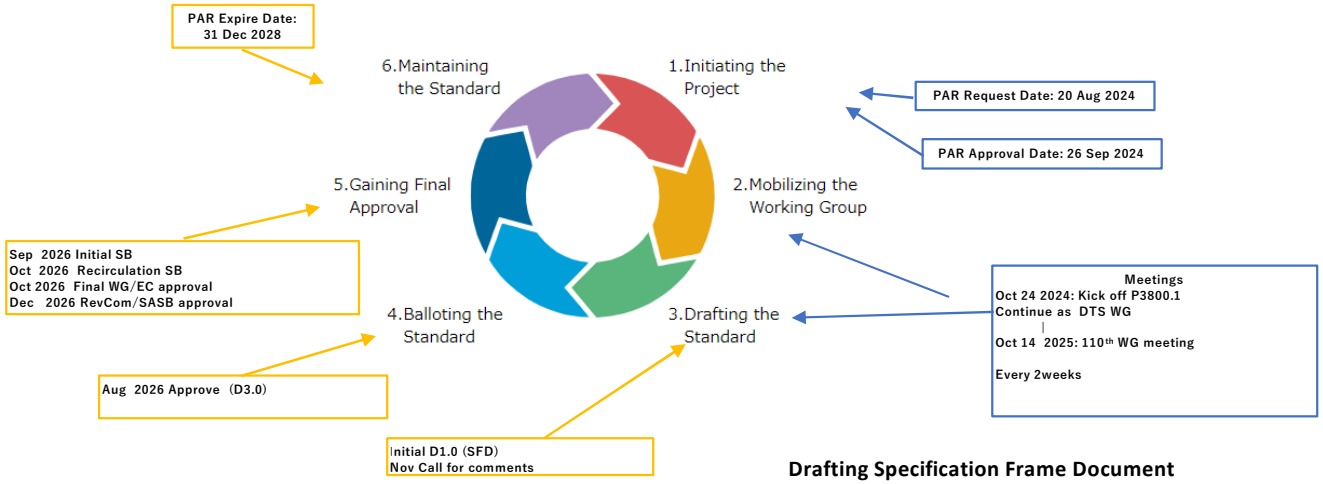
- IEEE 3800-2024 DTS has been approved on Sep SASB and published.
- IEEE 3800.1 PAR has been approved in Sep 2024 SASB



Drafting Specification Frame Document

IEEE DTS WG status P3800.1

- IEEE 3800.1 PAR has been approved in Sep 2024 SASB



What is IEEE 3800-2024

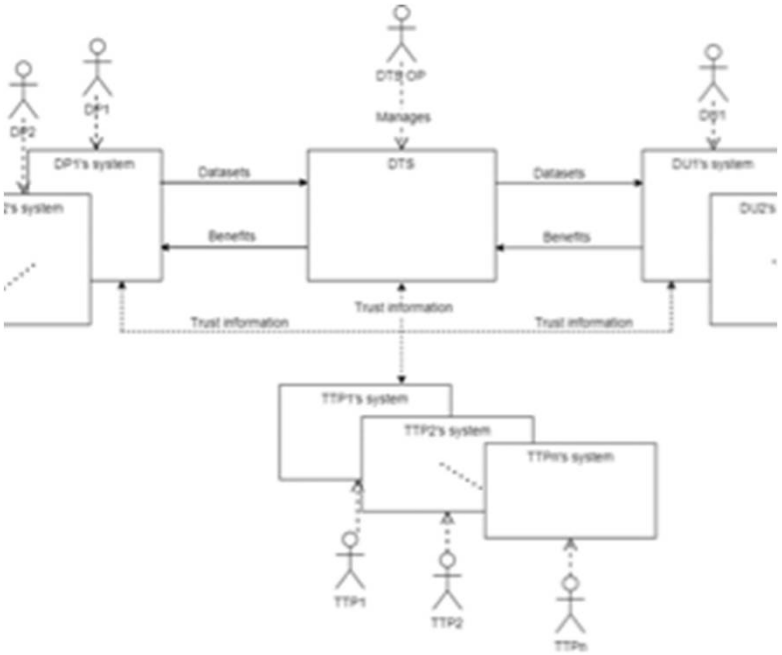
- Abstract:
  - In this document, a standard is defined for setting up and operationalizing a data trading system (DTS) to trade data through a domain-independent and principled marketplace under a unified architecture. The document contains: definitions and specifications for stakeholders, relevant external entities, and objects; definitions of the reference model, trading terms, functional and non-functional requirements to operate a DTS; overview of the data trading via the DTS. These provides the foundation for operationalizing a data trading system that allows data trading among multi-stakeholders.

Scope & Purpose

- 1.1 Scope
  - This standard establishes a system designed to trade data through domain-independent and principled marketplaces operating under a unified architecture. It defines terminology, a reference model, and the roles and functions of data providers, data users, and data marketplaces. The standard provides an overview of the data trading system using its reference model.
- 1.2 Purpose
  - This standard provides the foundation for a data-trading system that allows multilateral exchanges of data.

System Structure

- 5.1 System structure
- The DTS reference model is an abstract framework consisting of a system, designed to exchange data through a domain-independent and principled marketplaces operating under a unified architecture, and participating stakeholders; the system, DTS, is built and operated by the DTS OP. This system mediates between DPs and DUs and realizes the exchange of data and benefits in a secure, safe, and trusted manner. A stakeholder is an entity directly connected to the DTS and handles objects between different DTSs.
- This clause presents the reference architecture of the DTS and each stakeholder and the objects handled by each stakeholder. Figure 1 shows the highest level of system structure of DTS.



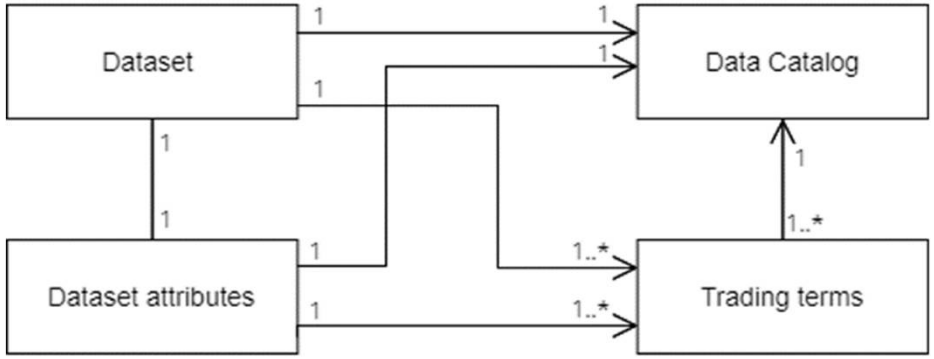
Stake holders

- Data provider (DP)
- Data user (DU)
- DTS operator (DTS OP)
- Trusted third party (TTP)

Objects

The object is an item handled among the stakeholders through the DTS. The objects include:

- Dataset
- Trading terms
- Dataset attributes
- Data catalog
- Benefit
- Trust information



P3800.1 overview Standard for a Data Trading System: Protocol and Object Framework

PAR(Project Authorization Request) has been approved on Sep SASB

5.2 Scope of proposed standard:

- This standard specifies a protocol and object framework for a data trading system based on an architecture provided in IEEE 3800 standard.

5.4 Purpose:

- This standard provides the foundation for a data-trading system that allows multilateral exchanges of data.

5.5 Need for the Project:

- To facilitate the adoption of IEEE 3800 standard, the specification of protocol and object framework for Data Trading System (DTS) is essential. This will facilitate consistent and efficient implementation of the specifications developed based on 3800 reference architecture, ensuring that DTSs are interoperable and meet regulatory requirements.

5.6 Stakeholders for the Standard:

- DTS designers, developers and operators, data cooperation standard developers, data space participants, users of third-party data sources, data producers and sellers, IoT device manufacturers, mobile app developers, consumer data privacy advocates, and government agencies.

IEEE 3800.1 Protocol and Object Framework

This standard aims to advance the social implementation of the IEEE P3800 standard.

5.2 Scope of proposed standard: This standard specifies a protocol and object framework for a data trading

system based on an architecture provided in IEEE P3800 standard.

5.3 Is the completion of this standard contingent upon the completion of another standard? Yes

Explanation: This standard aims to advance the social implementation of the IEEE P3800 standard. Then this standard depends on P3800.

5.4 Purpose: This standard aims to advance the social implementation of the IEEE P3800 standard.

5.5 Need for the Project: To facilitate the adoption of IEEE P3800 standard, the specification of protocol and object framework for Data Trading System (DTS) is essential. This will facilitate consistent and efficient implementation of the specifications developed based on P3800 reference architecture, ensuring that DTSs are interoperable and meet regulatory requirements.

5.6 Stakeholders for the Standard: DTS designers, developers and operators, data cooperation standard developers, data space participants, users of third-party data sources, data producers and sellers, IoT device manufacturers, mobile app developers, consumer data privacy advocates, and government agencies.

P3800.2 overview Standard for Data Space Discovery Protocol for Data Trading System Operators and Data Space Authorities

Hiroshi Mano (IEEE P3800 Chair)

PAR(Project Authorization Request) has been approved on Feb 26 SASB

Approved PAR 1/3

P3800.2

Type of Project: New IEEE Standard
Project Request Type: Initiation / New
PAR Request Date: 19 Dec 2025
PAR Approval Date:
PAR Expiration Date:
PAR Status: Submitted

1.1 Project Number: P3800.2
1.2 Type of Document: Standard
1.3 Life Cycle: Full Use

2.1 Project Title: Standard for Data Space Discovery Protocol for Data Trading System Operators and Data Space Authorities

3.1 Working Group: Data Trading System Working Group(CTS/DFESC/DTSWG)
3.1.1 Contact Information for Working Group Chair:
Name: Hiroshi Mano
Email Address: hiroshi@manosan.org
3.1.2 Contact Information for Working Group Vice Chair:
None
3.2 Society and Committee: IEEE Consumer Technology Society/Digital Finance and Economy Standards Committee(CTS/DFESC)
3.2.1 Contact Information for Standards Committee Chair:
Name: Daozhuang Lin
Email Address: john.lin@ieee.org
3.2.2 Contact Information for Standards Committee Vice Chair:
None
3.2.3 Contact Information for Standards Representative:
Name: Kim Fung Tsang
Email Address: ee330015@cityu.edu.hk

Approved PAR 2/3

4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot: Dec 2027
4.3 Projected Completion Date for Submittal to RevCom: Dec 2028

5.1 Approximate number of people expected to be actively involved in the development of this project: 20
5.2 Scope of proposed standard: This standard specifies a Data Space Discovery Protocol between a Data Trading System (DTS) operator and a Data Space Authority. The standard defines protocols and an object framework for the advertisement and discovery processes of data spaces. This enables DTS operators to discover appropriate data spaces and to be aware of the requirements and methods for participating in the target data space.

5.3 Is the completion of this standard contingent upon the completion of another standard? Yes
Explanation: P3800.1.
Then, this standard depends on IEEE 3800-2024 and P3800.1.
5.4 Purpose: This standard aims to advance the social implementation of the IEEE Std 3800-2024 and P3800.1 that enables multilateral data trading across heterogeneous data spaces.
5.5 Need for the Project: To facilitate the adoption of IEEE Std 3800-2024 and P3800.1 standard, the specification of Data Space Discovery Protocol between the DTS (Data Trading System) operator and the Data Space Authority is essential.
This standard will facilitate the consistent and efficient implementation of specifications developed based on the IEEE Std 3800-2024 reference architecture and P3800.1, helping ensure that DTSs are interoperable and meet regulatory requirements across multiple data spaces.
5.6 Stakeholders for the Standard: Data Space Authority, Data Space participants, DTS designers, developers, and operators, data cooperation standard developers, data space participants, users of third-party data sources, data producers and sellers, IoT devices manufacturers, mobile app developers, consumer data privacy advocates, and government agencies.

Approved PAR 3/3

6.1 Intellectual Property

6.1.1 Is the Standards Committee aware of any copyright permissions needed for this project?
No

6.1.2 Is the Standards Committee aware of possible registration activity related to this project?
No

7.1 Are there other standards or projects with a similar scope? No
7.2 Is it the intent to develop this document jointly with another organization? No

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8.1 Additional Explanatory Notes: Data Space:
A Data Space is a decentralized ecosystem with common policies and rules defined by a governance framework sovereignty.
Data Space Authority:
A Data Space Authority refers to an individual or organization responsible for the construction, operation, and governance of a data space.

What is the DTS

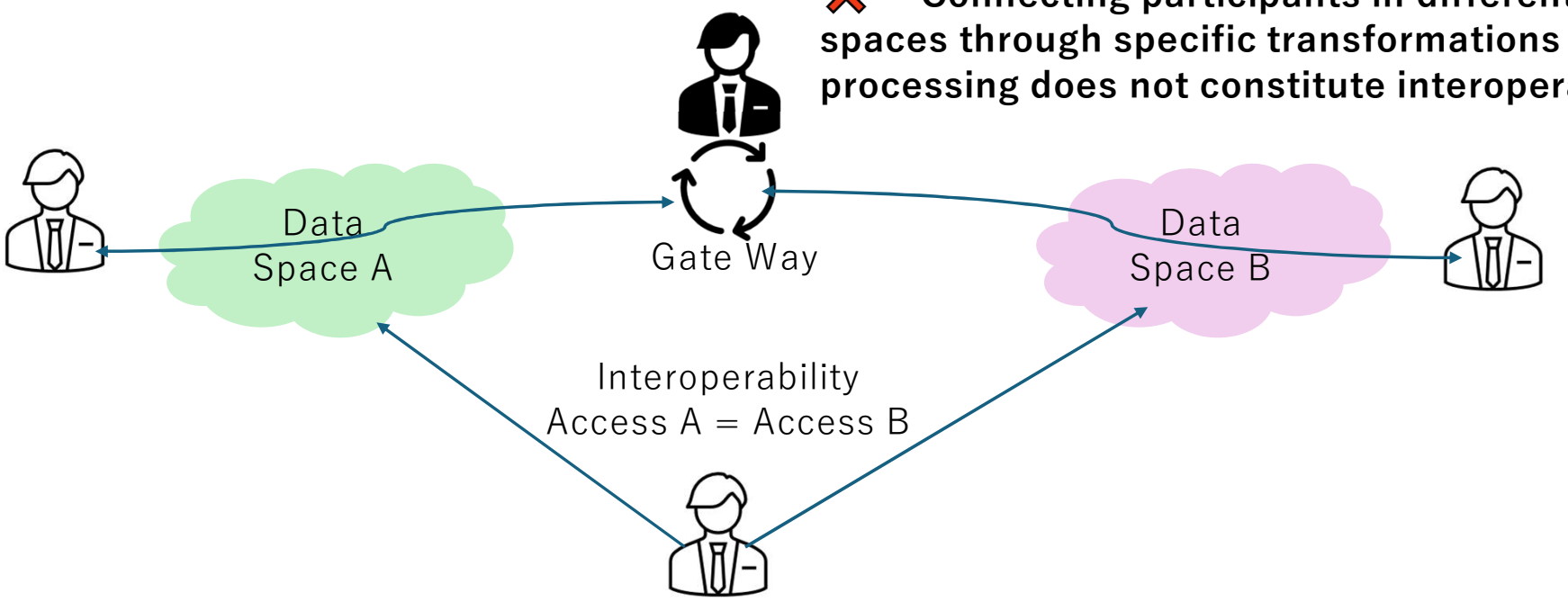
- DTS (Data Trading System) is a system for exchanging data and other assets among different participants.
- DTS is built and operated by DTS operators.
- The DTS Operator is a neutral and impartial intermediary independent of participants in the data space and never processes or holds the data it mediates.

What is the Data Space and Data Space Authority

- Data Space
  - A Data Space is a decentralized ecosystem with common policies and rules defined by a governance framework of sovereignty.
- Data Space Authority:
  - A Data Space Authority refers to an individual or organization responsible for the construction, operation, and governance of a data space.

What is the Interoperability in case of the autonomous deployment system

✕ **Connecting participants in different data spaces through specific transformations or processing does not constitute interoperability.**

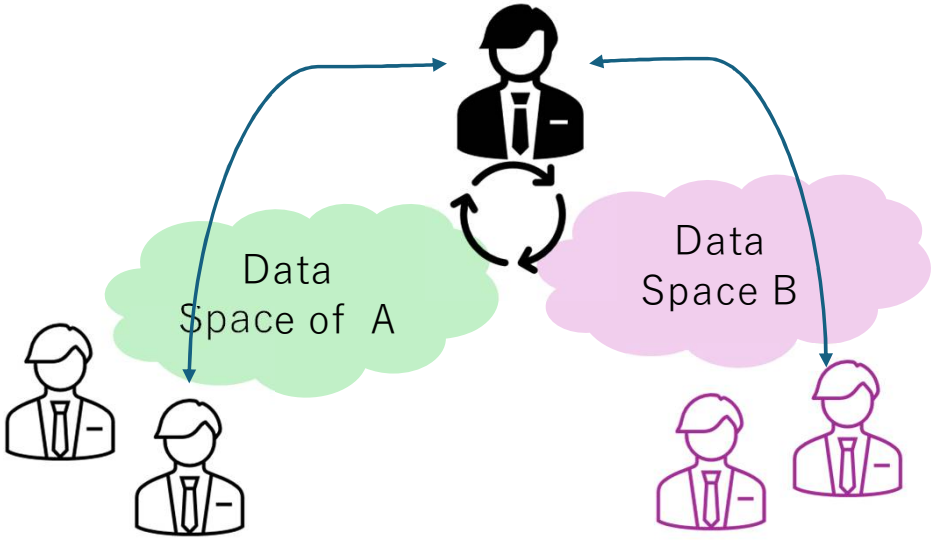


Participants can access A and B with a unified method and technologies

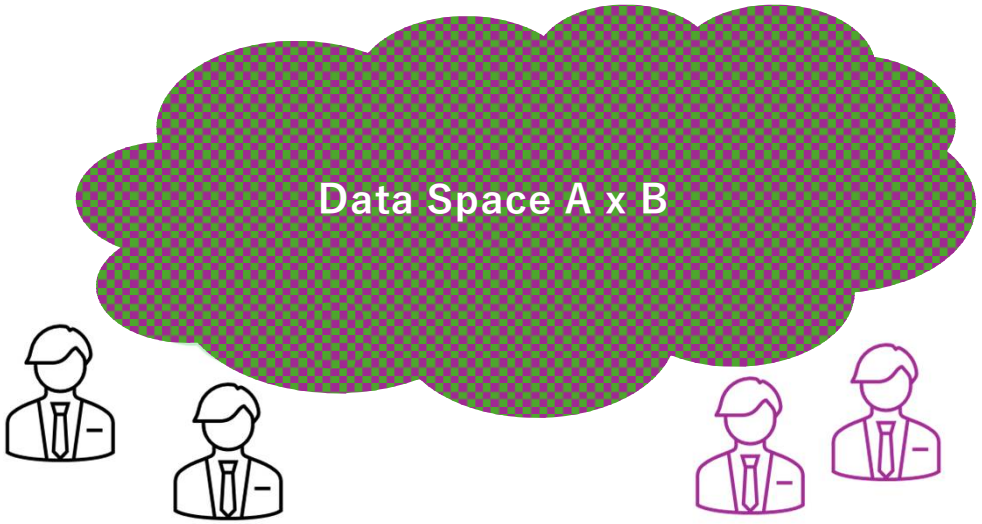
⭕ **Interoperability is precisely the provision of a unified access method to different data spaces.**

Multimodal data space

Participants of data spaces A and B are interested in common topics.
A combination of data from spaces A and B makes a new benefit.
How can we create the appropriate data space?



✕ Collaborated under control by an intermediary who may take over participants' sovereignty.



○ Create a new Data Space A x B, maintain participants' sovereignty.

Does DTS provide interoperability?

- **The data trading market does not retain or process data from other participants to ensure neutrality and fairness.**
- **In other words, the data trading market is a participant that uses an interoperable unified access method rather than performing data conversion for interconnection.**

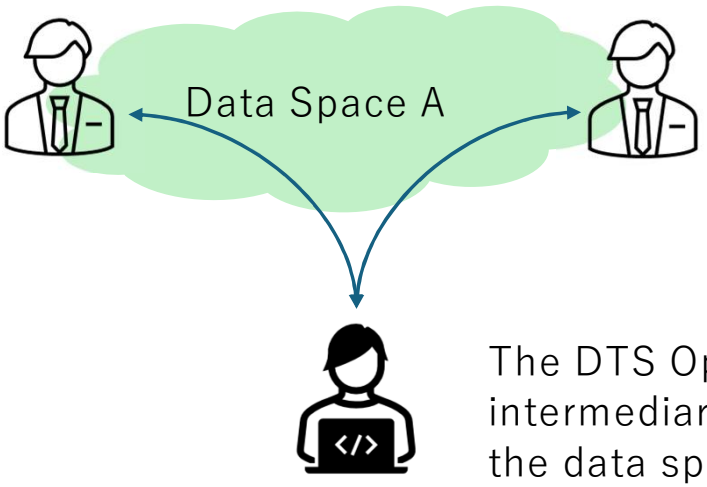
Functions provided by DTS/DTS Operator

- Advertisement
  - Function to notify other participants of the existence of data under its own sovereignty
- Discovery
  - Function to discover appropriate data under the sovereignty of other participants
- Authentication Function
  - Function to guarantee the authenticity of the other participants
  - Function to guarantee the authenticity of data
  - Function to guarantee the integrity of data
  - Function to guarantee the integrity of data and transaction conditions

DTS/DTS Operator on Data Spaces

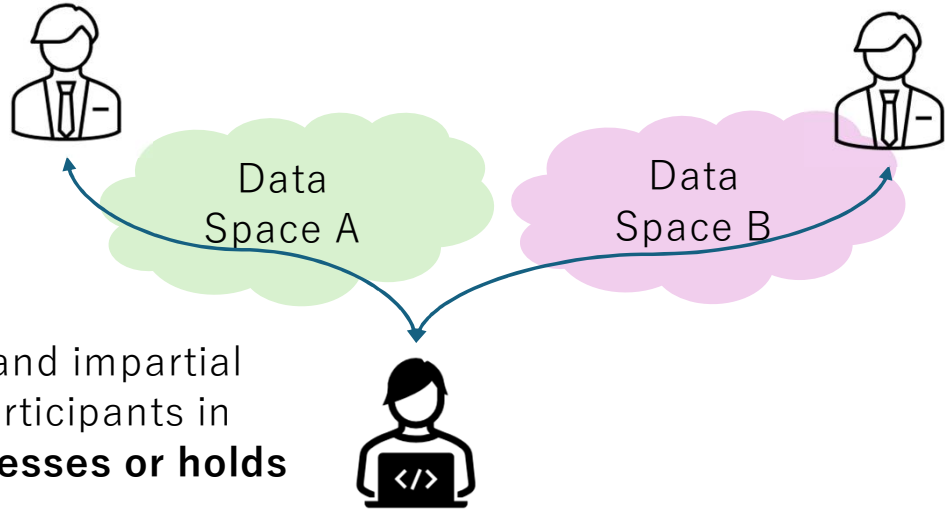
Internal Data Space Operations

- Mediation of data trading between participants within a specific data space.



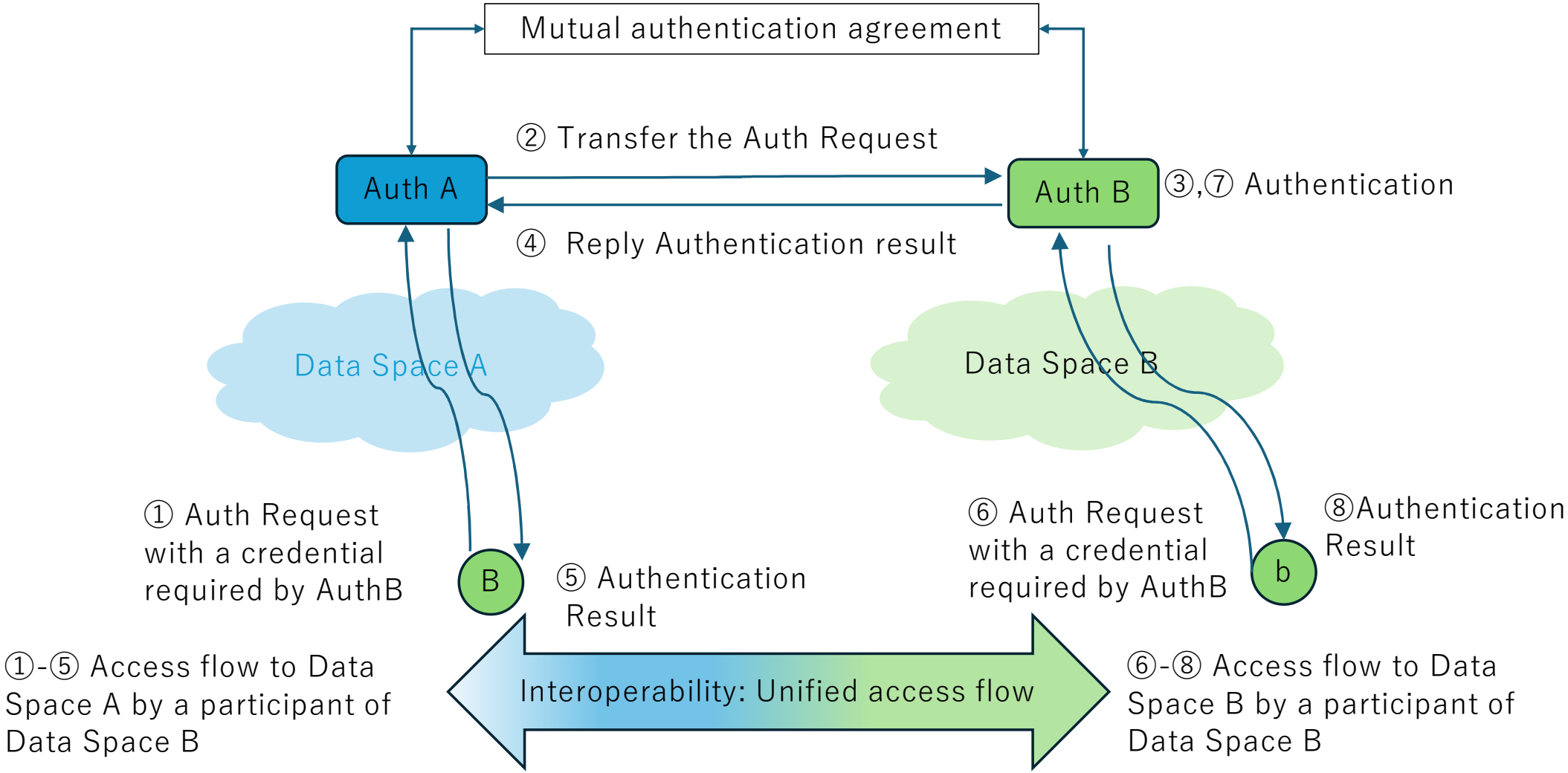
Multi-Data Space Operations

- Mediation of data trading between participants across different data spaces



The DTS Operator is a neutral and impartial intermediary independent of participants in the data space and **never processes or holds** the data it mediates.

The required Interoperability



Assumption

- Every data space has its own operational environment and policies.
- For examples
  - Legal area
  - Regulation
  - Target domain
  - Language
  - Vocabulary
  - Semantics
  - Implementation technology: such as Connectors, APIs, etc.
  - Credential used
  - Trust mechanism
  - .....

Problem statements

- DTS operators must recognize the necessary conditions for participation before joining an appropriate data space.
- The information required for this recognition should ideally be advertised and discoverable through a standardized method.
- Currently, no such standard exists.

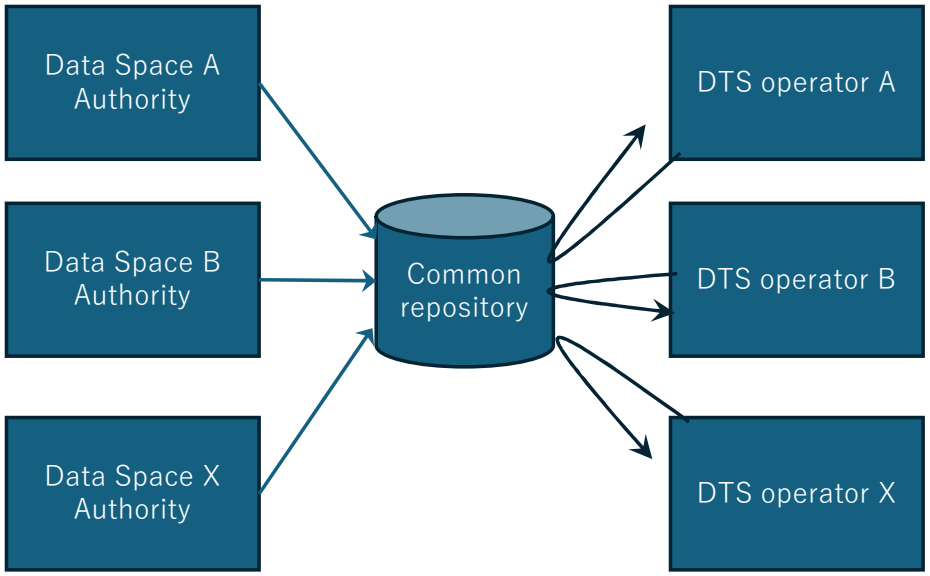
Required standard for

- Advertisement
  - Data space authorities require standardized methods to advertise their existence and contact points to the general public or to large numbers of specific individuals.
- Discovery
  - DTS operators require a standard method to discover the appropriate data space containing the data their clients require and to obtain the information necessary for connection.

These should be implemented in an autonomous and decentralized manner, without being centrally managed by specific administrators.

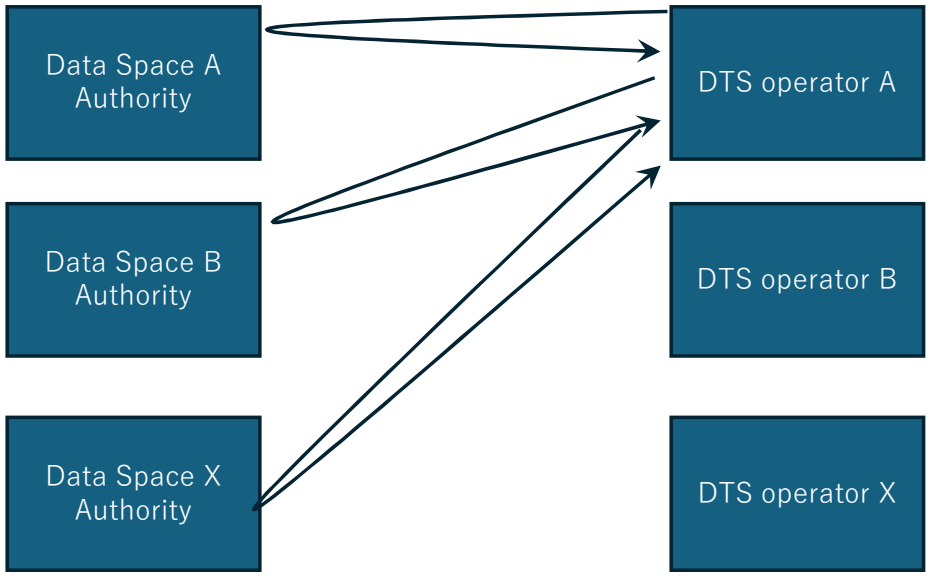
Common Data Space Repository System

- Standard define the common data space repository.
- Every single data space authority registers its own condition in the common repository.
- All DTS operators locate and retrieve the necessary information about the appropriate data space.



- **Is this a decentralized system?**
- **Who owns and operates the common repository?**

Crawling method system

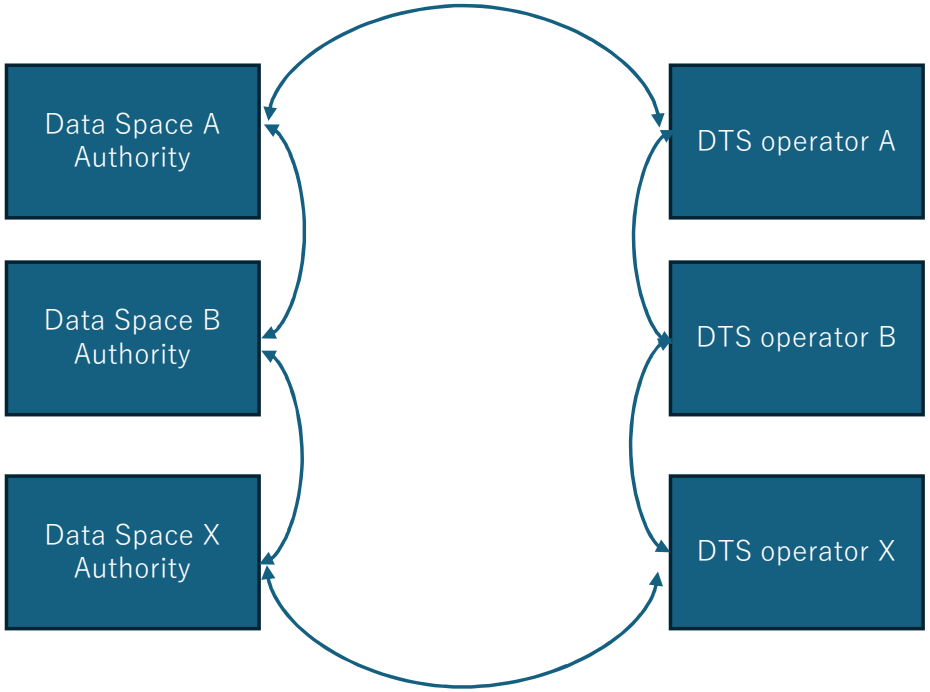


- DTS operator crawling data space authorities to get information.
- To crawl, the DTS operator should first obtain the access information for the data space authority.

- The standard method is not specified.
- Is there a unique identifier of the data space?
- The FQDN is unique, but the endpoint URL format is not standardized.
- exp:
  - https://dsa.org/dataspace
  - https://dsa.org/access/dataapce/%=public

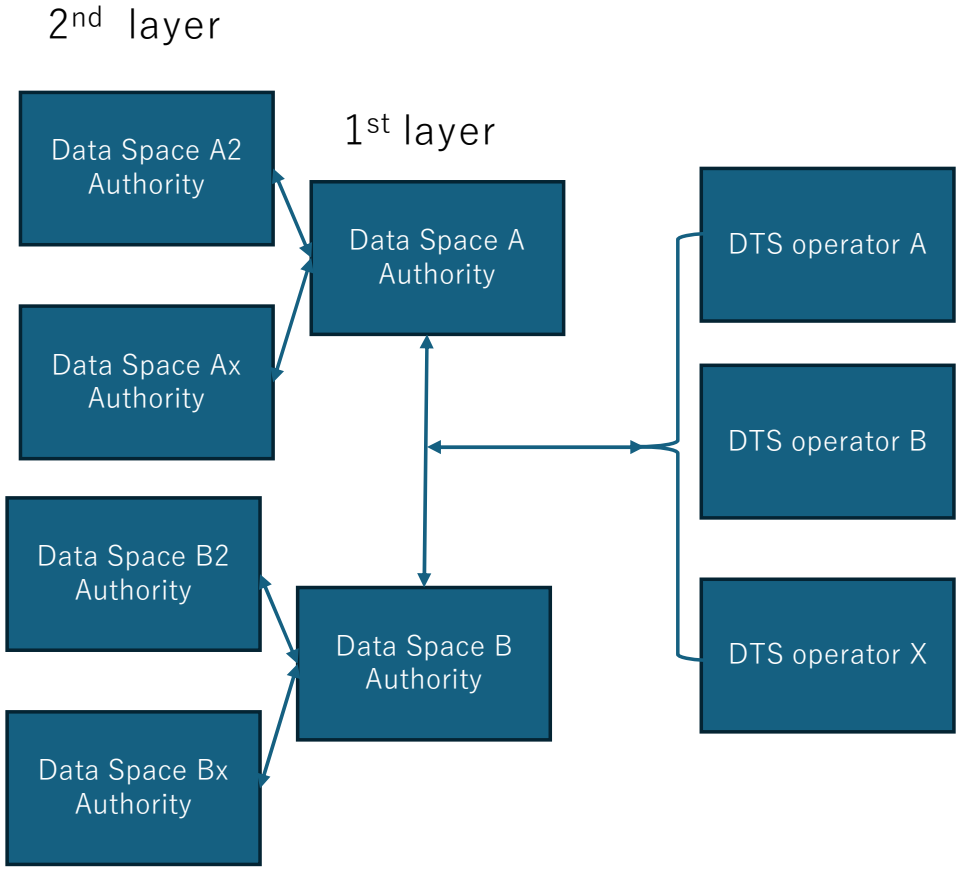
  - “https://dsa.org/” points to a particular domain, but it is not enough to get detailed information about the target data space.

P to P method



- All data spaces, authorities and DTS operators are connecting by P to P

Tree structure



- All data spaces are classified by a tree structure.
- DTS Operator access to the 1st-layer Data space authority and request will be forwarded to the next level.
- Same as AS system of the internet.
- We need organization as like ICANN , IANNA.

Call for an architecture idea!

IEEE 3800シリーズ：データ取引システムの標準化概要

データ取引システム標準化の目的

• デジタル経済においてデータは競争優位の核心資産へと進化した

• 機密情報を保護しつつ価値あるデータ交換を可能にする環境が不可欠

• 全参加者がデータ提供に対して適切な対価を得られる仕組みが必要

• 標準化されたフレームワークにより異なるシステム間のシームレスな連携を実現

• 閉鎖的なサイロを超え、国際的な統一基準でデータ流通を促進する

• 信頼性の高いデータ取引を支える国際標準として策定された統合フレームワーク

DFESCのDTSWGが開発する統一的な国際フレームワーク。3800基盤・P3800.1技術・P3800.2連携の3層で構成されるデータ取引システム

参照モデルと用語を定義する最初の承認済み標準。

参照モデルを実装するための通信プロトコルを規定。

データスペース間の発見・認証プロトコルを定義。

- ドメイン非依存：特定分野に依存せず、様々なセクターに適用可能
- 相互運用性：異なるシステム間のシームレスなデータ交換を実現

P3800.2は、DTSオペレーターが異なるデータスペースを発見し参加するためのプロトコルを規定する標準です。

IEEE 3800-2024およびP3800.1を基盤として構築

DTSオペレーターがデータスペースを発見・参加する手順を定義

2028年12月完成予定、異種環境間の相互運用を実現

標準化による相互運用性の確保

標準化された識別子の活用

一意のDTS IDにより、異なるシステム間での確実な識別を実現

中立的仲介者としてのDTS運営者

DTS運営者はデータを保持せず、公正な取引を保証する

共通オブジェクト定義による相互性

データセット・取引条件・カタログを標準化し一貫性を確保

TTPs（信頼できる第三者）の役割

認証・証明書発行により、参加者の真正性を検証する

ドメイン非依存の設計思想

業界を問わず適用可能な汎用フレームワークで相互運用性を向上

5段階プロセスによる安全な取引

準備から終了まで標準化されたワークフローで監査可能性を担保

3800・P3800.1・P3800.2が
階層的に連携し
包括的な枠組みを形成

データを保持せず公正な取引を
保証する中立的役割を担う

データセット・取引条件・
カタログ等を統一定義し
相互運用性を確保

準備から終了まで安全かつ監査
可能なワークフローを標準化

P3800.2により分散した複数の
データ空間を横断的に
連携可能にする

国境を超えた公正な取引市場を
構築しデータ主権を保護する

160カ国以上・42万人超の技術専門家が参加するIEEEが生導する標準化は、真のグローバル採用を保証する。

IEEEの標準化は透明性・開放性・コンセンサスを展開とし、産学官が協力して公正な国際標準を指定する。

IEEE 3800 (参照モデル) → P3800.1 (アーキテクチャ) → P3800.2 (プロトコル) の3層構造が、包括的な枠組みを形成する。

公正性・透明性・相互運用性・データ主権の保護を成功基準とし、取引の信頼性と効率性を定量的に評価する。

P3800.1は2026年12月、P3800.2は2028年12月の完成を目指標とし、段階的に国際標準として確立する。

IEEE 3800シリーズにより、国境を超えた『ネットワーク・オブ・ネットワーク』が形成され、真のデータ主権が保証される。