Climate Warehouse

End-to-End Digital Ecosystem for Carbon Markets

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Climate Warehouse

IETA
A IS FOR AMBITION

Webinar
September 2022

End-to-End Digital Carbon Market Infrastructure

Climate Action Data*
(working name)

Agenda

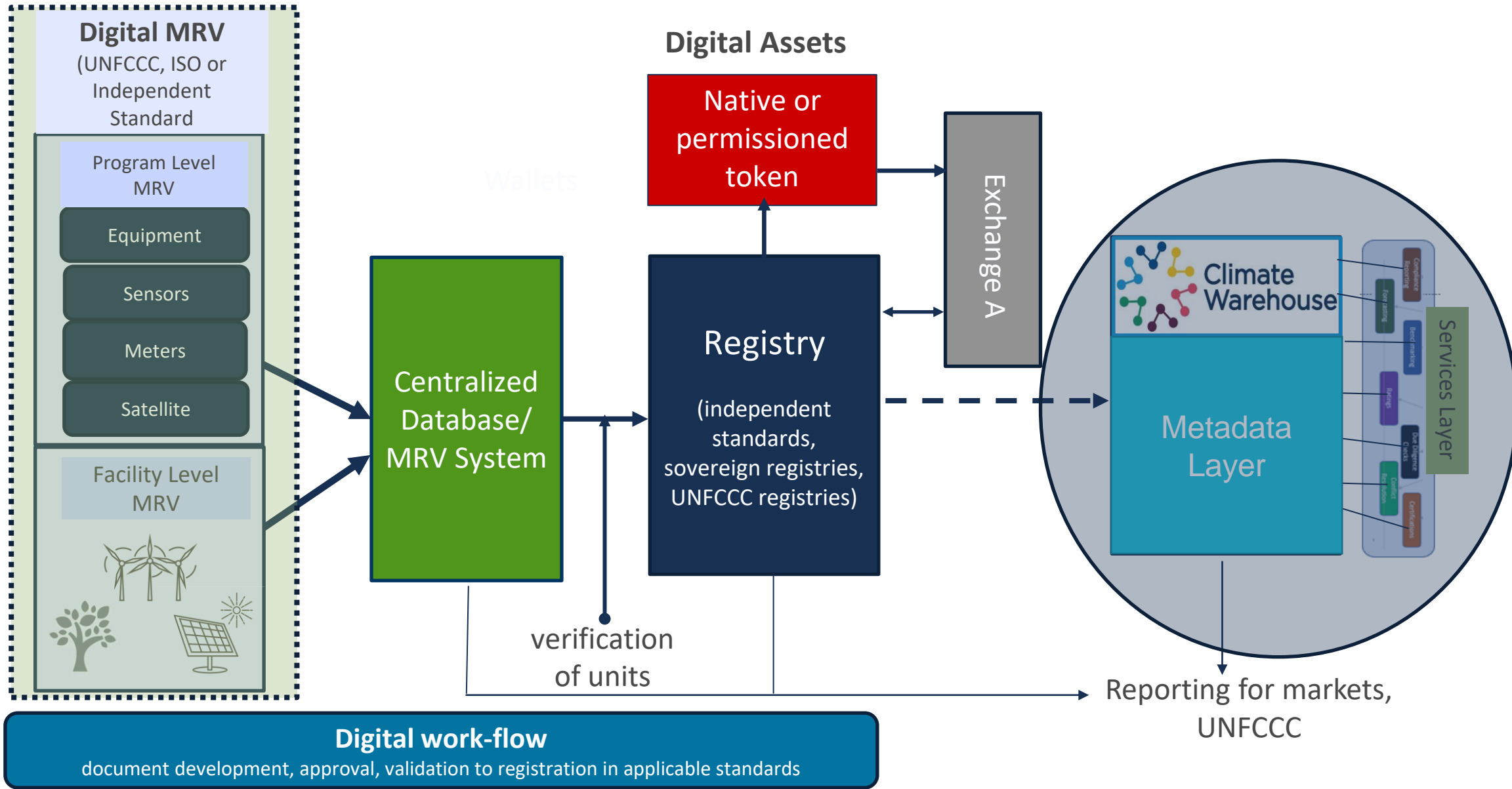# The Climate Warehouse data-layer anchors end-to-end- digital ecosystem for carbon markets

Digital MRV
(UNFCCC, ISO or Independent Standard)

Program Level MRV

Equipment

Sensors

Meters

Satellite

Facility Level MRV

Centralized Database/ MRV System

Digital Assets

Native or permissioned token

Exchange A

Registry
(independent standards, sovereign registries, UNFCCC registries)

Wallets

Climate Warehouse

Metadata Layer

Services Layer

verification of units

Reporting for markets, UNFCCC

Digital work-flow
document development, approval, validation to registration in applicable standards

Context-setting

- **Individual commitments through nationally determined contributions (NDCs).** The Paris Agreement introduced a bottom-up approach for addressing climate change.

- **Decentralized cooperative approaches to achieve their NDCs.** This is expected to lead to heterogeneous climate markets, which may have differences in governance rules and operate under different technological systems.

- **Climate Action Data:** a decentralized information technology approach to connect climate markets systems.

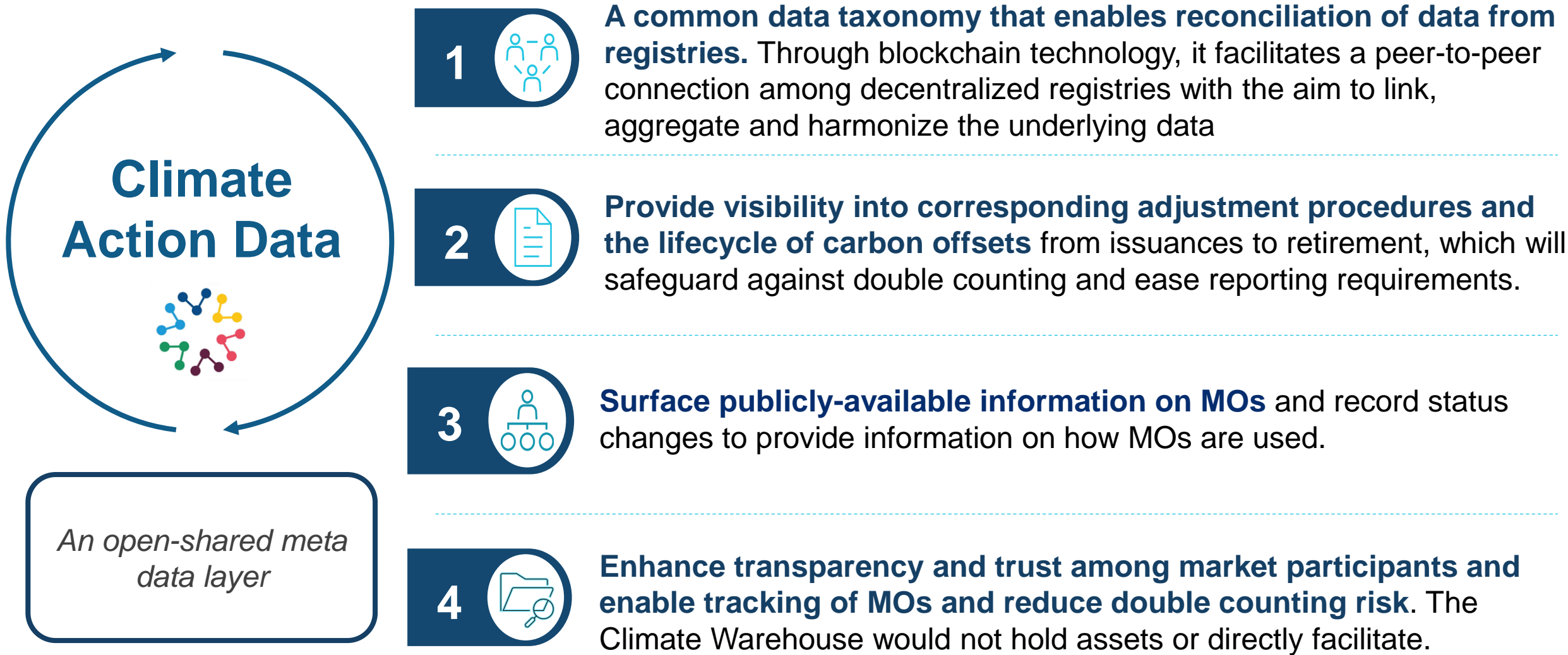**Report by Taskforce on Scaling Voluntary Carbon Markets (TSVCM)**
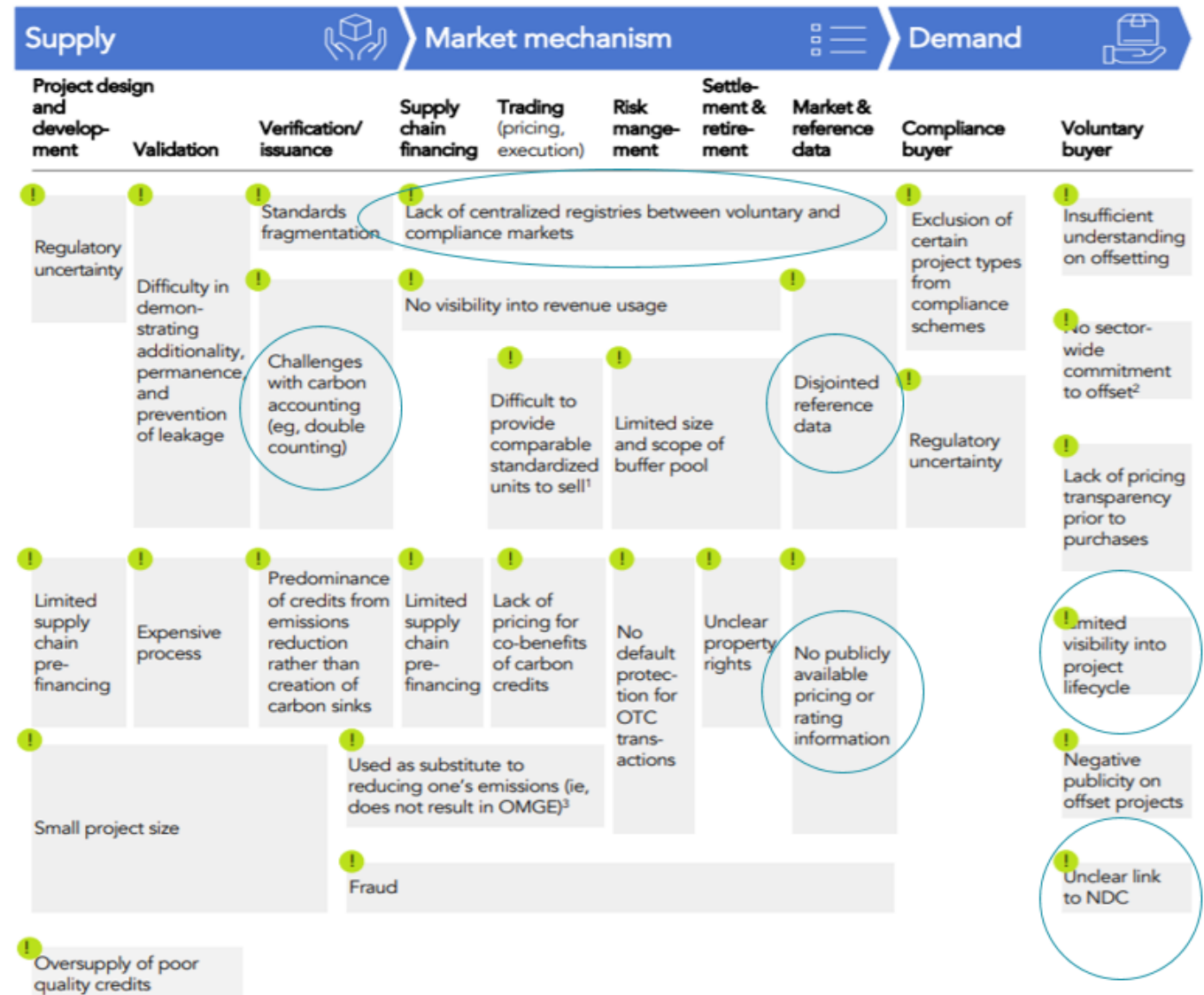
Source: Adams, Tim. Winters, Bill. Nazareth, Annette and Mark Carney *Taskforce on Scaling Voluntary Carbon Markets Phase 1 Final Report: January 2021*, TSVCM, pg. 45

What is the value proposition?
A decentralized IT approach to connect climate markets

Climate Action Data

An open-shared meta data layer

1 — **A common data taxonomy that enables reconciliation of data from registries.** Through blockchain technology, it facilitates a peer-to-peer connection among decentralized registries with the aim to link, aggregate and harmonize the underlying data

2 — **Provide visibility into corresponding adjustment procedures and the lifecycle of carbon offsets** from issuances to retirement, which will safeguard against double counting and ease reporting requirements.

3 — **Surface publicly-available information on MOs** and record status changes to provide information on how MOs are used.

4 — **Enhance transparency and trust among market participants and enable tracking of MOs and reduce double counting risk**. The Climate Warehouse would not hold assets or directly facilitate.

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What is the value proposition?
An aggregating force in the ecosystem

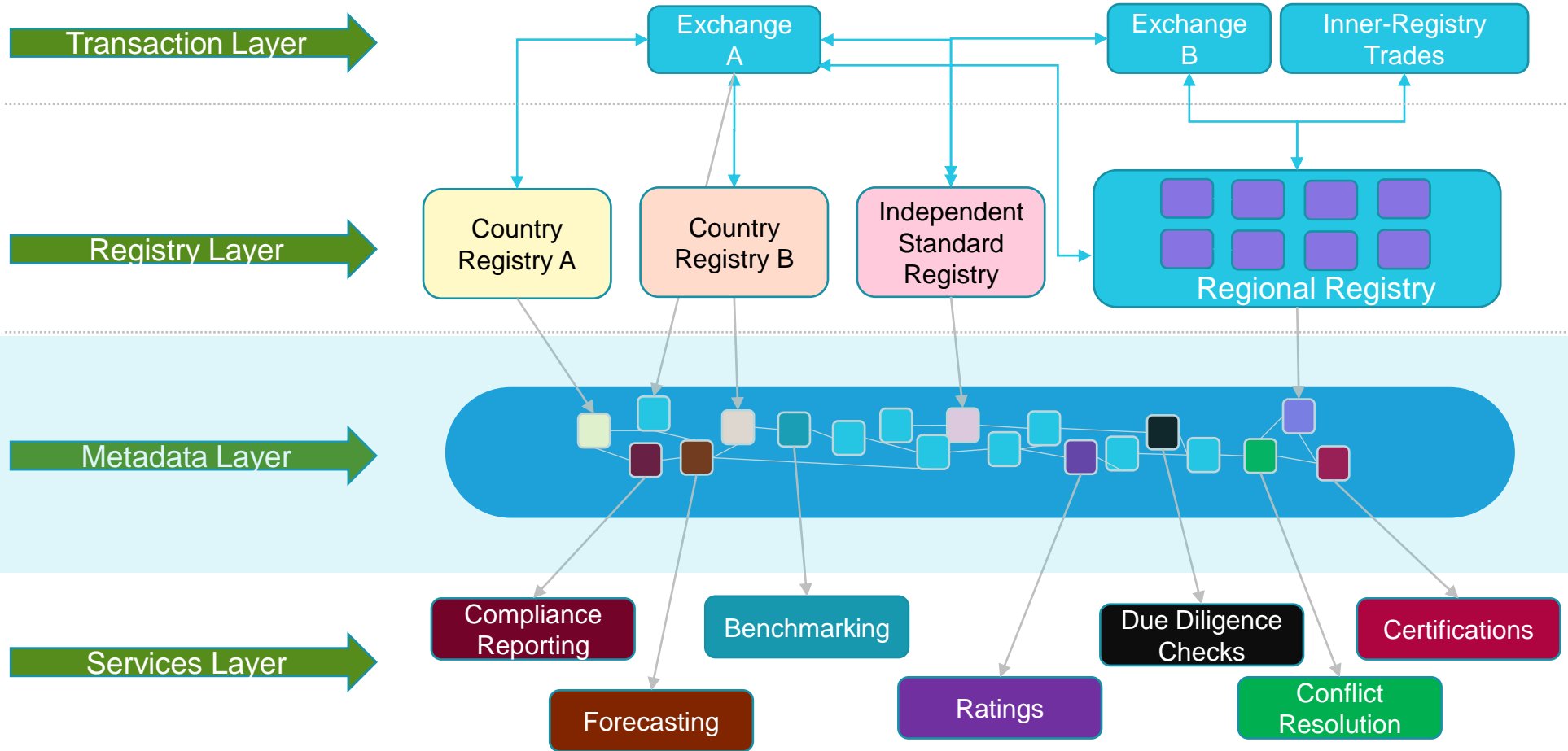| Stakeholder type	Benefits
Governments	• Increases visibility and credibility of a country's climate activities • View MOs to potentially purchase • Promotes new project activity • Can increase market participation of private sector • Can provide an aggregate view of projects within their jurisdiction, ability to identify duplicative projects • Increases accountability
Independent Standards	• Reduces burden on monitoring external systems for due diligence processes because of the ease of aggregating information together • Facilitates trust and transparency between systems
UNFCCC	• Aggregate reporting
Exchanges	• Decreases market fragmentation and eases integration • Promotes standardization and asset integrity • Adds information security to the data needed from registries for transactions • Increases volume of standard asset types
Project Developers	• Building trust in the accounting of MOs will enable transparency and trade, benefiting project developers
Verification Bodies	• Access to aggregated information, ability to audit transactions and changes to data
Buyers and Traders	• Aggregated trustworthy data to search through. Easier access to project developer information

Building a public good data layer

- Designed as an open shared infrastructure layer

- Common taxonomy of data facilitates communication between entities

- Registry service providers and countries share data to the Warehouse

- Public and private sector market players can host a node and build out the service layer

Transaction Layer

Registry Layer

Metadata Layer

Services Layer

Exchange A

Exchange B

Inner-Registry Trades

Country Registry A

Country Registry B

Independent Standard Registry

Regional Registry

Compliance Reporting

Benchmarking

Due Diligence Checks

Certifications

Forecasting

Ratings

Conflict Resolution

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Climate Warehouse

Prototype Architecture

The Climate Warehouse infrastructure has 2 layers: the CW data layer and the public blockchain layer

Climate Warehouse Data Layer…

- Defines a common data model and taxonomy
- Reconcile data across registries
- Identify potential double counting
- Enable auditing and reporting

…Tested on a Public Blockchain Layer

- Transparent and Immutable Data
- Auditable
- Accessible and Inclusive
- Public and Transparent
- Open source
- Peer-to-peer governance

Initial Simulation III Data Model (March 2022)

Project Location
- Warehouse Project ID* (FK)
- Project Location ID* (PK)
- Country*
- In-Country Region
- Geographic Identifier*

Project Rating
- Warehouse Project ID* (FK)
- Project Rating ID* (PK)
- Rating Type*
- Rating Range Lowest*
- Rating Range Highest*
- Rating*
- Rating Link*

Co-Benefits
- Warehouse Project ID* (FK)
- Co-Benefit ID (PK)
- Co-Benefit

Estimations
- Warehouse Project ID* (FK)
- Estimations ID* (PK)
- Crediting Period Start*
- Crediting Period End*
- Unit Count*

Projects
- Warehouse Project ID* (PK)
- Current Registry*
- Project ID*
- Registry of Origin*
- Program
- Project Name*
- Project Link*
- Project Developer*
- Sector*
- Project Type*
- Project Tags
- Covered by NDC*
- NDC Information
- Project Status*
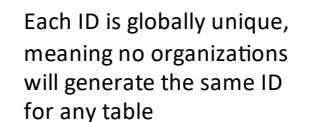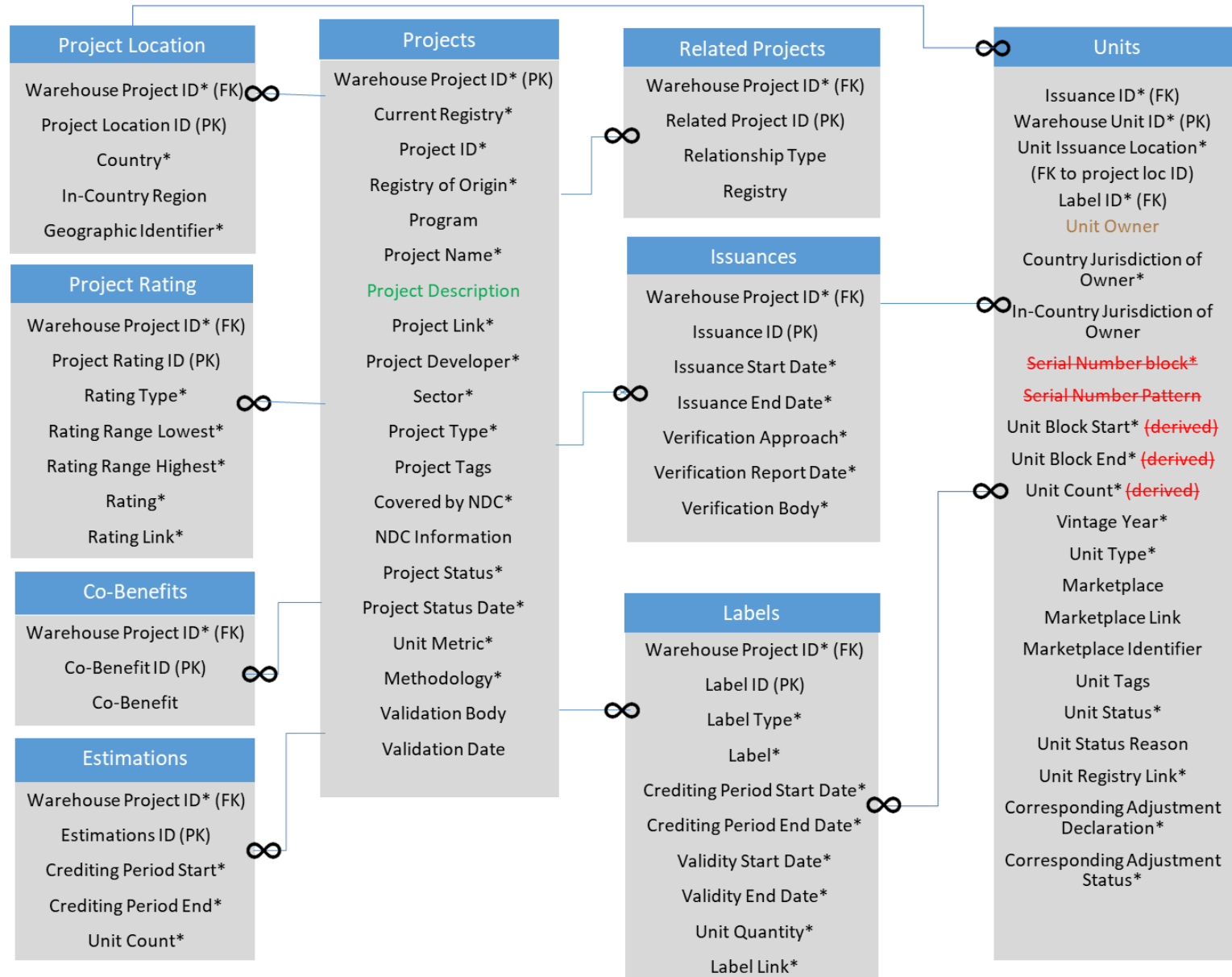- Project Status Date*
- Unit Metric*
- Methodology*
- Validation Body
- Validation Date
- Project Description

Related Projects
- Warehouse Project ID* (FK)
- Related Project ID (PK)
- Relationship Type
- Registry

Issuances
- Warehouse Project ID* (FK)
- Issuance ID* (PK)
- Issuance Start Date*
- Issuance End Date*
- Verification Approach*
- Verification Report Date*
- Verification Body*

Labels
- Warehouse Project ID* (FK)
- Label ID (PK)
- Label Type*
- Label*
- Crediting Period Start Date*
- Crediting Period End Date*
- Validity Start Date*
- Validity End Date*
- Unit Quantity*
- Label Link*

Units
- Issuance ID* (FK)
- Warehouse Unit ID* (PK)
- Unit Issuance Location* (FK to project loc ID)
- Label ID* (FK)
- Unit Owner*
- Country Jurisdiction of Owner*
- In-Country Jurisdiction of Owner
- Unit Block Start*
- Unit Block End*
- Unit Count*
- Vintage Year*
- Unit Type*
- Marketplace
- Marketplace Link
- Marketplace Identifier
- Unit Tags
- Unit Status*
- Unit Status Reason
- Unit Registry Link*
- Corresponding Adjustment Declaration*
- Corresponding Adjustment Status*

Governance (ref)
- Registry values
- Project Sector values
- Project Status values
- Unit Metric values
- Validation Body values
- Country values
- Rating Type values
- Unit Type values
- Unit Status values
- Unit Transaction Type values
- Corresponding Adjustment Declaration values
- Corresponding Adjustment Status values
- Related Project Relationship type values
- Label Type values
- Verification Body values

Fields with an * are required form fields

Each ID is globally unique, meaning no organizations will generate the same ID for any table

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Updates to the Simulation III Data Model Based on Feedback

Project Location
- Warehouse Project ID* (FK)
- Project Location ID (PK)
- Country*
- In-Country Region
- Geographic Identifier*

Project Rating
- Warehouse Project ID* (FK)
- Project Rating ID (PK)
- Rating Type*
- Rating Range Lowest*
- Rating Range Highest*
- Rating*
- Rating Link*

Co-Benefits
- Warehouse Project ID* (FK)
- Co-Benefit ID (PK)
- Co-Benefit

Estimations
- Warehouse Project ID* (FK)
- Estimations ID (PK)
- Crediting Period Start*
- Crediting Period End*
- Unit Count*

Projects
- Warehouse Project ID* (PK)
- Current Registry*
- Project ID*
- Registry of Origin*
- Program
- Project Name*
- Project Description
- Project Link*
- Project Developer*
- Sector*
- Project Type*
- Project Tags
- Covered by NDC*
- NDC Information
- Project Status*
- Project Status Date*
- Unit Metric*
- Methodology*
- Validation Body
- Validation Date

Related Projects
- Warehouse Project ID* (FK)
- Related Project ID (PK)
- Relationship Type
- Registry

Issuances
- Warehouse Project ID* (FK)
- Issuance ID (PK)
- Issuance Start Date*
- Issuance End Date*
- Verification Approach*
- Verification Report Date*
- Verification Body*

Labels
- Warehouse Project ID* (FK)
- Label ID (PK)
- Label Type*
- Label*
- Crediting Period Start Date*
- Crediting Period End Date*
- Validity Start Date*
- Validity End Date*
- Unit Quantity*
- Label Link*

Units
- Issuance ID* (FK)
- Warehouse Unit ID* (PK)
- Unit Issuance Location* (FK to project loc ID)
- Label ID* (FK)
- Unit Owner
- Country Jurisdiction of Owner*
- In-Country Jurisdiction of Owner
- ~~Serial Number block*~~
- ~~Serial Number Pattern~~
- Unit Block Start* ~~(derived)~~
- Unit Block End* ~~(derived)~~
- Unit Count* ~~(derived)~~
- Vintage Year*
- Unit Type*
- Marketplace
- Marketplace Link
- Marketplace Identifier
- Unit Tags
- Unit Status*
- Unit Status Reason
- Unit Registry Link*
- Corresponding Adjustment Declaration*
- Corresponding Adjustment Status*

Governance (picklist values)
- Registry values
- Project Sector values
- Project Status values
- Project Type values
- Methodology values
- Unit Metric values
- Validation Body values
- Country values
- Rating Type values
- Unit Type values
- Unit Status values
- Corresponding Adjustment Declaration values
- Corresponding Adjustment Status values
- Related Project Relationship type values
- Label Type values
- Verification Body values
- Tag values
- Cobenefit values

Key:
- • No change
- • New field
- • Updated picklist values
- • Converted from required to optional
- • ~~Removed~~

Fields with an * are required form fields

PK denotes primary key for a specific table

FK denotes foreign key which links tables together

Each ID is globally unique, meaning no organizations will generate the same ID for any table

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Prototype Architecture

The blockchain layer supports inclusiveness, accountability, transparency and integrity
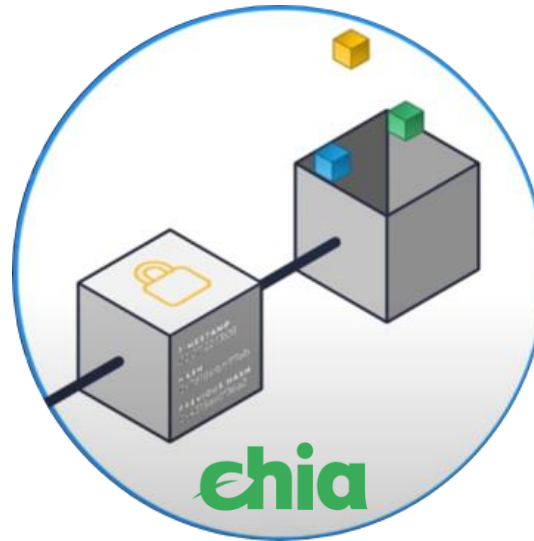
Transparency
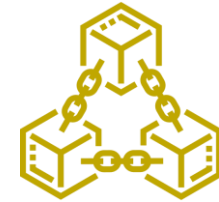- *Fully auditable and secure record of transactions*

Accountability
- *Decentralized governance/peer-to-peer support*
- *Only registries can edit their own data, allowing countries to flexibly choose their approaches*
- *Follows the Article 6 bottom-up approach*

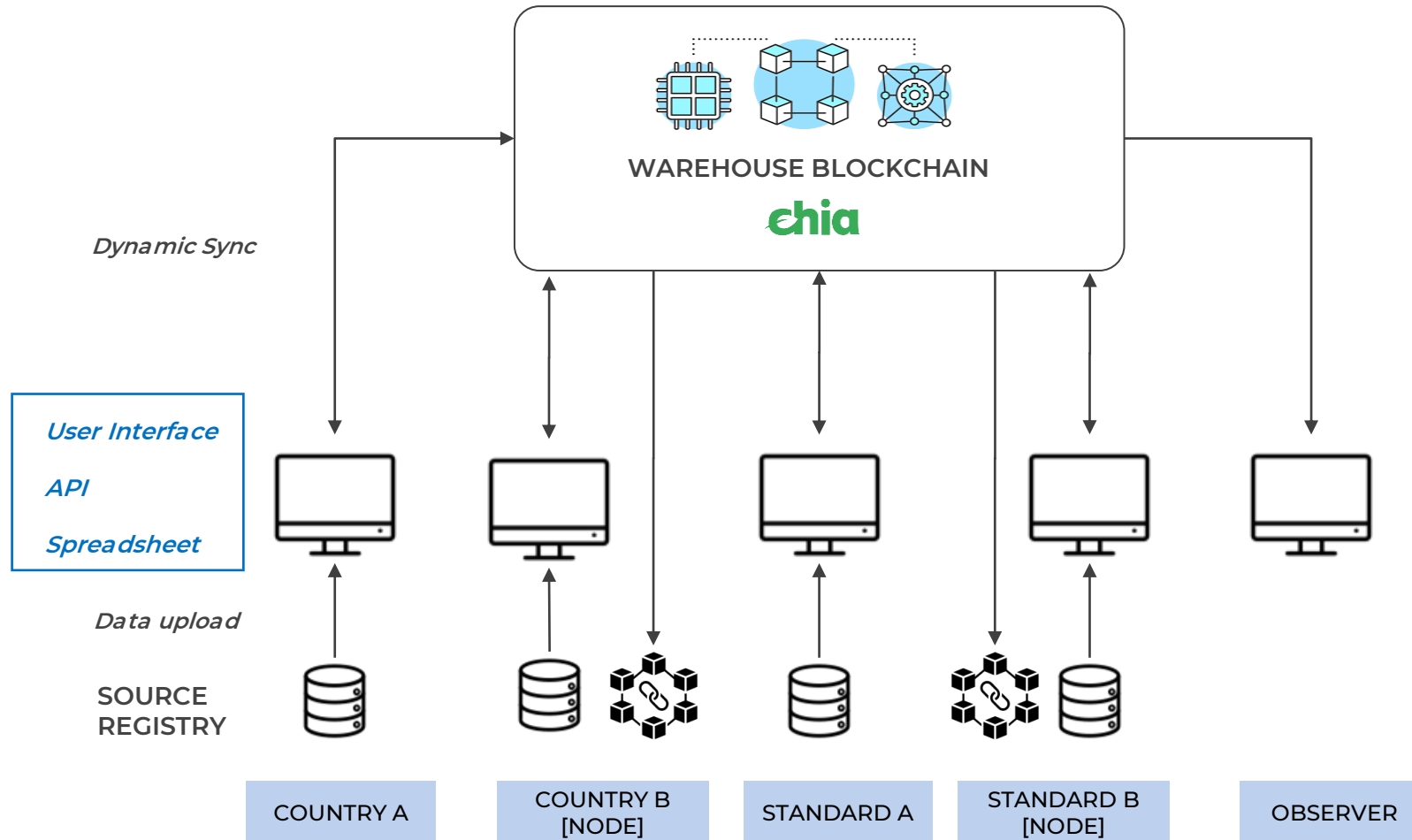**The Chia Blockchain Layer**

Integrity
- *Fully immutable and traceable*

Inclusiveness
- *Public, fully open source and permissionless*
- *Anyone in the network can access both the data layer and Chia Network blockchain node and add blocks*

The World Bank's collaborative partnership with Chia is non-exclusive. It is for open-sourced public good, bears no costs or intellectual property rights from the World Bank and promotes interoperability.

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Prototype Architecture

There are three ways to integrate data into the Climate Warehouse: User Interface, API and Spreadsheet import/export

WAREHOUSE BLOCKCHAIN

chia

Dynamic Sync

User Interface
API
Spreadsheet

Data upload

SOURCE REGISTRY

COUNTRY A

COUNTRY B [NODE]

STANDARD A

STANDARD B [NODE]

OBSERVER

User Interface

Aux App | Ware-house
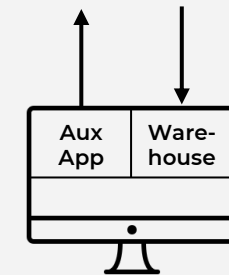
The Warehouse web application has two main interfaces with the blockchain. One is the Auxiliary App, which helps *Integrated Participants* manage their data sync and entry point into the Warehouse. The other is a tab that showcases the data in the warehouse blockchain. *Node Participants* hold a full copy of the blockchain via direct integration. *Observer participants* view the Warehouse data via an Auxiliary App made available by the WBG.

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Timeline

August 2019   November 2019   January 2022   August 2022
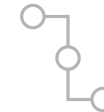
Phase I   Phase II   Phase III

Product development, Stakeholder participation and Governance model

Objectives of Simulation III

Prototype Development

- **Develop the 3rd version** of the prototype :
  - It is **open source** and **interoperable**
  - It is on a **public blockchain**
  - It has an **updated data model** and **functions** based on the lessons learned from Simulation II

- **Develop technical and functional documentation** for testing scenarios

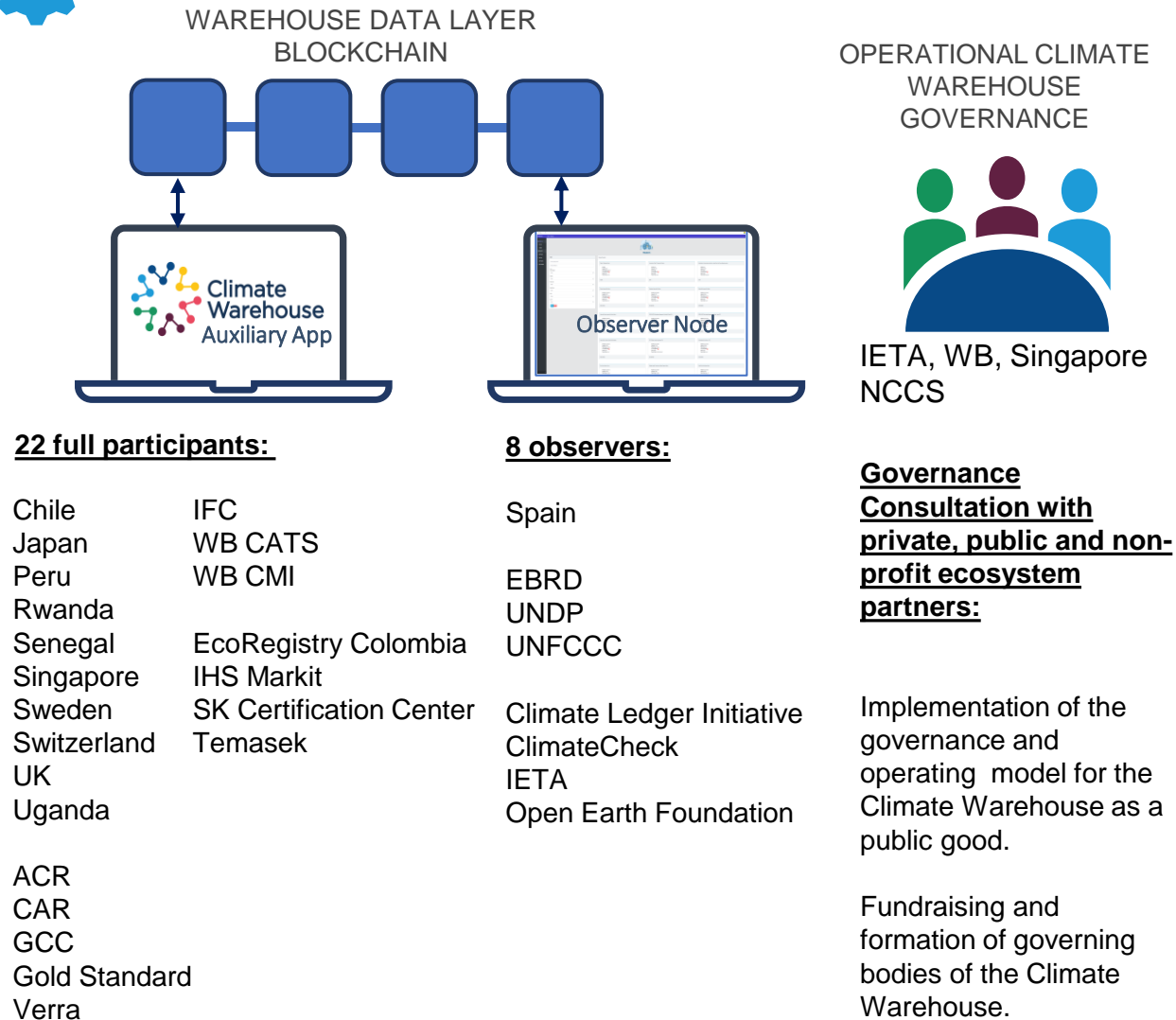- **Publish Observer Node** on theclimatewarehouse.org

Testing Activities

- **Outreach and engage with partners** of the Climate Warehouse

- **Onboard and create hosted environments** for participants for testing activities

- **Conduct sprint sessions** with participants to test the 3rd version of the prototype

Governance

- Implement the recommendations from the **governance consultations on operational Climate Warehouse** with IETA and the Government of Singapore:

  - Set up independent legal entity

  - Conduct fundraising

  - Formation of governing bodies

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Results of Simulation III

WAREHOUSE DATA LAYER BLOCKCHAIN

Climate Warehouse Auxiliary App

Observer Node

22 full participants:

Chile	IFC
Japan	WB CATS
Peru	WB CMI
Rwanda	
Senegal	EcoRegistry Colombia
Singapore	IHS Markit
Sweden	SK Certification Center
Switzerland	Temasek
UK	
Uganda	

ACR
CAR
GCC
Gold Standard
Verra

8 observers:

Spain

EBRD
UNDP
UNFCCC

Climate Ledger Initiative
ClimateCheck
IETA
Open Earth Foundation

OPERATIONAL CLIMATE WAREHOUSE GOVERNANCE

IETA, WB, Singapore NCCS

Governance Consultation with private, public and non-profit ecosystem partners:

Implementation of the governance and operating model for the Climate Warehouse as a public good.

Fundraising and formation of governing bodies of the Climate Warehouse.

High Level Outcomes of Simulation III
- Participation
  - **75** individual testers
  - **30** participating organizations,
  - **58** testing sessions
  - **40** weekly office hour sessions
  - **30** kick-off and onboarding meetings

- Feedback
  - Collected, categorized and logged **514** individual **points of feedback**, which helped identify **156 development actions**, 139 of which were implemented during Simulation III an
  - Shared **key lessons learned and a complete log of all participant feedback** with the governing body of the operational Climate Warehouse at the end of Simulation III in August 2022

Next Steps:
- Transition to the governing body of the operational Climate Warehouse, under the leadership of IETA, in close collaboration with the World Bank and the government of Singapore
- Launch the operational Climate Warehouse (expected in mid-October 2022)

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Testing Activities

Phase I

Phase II

Phase III

Phase IV

Group 1 (Internal testing)	Group 2	Group 3	Feedback consolidation and documentation
• World Bank Carbon Assets Tracking System • World Bank Carbon Markets and Innovation Unit	• Chile • Japan • Singapore • Sweden • Switzerland • IHS Markit • Verra • Climate Action Reserve* • American Carbon Registry* • Gold Standard • Global Carbon Council**	• Rwanda • Senegal • Peru • Uganda • United Kingdom • EcoRegistry Colombia • Temasek • IFC • SK Certification Center	**Capture feedback in six tools:** • Test scripts • Feedback notes • Feedback survey • Feedback tracker • Action items tracker • Participant & feedback profiles
Observers: • International Emissions Trading Association • Open Earth Foundation	**Observers**: • Spain • UNFCCC • EBRD • UNDP	**Observers:** • Climate Ledger Initiative • ClimateCheck	**Produce documentation:** • Simulation III final report • Transition plan • Simulation III onboarding package
March – April 2022	April – May 2022	May – July 2022	July - August 2022

These groupings may be subject to change due to availability and preferences of participants

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Governance and Finance consultation
September 2021 – March 2022

70+
Entities involved

- Governments
- Independent standards
- Exchanges
- Traders
- Project developers
- Private sector
- Financial institutions
- Technology providers
- NGOs
- Think tanks
- Law firms
- Multilateral development banks

- Observer: UNFCCC

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Governance models reviewed

- Western Climate Initiative, Inc (WCI, Inc.)
- Integrity Council for Voluntary Carbon Markets (IC-VCM)
- EU-Swiss ETS link
- Joint Crediting Mechanism (JCM)
- British Standards Institution (BSI) & Enterprise Singapore (ES)

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Focus groups conducted

- 4 on governance (46 entities)
- 2 on finance (45 entities)

+ *polls and surveys for participant feedback throughout*

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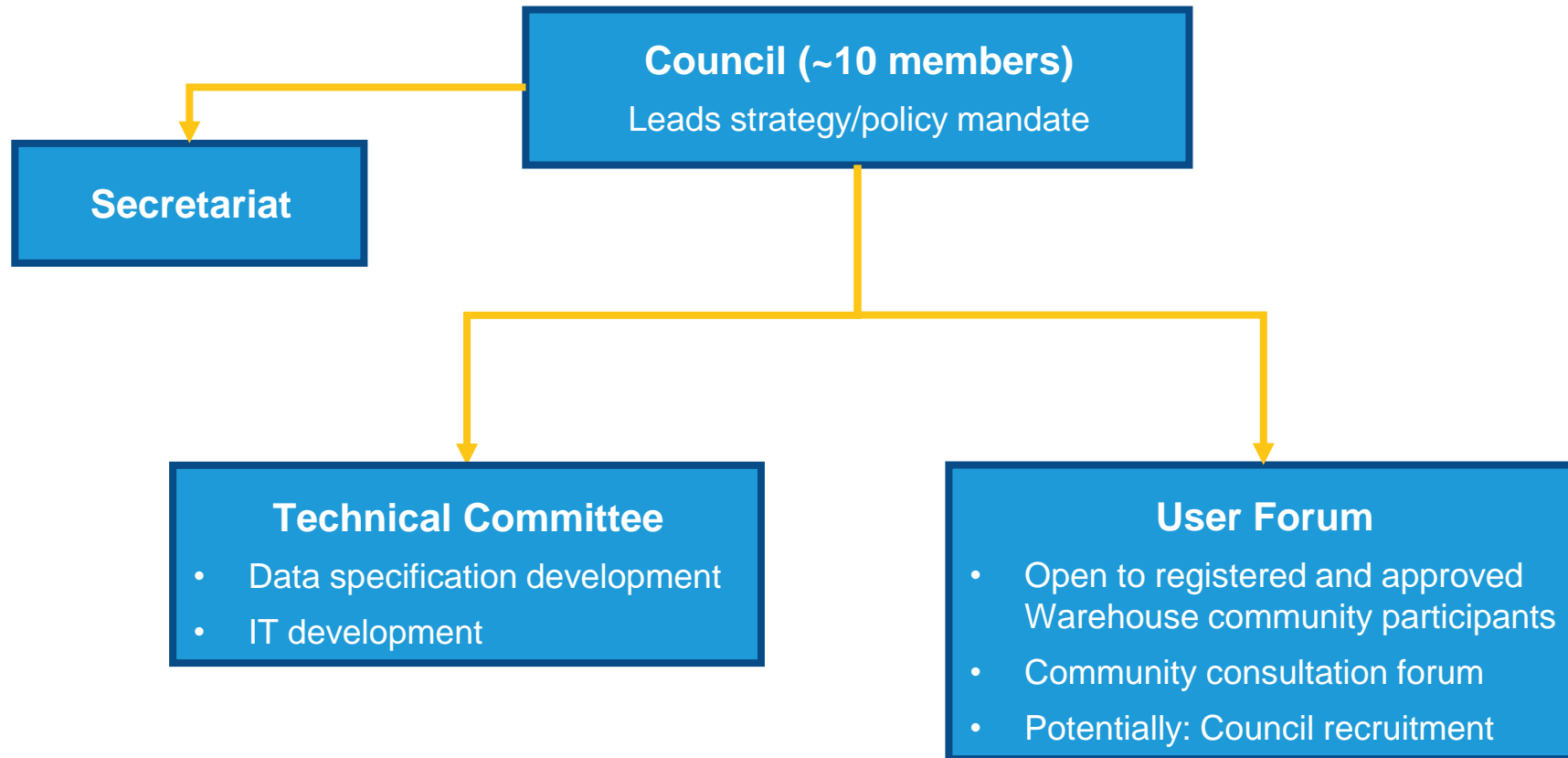# Learnings and working recommendations

Identified priority missions

1. Bring transparency to the market:
   - mitigation outcomes
   - carbon credit lifecycle
   - corresponding adjustments

2. Reduce risk of double counting

3. Enable carbon market services built on comprehensive, real-time data

Recommendations

- Deliver **unified data reporting specifications** for all carbon crediting programmes, potentially as an (inter)national standard

- Encourage **wide programme participation** in the public blockchain to track unit data

- **Efficient, yet consultative governance**: collaboration between governments, VCM standards, and carbon market participants

- Use **grants** to enable a public good service first and aim for **eventual financial sustainability**

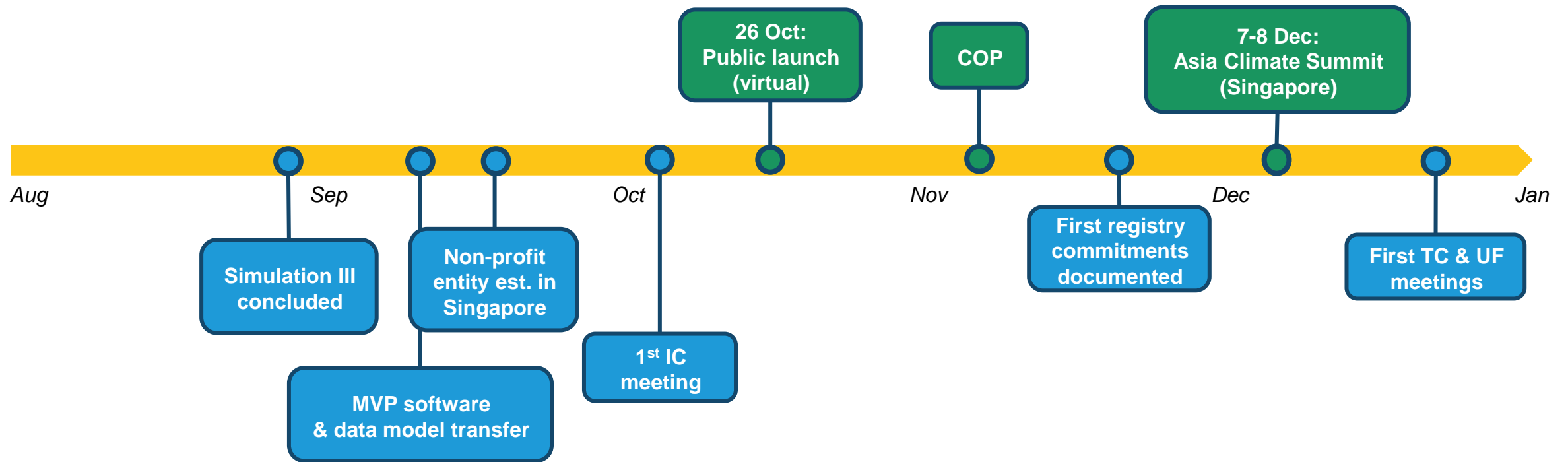# Interim governance structure of the operational Climate Warehouse

Inception	Interim Period	Permanent Governance

Jan 2023

Jan 2025

Council (~10 members)
Leads strategy/policy mandate

Secretariat

Technical Committee
- Data specification development
- IT development

User Forum
- Open to registered and approved Warehouse community participants
- Community consultation forum
- Potentially: Council recruitment

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Next steps

Outlook

	Inception phase 2022	Interim period 2023-2024	Permanent governance 2025 onwards
Governance	• IETA, World Bank, and Singapore Government provide governance and support • IETA provides Secretariat functions • Interim Council recruitment	• Interim Council in charge of strategic decisions and transition to permanent governance • IETA provides Secretariat functions	• Permanent Council elected and Council rotation established • Secretariat transitioned to an independent entity
Priorities	• Establish a legal entity • Fundraising • IT platform handover • Engagement with independent standards • Public launch	• Data specification development • Adoption by independent standards and national registries • Marketing, user adoption	• Further adoption by registries and governments • Build a service layer • UNFCCC reporting interaction • Long-term strategy
Funding	• Grant funding	• Grant funding	• Grant funding • Move to self-sustaining finance

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2022 outlook

Aug   Sep   Oct   Nov   Dec   Jan

**26 Oct:
Public launch
(virtual)**

COP

**7-8 Dec:
Asia Climate Summit
(Singapore)**

**Simulation III
concluded**

**Non-profit
entity est. in
Singapore**

**MVP software
& data model transfer**

**1st IC
meeting**

**First registry
commitments
documented**

**First TC & UF
meetings**

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Thank you