

AI and Blockchain Applications

Driving the Circular Economy



RESOURCE MANAGEMENT WEEK
2024

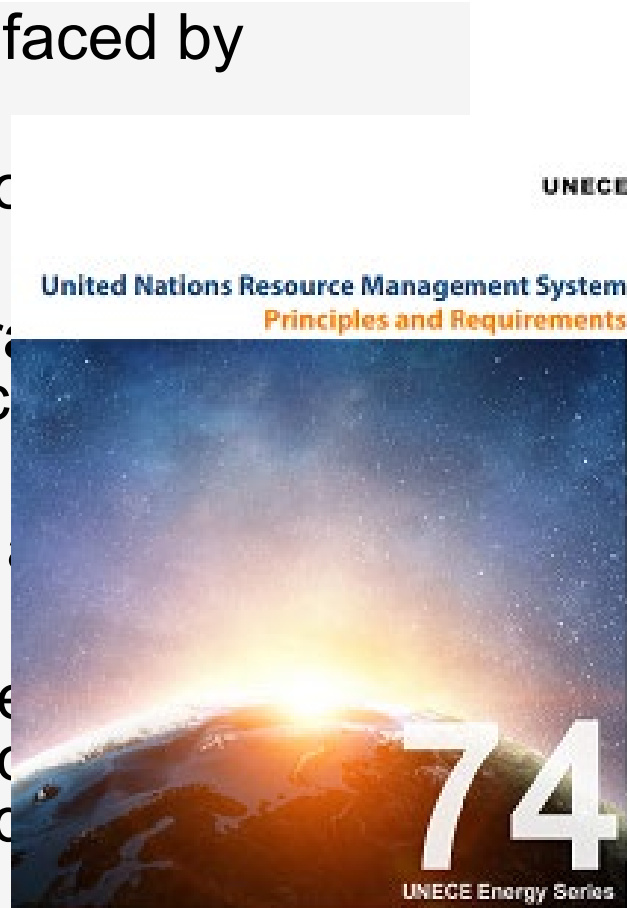


UNECE

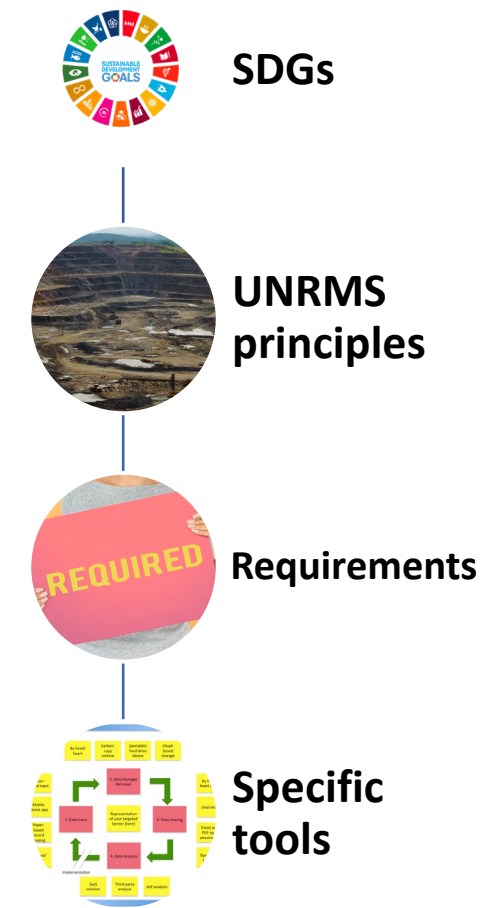
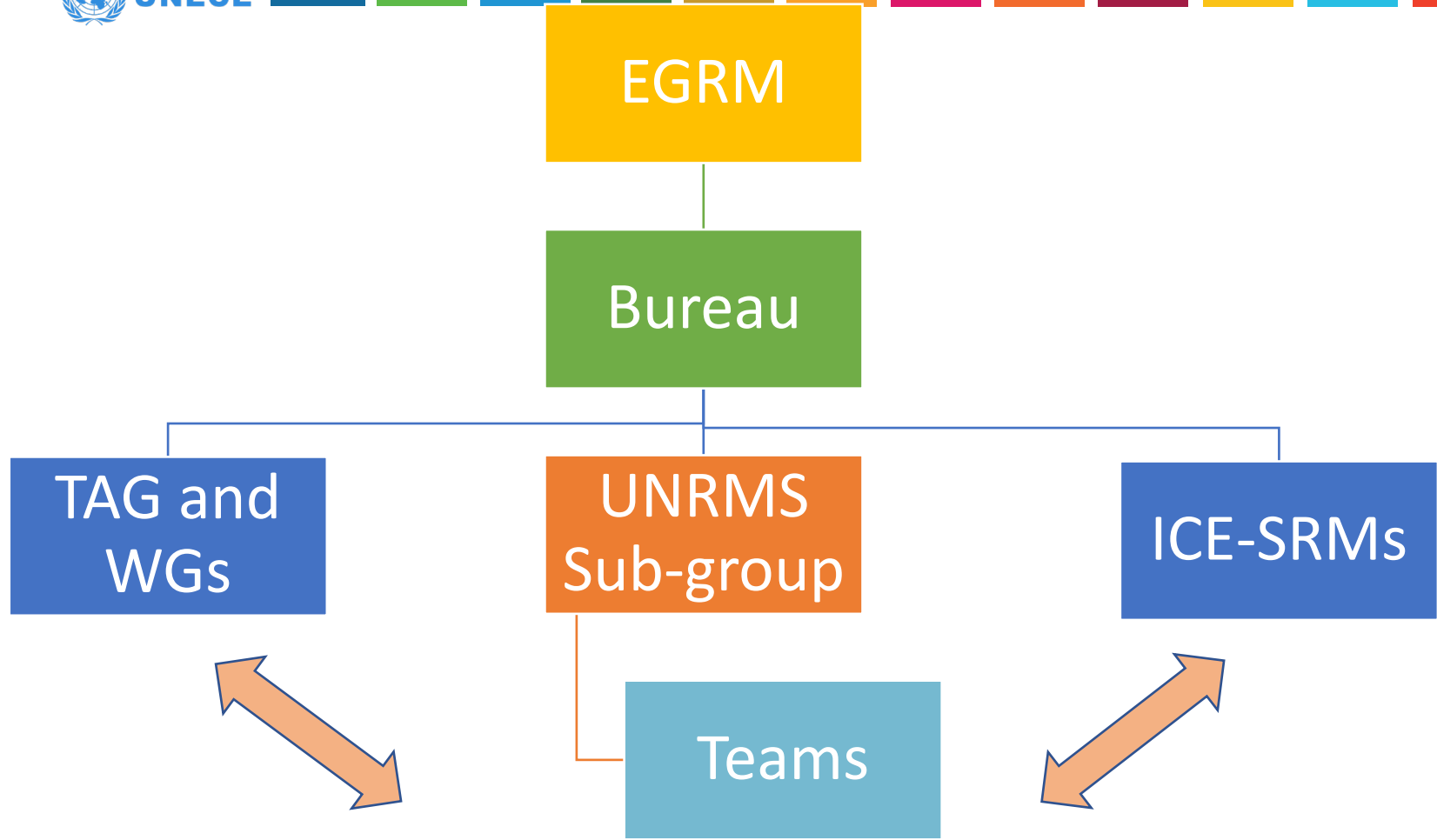
Build Forward Better



- Short-termism is the greatest threat faced by humanity
- It is the present bias that favours short-term gains over long-term rewards.
- Integrated management of the natural resource nexus of food, energy and water is critical for meeting universal needs.
- These resources must be managed in a sustainable way to achieve key SDGs.
- United Nations Resource Management System (UNRMS) provides the right framework for moving from a commodity business to a food and service industry.



UNRMS Development



UNRMS Development process



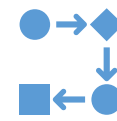
1. Identify a need to respond to UNRMS principles requirements through gap analysis - UNRMS workshops



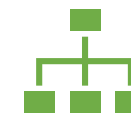
2. Formulate the conceptual solution/tool – Team



3. Test it through case studies, measure the usefulness and get feedback on its usefulness - Team in collaboration in ICE-SRMs



4. Iterate and firm up the tool – Team



5. Review process - UNRMS Subgroup, TAG and Working Groups, EGRM Bureau



6. Formal release for use - EGRM Annual Meeting

UNRMS Fundamental Principles



- State rights and responsibilities in the management of resources;
- Responsibility to the planet;
- Integrated and indivisible management of resources;
- Social contract on natural resources;
- Service orientation;
- Comprehensive resource recovery;
- Circularity;
- Health and safety;
- Innovation;
- Transparency;
- Continuous strengthening of core competencies and capabilities;
- Added value

Deliverables and timelines



1. UNRMS stakeholder survey May – June 2021 **(Completed)**
2. UNRMS Principles, Structure and Guidelines Publication - December 2021 **(Completed)**
3. UNRMS Requirements Template - June 2021 **(Completed)**
4. Development of UNRMS requirements – April 2022 **(Completed)**
5. Template for UNRMS Case studies May 2022 – **(Completed)**
6. Concepts for initial UNRMS tools – April 2022 **(Completed)**
7. UNRMS Principles and Requirements draft for EGRM-13 April 2022 **(Completed)**
8. Public Consultations – September – November 2022 **(Completed)**
- 9. Publication UNRMS: Principles and requirements (2022) December 2022 (Completed)**
10. Approval by UNECE Commission 70th Annual Meeting -19 April 2023 **(Completed)**
11. Approval by ECOSOC late 2023 **(Completed)**
12. UNRMS Tool development by small teams
13. Case Studies Ongoing
14. Workshops planned – **EGRM15 (example)**

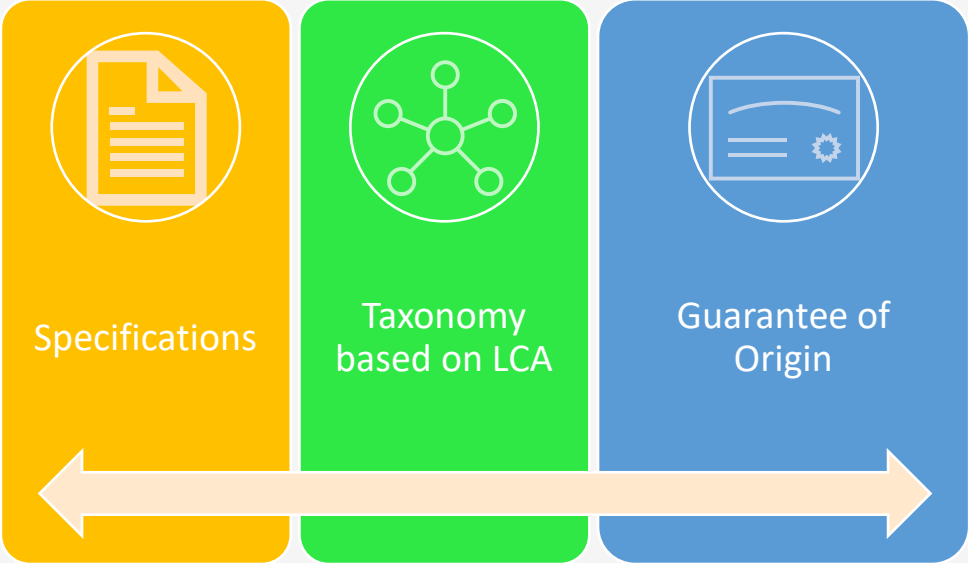
UNRMS primary Priorities



International CRM Dashboard



UNFC and UMRMS H2 Framework



UNFC & UNRMS Toolkit

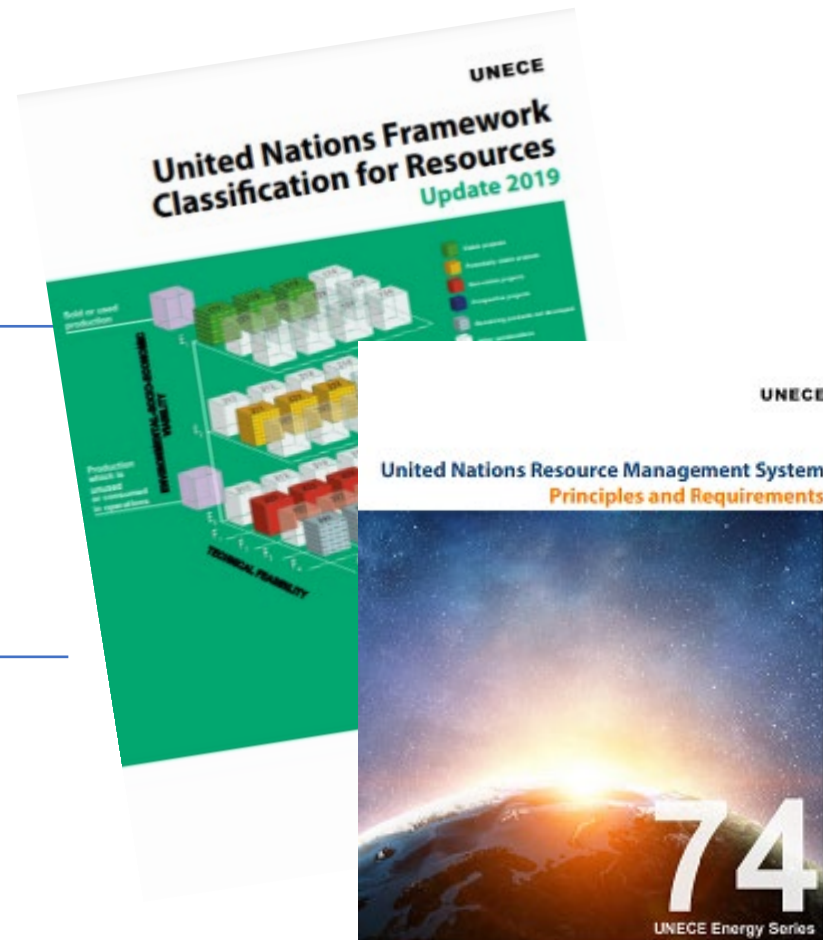
Build Forward Better, Manage Sustainably



Integrated and sustainable management of natural resources is critical to meeting universal needs.

Resources must be managed as a **public good** to achieve key SDGs.

UNFC and UNRMS provide the right information and tools to **manage natural resources**.



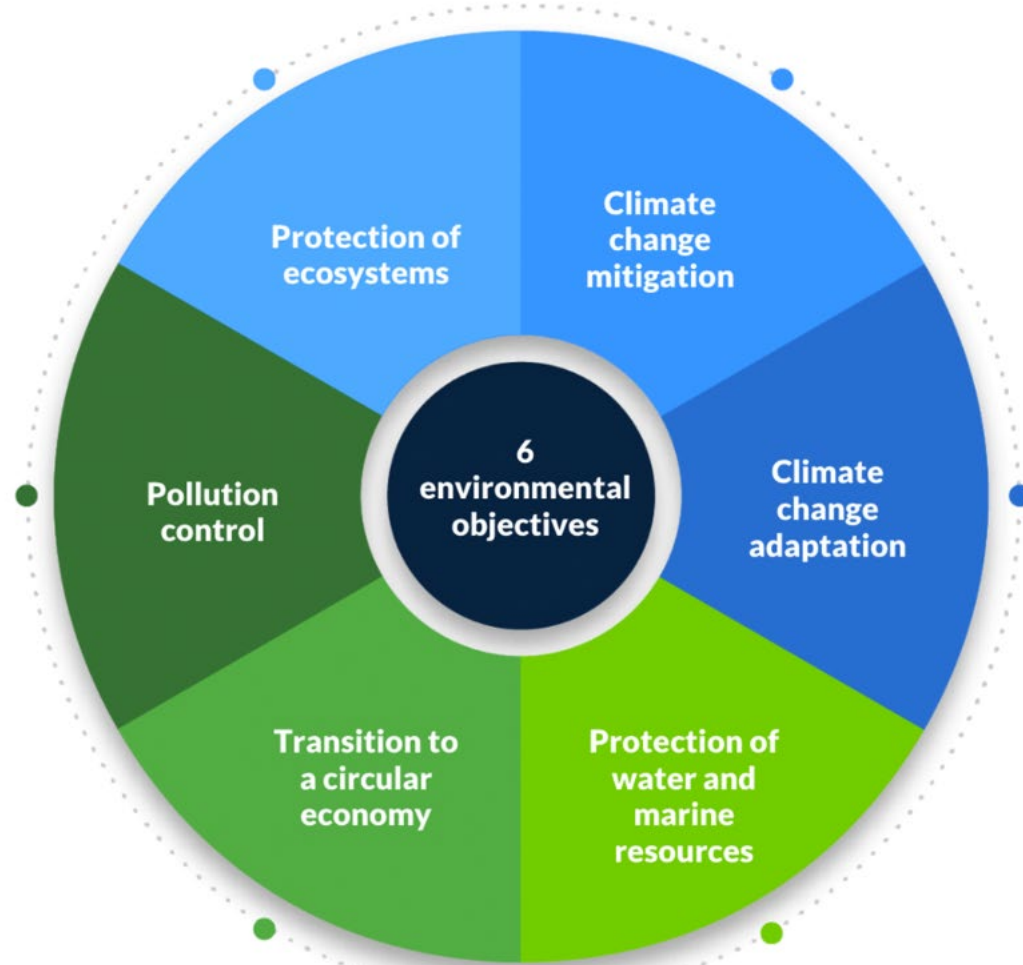
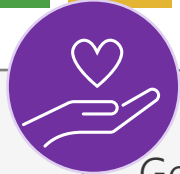
The Earth – The challenges

6 SDG



Changes in the precipitation, **extreme** storms, rising sea levels, coastal inundation and heatwaves directly affect people's security, economic well-being and health.

Current **de**rat Am lea in r by cor the circ

7 million die annually because of **air pollution**, one out of every 10 globally. For many people, water scarcity is a reality.

Geophysical, meteorological, hydrological "natural-loss events" caused approximately \$300 billion in damages. 23 million **people** were displaced.

While we have seen a significant increase in the breadth and depth of environmental challenges and the pace with which they are evolving demonstrates the need for governments, regulators and businesses to adapt more quickly than before. Business as usual is clearly not enough.

Sources:

¹ [A 2017 report](#) from 408 organizations (64 countries) were facing similar supply chain visibility challenges

² [The Tungsten Network Global Study](#) ³ ["The risks of delivering new products and services is driving the need for supply chain visibility"](#) KPMG, 2016

The opportunity - 4th Digital Revolution



See through **smart chains**:
Traditional, linear supply chain nodes are collapsing into a set of **dynamic networks**



Decentralized, sustainable and transparent **Sustainable Resource Management**; crucial for the **Energy** transformation



Raising the funding: new sources of **sustainable, collaborative and transparent finance**. The green bond



Incentivizing **circular economies** (agriculture, natural resources, energy) and **sharing economies**



Transforming carbon and other environmental markets; **CO2 emissions** control. Reduce **inefficiencies in the water sector**



Next generation **sustainability monitoring, reporting and verification**. Plus, automatic disaster preparedness and relief

Climate change and the accelerating need for sustainability are creating challenges for energy, utilities and natural resources companies. That means reinventing business models, redefining markets, incorporating sustainable technologies and delivering new products and services in new ways

SOURCE
1. US CEO Outlook 2017: Disrupt and grow, KPMG, 2017 2. [Aligning the organization for its digital future](#), MITSloan
3. Deloitte University Press: Rise of digital supply network 4. Gartner – Bimodal Supply Chain

Blockchain applications by challenge area



Climate Change

- Peer to peer renewable trading systems.
- Crowd sale for renewable energy investment.
- **Optimized distributed grid management.**
- **Authentication of renewable energy certificates.**
- **Data ledger for optimized transport logistics.**
- **Blockchain based decentralized delivery networks.**
- Peer to peer vehicle sharing.
- Smart parking system for optimized mobility.
- Ledger for collection and verification of ESD data.
- Soil data collation from distributed sensors.
- Blockchain platform for carbon offsetting.
- Waste to Energy blockchain solutions.
- **Blockchain enabled sustainable mining.**
- **Automation data collection for better sustainable accounting.**
- Smart cities and Digital governments.
- Citizen's loyalty and rewards platforms.



Biodiversity and conservation

- **Sustainable trade.**
- **Transparent monitoring of supply chain transactions.**
- **Real time traceability of supply chains.**
- Recording of pesticides use on agricultural land.
- Incentivized system for responsible waste management.
- Digital data platform for species tracking and disease control.
- Timber and other natural resources provenance tracking.
- A decentralized natural asset control.



Healthy Oceans

- **Tracking fish provenance.**
- **Monitoring of illegal fishing**
- Ocean plastic recycling
- **Transparent ledger for faster, safer, efficient shipping.**
- Decentralized collaborative ocean ledger data.
- Real time monitoring of ocean temperature, pH, conditions.
- Fundraising for marine wildlife conservation.
- Collaborative investment in ocean conservation.

Blockchain applications by challenge area



Water Security

- **Water monitoring and management.**
- Micropayments for water meter donations.
- Precipitation monitoring and forecasting.
- Automated crop insurance for drought periods.
- **Water quality control in catchment areas.**
- **Blockchain enabled peer to peer trading of excess water resources.**
- Blockchain enabled smart meters.
- Asset based token for clean drinking water.
- **Local water data for monitoring water quality.**
- **Efficient water treatment systems.**



Clean Air

- Air pollutant data collection from distributed sources.
- Automated activation of air –filtration devices.
- Local and real-time monitoring of particles.
- Intelligent methane monitoring system.
- EV / AV safe and reliable blockchain implementation with cryptocurrency payments.
- **Early detection of chemical leaks.**



Weather and Disaster Resilience

- Ledger to identify, verify and tract weather data.
- Enhanced distributed emergency disaster response.
- Disaster recovery funding.
- Decentralized disaster insurance platforms.
- Automated management in response to extreme weather event.
- Crowdfunding
- Decentralized weather sensors generating automated alerts.
- **Decentralized mini-grids** improving disaster resilience.

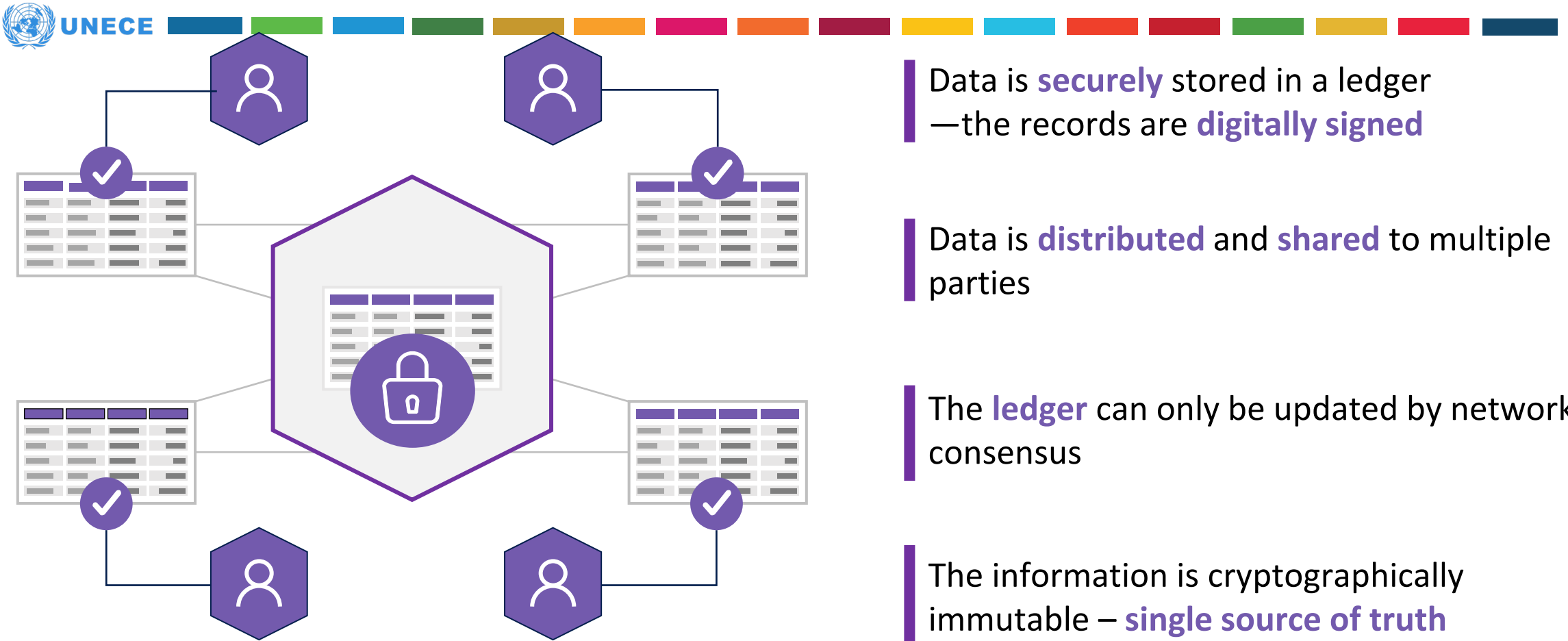


UNECE



What is Blockchain? And Why?

Blockchain is a secure, shared distributed ledger



Data is **securely** stored in a ledger
—the records are **digitally signed**

Data is **distributed** and **shared** to multiple parties

The **ledger** can only be updated by network consensus

The information is cryptographically immutable – **single source of truth**



Ways to create trust across organizations

1 Intermediaries

- Increases total cost (transaction cost)
- Adds complexity to business process
- Reduces direct contact between parties

2 Manual verification

- Increases total cost (human resources)
- Is more prone to errors
- It usually takes time to ensure that records are complete and accurate



Consensus Mechanism


- Verification mechanism to make decisions in the consortium about the existing transactions.
- Transactions are broadcast to the entire network to be verified in each node.
- All parties agree to accept by network-verified transactions.





3 Top Benefits Categories

Increase Efficiency



- **Reduce the cost** of a complete record of every transaction
- **Data is available electronically** only involved parties in real-time
- Enable **data and documents to be stored securely**.
- Enable **end-to-end transaction management** consolidating input from all parties

Mitigate Risks



- **Reduced security threats** from fraud, and data manipulation
- Build **audit trail on terms, funds and client records**
- **Eliminates single point of failure** for data storage.
- **Regulated level of access for all parties**, protecting data from unauthorized access

New Value-Added Services



- Transparency creates trust and **increases business speed**
- Automate **financing workflows** with alerts on key events
- **Consolidated view of assets consumption and availability**
- **Global Digital identity for all parties** to support new trade relations



How to determinate if blockchain is appropriate?

Is this a business process that crosses trust boundaries?

Do multiple parties work off of the same data?

Are there any intermediaries that control the single source of the truth?

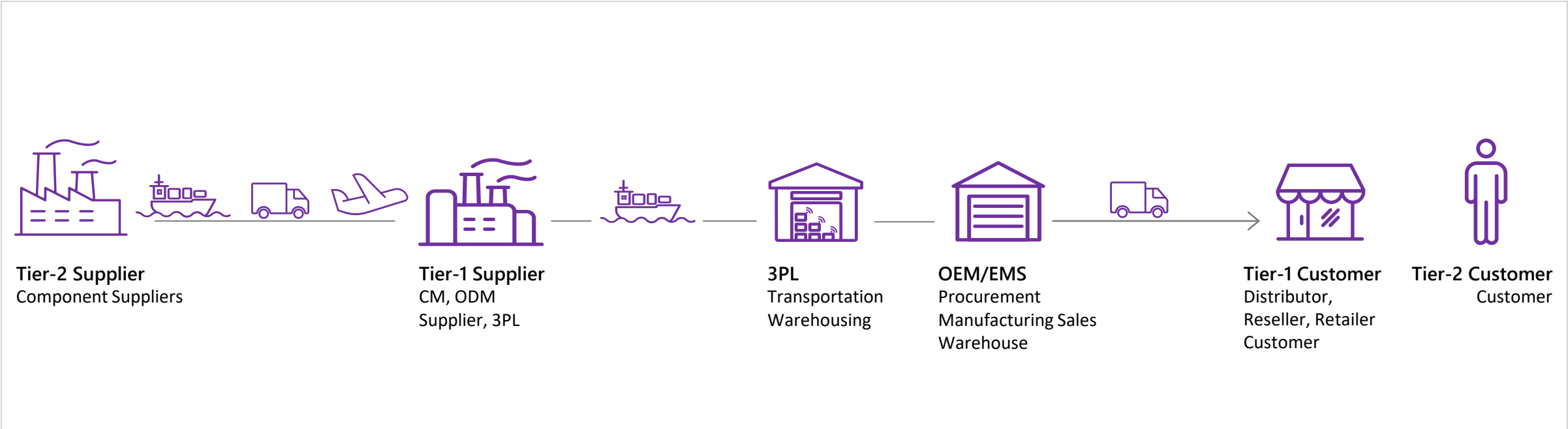
Does the process involve low-value, manual verification steps?

Paper Trade
Data & Contract
Privacy between
suppliers



The Earth – The Blockchain Opportunity.

Key capabilities for Decentralized Supply Chain



<p>Integrated activities and data across functional line driving productivity and operational resiliency</p>	<p>Partner and Supplier visibility and collaboration driving effective engagement</p>	<p>Innovation capabilities in developing new products, process and services</p>	<p>Data driven approach for developing differentiated supply chain and risk management strategies</p>	<p>Customer, product or services insights and collaboration to increase value proposition</p>
<p>Cost Reduction</p>	<p>Improved Performance</p>	<p>Sustainable Growth</p>	<p>New Models</p>	<p>Customer Experience</p>

Intelligent Supply Chain



UNECE

Connect and Visualize the Supply Chain



Supply Chain Visibility

- Cloud-based tracking and visibility
- Real-time availability of Supply Chain data & synchronized IT systems
- SAP on Azure

Predict and Mitigate Disruptions



Remote Monitoring & Predictive Analytics

- Exception based
- Predictive Notifications
- Intelligent recommendations

Democratize and Secure Value Chain Information



Blockchain

- Provenance
- Traceability
- Smart Contracts
- Payments

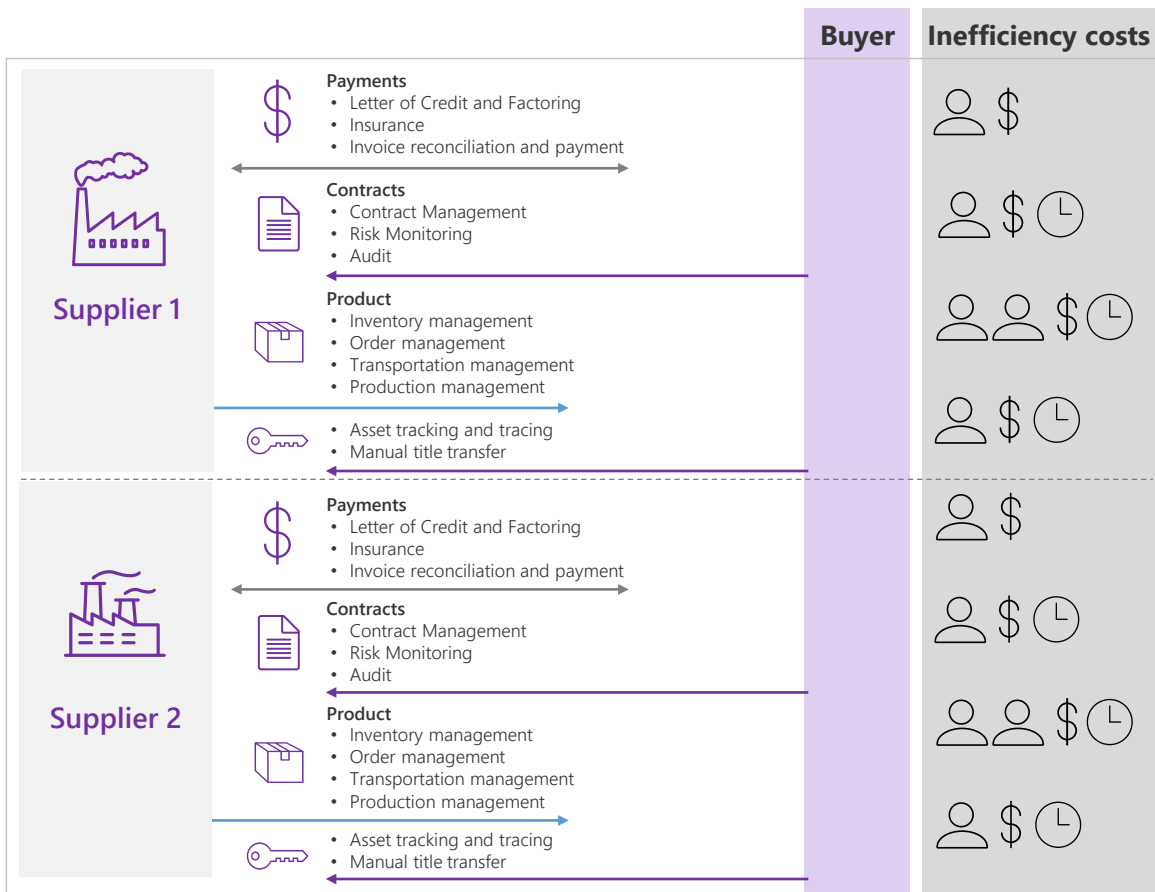
Optimizing the Supply Chain

Current Supply Chain

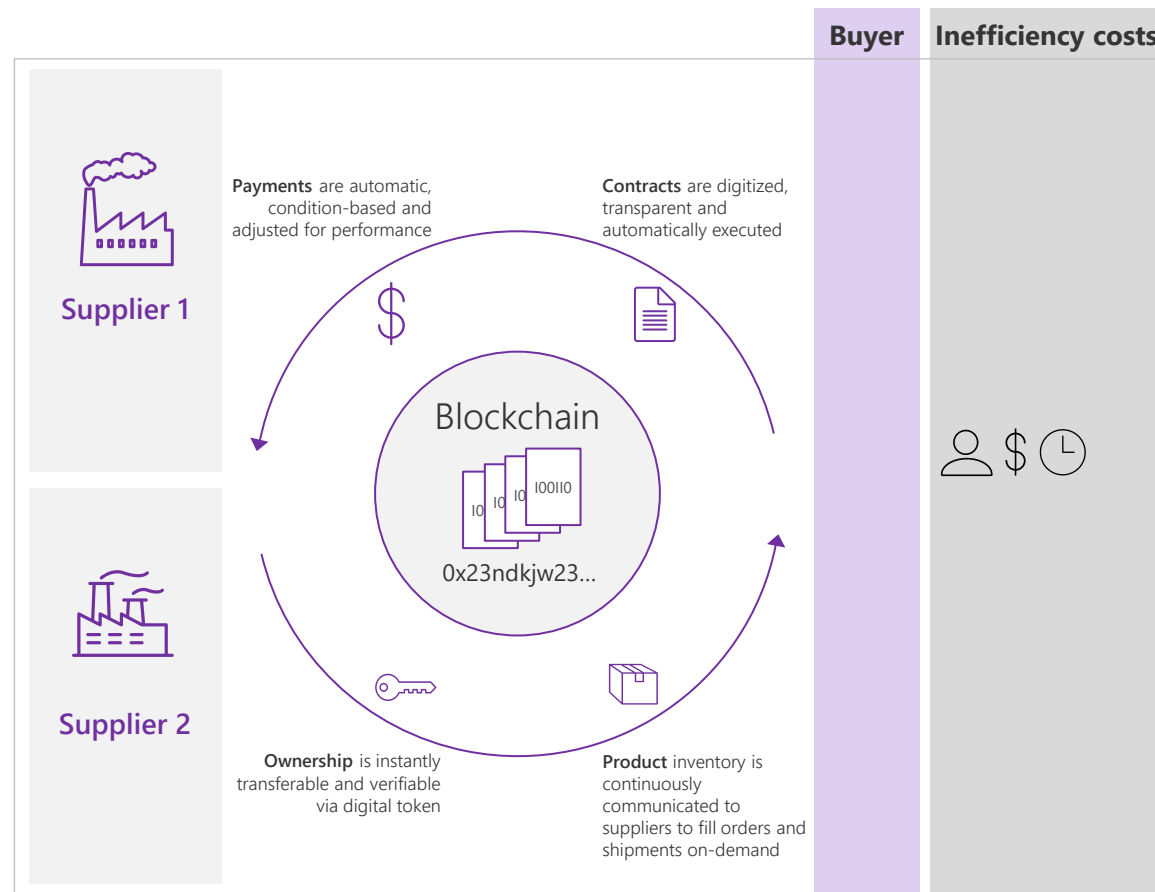
Manual Opaque Inflexible

Blockchain-enabled Supply Chain

Automated Transparent Scalable



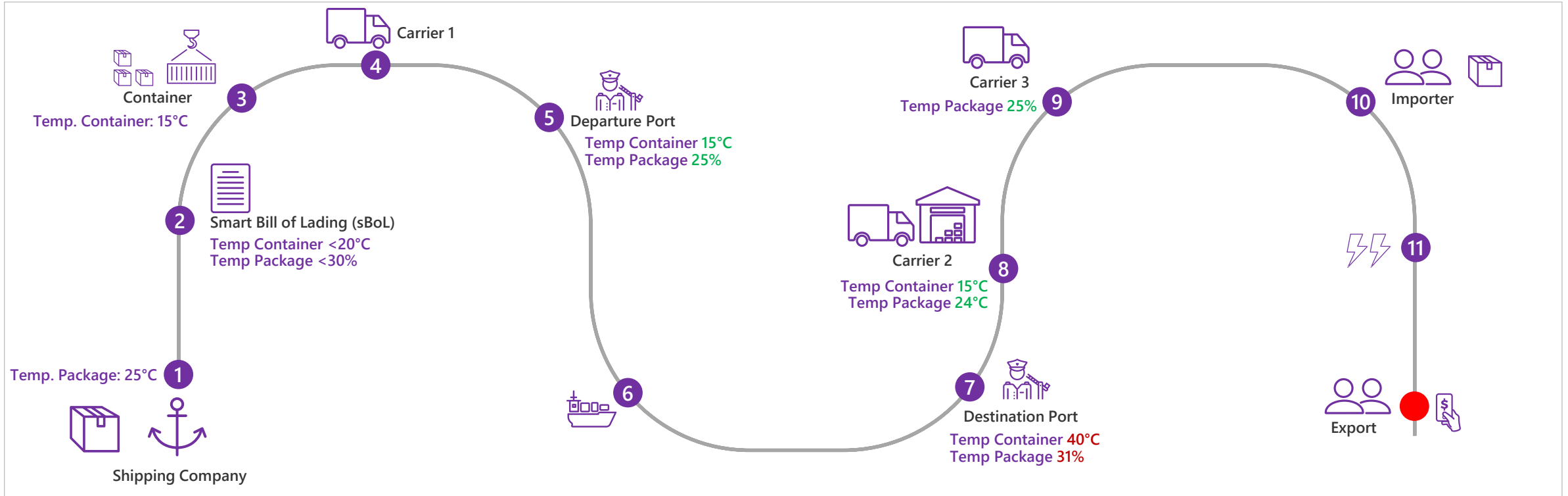
- Processes are inefficient and must be replicated for each supplier
- Processes are not adaptable to market, environmental or supplier changes
- Processes require substantial overhead to support
- Processes reduce ability to fully optimize inventory levels



Blockchain enables deep integration of supply chain operations and financing:

- Optimize sourcing through automation
- Enable supply chain execution transparency
- Mitigate supplier risk
- Increase sales through better planning
- Reduce inventory costs
- Reduce overhead costs
- Free up working capital

Supply Chain Collaboration (Blockchain with IoT)



- 1** The shipment company receive the package from the exporter
- 2** Document issued by shipment company which details a shipment of merchandise, terms for refund, and gives title of that shipment to a specified party. Example, the package has to be maintained at:

- 3** The package is stored in an IoT enabled container to collect data on the conditions of shipments
- 4** A carrier delivers the container to the port
- 5** Container check-in to the departure port where the sBoL and the container's content is reviewed

- 6** A cargo ship delivers the container
- 7** After receiving the consensus from all the trusted members, the customs certificate gets added to the blockchain
- 8** The carrier 2 deliver the container to the warehouse

- 9** A carrier 3 pick the package from the warehouse and deliver it to the Importer
- 10** Package delivered successfully
- 11** Due to the conditions of shipments doesn't meet the agreement, a refund for damaged party is self-executed without the need for litigation or any human intervention

Why blockchain? Benefits

1

Automation, Operational simplification and improve efficiency

Blockchain reduces manual efforts required to perform reconciliation and resolve disputes. Also may improve efficiency due to the self-executing nature of the Enterprise Smart Contracts.

2

Improved Transparency

By bringing security and transparency in transactions, blockchain creates digital trust and activates near real-time monitoring of the procurement activity between the parties what provides deeper engagement by different stakeholders

3

Fraud and corruption minimization

Blockchain implements asset provenance and full transaction history to be established with a single immutable source of truth. Reduces fraud related to data integrity.

4

Clearing and settlement time reduction

Blockchain disintermediates third parties that support transaction verification and accelerates settlement.

5

Increase traceability

Increase traceability of material supply chain to ensure corporate standards are met and eliminate losses from counterfeit/gray market trading

6

Digitalization and compliance

Improve visibility and compliance over outsourced contract manufacturing reducing paperwork and administrative costs

Why do we need traceability in a value chain?

Impacts of EU Taxonomy on Circular Economy Adoption

- How does the EU Taxonomy framework influence the adoption of circular economy principles within various industries?
- What are the key barriers and drivers for companies in aligning their operations with EU Taxonomy requirements for circularity?

Circularity Metrics and Indicators :

- What are the most effective metrics and indicators for assessing circularity within different stages of the value chain, as defined by the EU Taxonomy?
- How can these metrics be standardized and integrated into existing reporting frameworks to ensure comparability and transparency?

Value Chain Optimization for Circular Economy :

- How can the principles of the circular economy be integrated into value chain optimization strategies to maximize resource efficiency and minimize waste?
- What are the trade-offs and synergies between circularity objectives and other value chain priorities such as cost efficiency and product quality?

Why do we need a value chain?

Policy and Regulatory Frameworks

- How do existing policy and regulatory frameworks, including the EU Taxonomy, influence circularity practices within the value chain?
- What additional policy measures or incentives are needed to accelerate the transition towards a circular economy, as defined by the EU Taxonomy?

Circular Supply Chain Resilience

- How does circularity impact the resilience of supply chains to disruptions such as raw material shortages or regulatory changes?
- What strategies can companies adopt to enhance the resilience of their supply chains while advancing circular economy objectives?

Stakeholder engagement and Collaboration

- What are the roles and responsibilities of different stakeholders (e.g., governments, businesses, consumers) in advancing circularity within the value chain?
- How can stakeholder engagement and collaboration be effectively leveraged to address challenges and drive progress

Why do we need traceability in a value chain?

- **Transparency and Immutability:** Blockchain provides a transparent and immutable ledger where all transactions and changes are recorded. This feature ensures that all stakeholders have access to the same information, reducing the possibility of fraud or manipulation. In resource management systems, this transparency can be crucial for tracking the allocation and usage of resources accurately.
- **Decentralization:** Traditional resource management systems often rely on centralized authorities to oversee transactions and data management. Blockchain, however, operates in a decentralized manner, eliminating the need for a central authority and distributing control among all participants in the network. This decentralization can lead to greater efficiency, reduced costs, and increased trust among stakeholders.
- **Smart Contracts:** Smart contracts are self-executing contracts with the terms of the agreement directly written into code. These contracts automatically enforce and execute the terms of an agreement when predefined conditions are met. In resource management systems, smart contracts can automate various processes such as resource allocation, verification, and payment, streamlining operations and reducing the need for intermediaries.

Why do we need traceability in a value chain?

- **Security:** **Blockchain technology employs cryptographic techniques to secure transactions and data, making it highly resistant to tampering and unauthorized access.** This security feature is particularly valuable for resource management systems, where sensitive data about resource allocation, utilization, and ownership needs to be protected from cyber threats and unauthorized manipulation.
- **Traceability and Audibility:** **Blockchain's transparent and immutable nature enables comprehensive traceability and audibility of transactions and data.** This capability allows stakeholders to track the flow of resources throughout the entire supply chain or lifecycle, ensuring compliance with regulations, verifying sustainability practices, and facilitating audits.
- **Tokenization:** **Blockchain facilitates the tokenization of assets, representing real-world resources as digital tokens on the blockchain. These tokens can be traded, exchanged, or transferred easily and securely, enabling new forms of resource ownership, investment, and monetization.** In resource management systems, tokenization can unlock liquidity, improve asset utilization, and enable innovative business models.

Where we are?

The BiTA Community



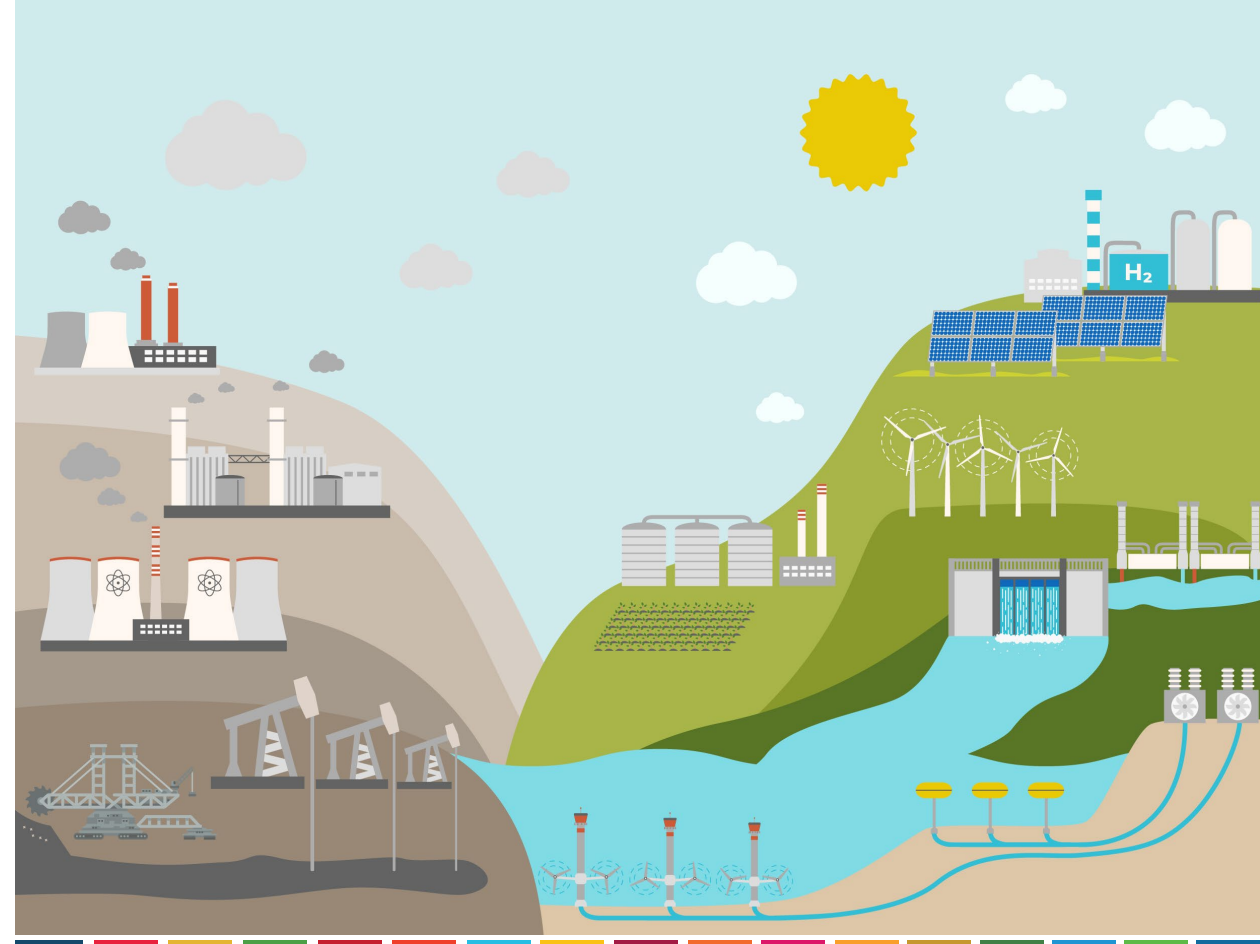
THE VIEWS EXPRESSED ARE THOSE OF [Teresa Ponce de Leão / Jairo Romo] AND DO NOT NECESSARILY REFLECT THE VIEWS OF THE UNITED NATIONS.

Thank you!

Teresa Ponce de Leão
Vice-president EGRM / Chair sub-group UNRMS

UNECE

Date 23 | 04 | 2024, Geneva



RESOURCE MANAGEMENT WEEK 2024



UNECE