Responsible Business Transparency Protocol (RBTP)

Handbook

Version 1

September 2025

Executive Summary

Companies face increasing pressures for verifiable supply chain data & material traceability across supply chain resilience & risk management, heightened ESG & sustainability regulatory and disclosure requirements, and expanding customer expectations for supply chain data transparency. However, these requirements are difficult for companies to meet due to system fragmentation for supply chain data, low data quality, trade & legal confidentiality concerns, and reporting fatigue in fulfilling duplicative requests for similar information.

The Responsible Business Transparency Protocol (RBTP) is a UN-recognized data exchange framework developed by the Responsible Business Alliance (RBA). Built on the UN Transparency Protocol (UNTP) and W3C verifiable credentials, it enables verifiable, portable, and interoperable supply chain data exchange across the automotive, electronics, and related sectors. As a protocol-based approach, rather than a platform, the RBTP ensures data is portable, tamper-evident, and comparable across systems and schemes as companies pursue expanded supply chain transparency.

The RBA is digitizing its assessment schemes, including the Responsible Minerals Assurance Process (RMAP) and Validated Assessment Program (VAP), into the RBTP and mapping its tools, such as the RMI Mineral Reporting Templates (CMRT/AMRT) and emissions management tool (EMT), into the Protocol. The RBA is also hosting a Reference Implementation where companies can test data exchange scenarios with the RBTP and participate in individual company or collaborative pilots. Practical examples of how the RBTP can be used to issue a product passport, trace materials from an OEM to a mine, etc. are already available in the RBTP Knowledge Base. As RBA addresses known data-sharing complexities and challenges in upcoming pilots, the Handbook will be iterated with lessons learned and solutions to identified challenges.

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1 About this Handbook

This Handbook is designed to provide an overview of the core concepts, architecture and implementation considerations for the Responsible Business Transparency Protocol (RBTP) for internal teams at Responsible Business Alliance (RBA) member companies and their suppliers. In view of the drivers underlying increased need for supply chain data transparency & a review of the technology landscape, the RBA determined that a protocol approach to enabling the interoperable exchange of verified, trusted data best met company needs while offering the flexibility needed to address core challenges to scaling any solution for supply chains.

Context & Drivers

Global supply chain expectations have outpaced the ability of many organizations to ensure consistent, verifiable data exchange across supply chain actors, a necessary precursor to meeting heightened customer and regulatory requirements for supply chain transparency and traceability. As businesses seek enhanced supply chain transparency, they encounter significant barriers including:

- *System fragmentation* - multiple supply chain data management systems already in use at companies and often multiple different systems used within the same company
- *Data quality* - data received from supply chain is often self-reported and not verified; manual work to pull and input data across different platforms also produces data errors that are then passed along the supply chain
- *Reporting fatigue and duplicative requests for similar information* – expanding ESG reporting requests requires companies to enter often overlapping sets of data into different systems or report templates, requiring significant resources to respond
- *Trade & legal confidentiality concerns* – business concerns with data disclosure complicate getting necessary suppliers to all join a preferred technology platform for data-gathering

Without shared standards and trusted mechanisms for verifying information, supply networks struggle to operate efficiently, transparently, or at scale to meet heightened business needs

Lessons Learned and Guiding Principles

After surveying the existing landscape of supply chain transparency & traceability solutions (refer to Appendix 6.2) and conducting member consultations to understand the largest barriers to traceability, the RBA and its membership collectively determined that, rather than offer yet another platform solution, we needed to instead lay a foundation for supply chain due diligence and n-tier visibility. This foundation begins with building and aligning the core data standards and exchange framework within our supply chains and adjacent industries, and the RBA has outlined important guiding principles for a successful solution to known challenges:

- Sovereign systems, i.e. not all data will live in a single system and the best place for data to be located is with its owner
- Platform agnostic
- Data security
- Data portability
- Data comparability
- Flexibility for industry customization
- Leverage what data, standards, solutions etc. already exist
- Approach with highest potential for uptake across the supply chain

After review of potential approaches to supply chain transparency that met these guiding principles, the RBA opted to create the Responsible Business Transparency Protocol (RBTP), which is an industry extension of the UN Transparency Protocol (UNTP). As the RBA and companies in the supply chain test and implement the RBTP, this Handbook will be updated with additional lessons learned, implementation examples and other practical considerations for companies and their suppliers.

2 Overview of UN Transparency Protocol (UNTP)

2.1 UNTP Introduction

The overarching protocol upon which the RBTP is based, the UN Transparency Protocol (UNTP) provides a standardized way to access digital and verifiable upstream supply chain data about both products and facilities. Unlike a specific traceability technology platform, UNTP is a standard protocol which supports consistent data exchange between all actors in global value chains irrespective of their individual technology choices. This "protocol over platform" approach is designed to provide a more scalable solution to n-tier traceability and transparency than one that depends on multiple actors choosing the same platform. The banking industry provides a useful analogy: every business chooses their own bank, but payments still flow between any two businesses because there is a global inter-bank payments standard called SWIFT (ISO-20022). The UNTP is to ESG data exchange what SWIFT is to banking data exchange.

The UNTP is overseen by the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), which provides trade facilitation recommendations and serves as a focal point for electronic business standards. The UNTP was launched as UN/CEFACT's official implementation of its Recommendation 49, and it is being piloted in the construction and agricultural industries, with new industry extensions announced for the battery and copper industries.

The role of UNTP is to gather supply chain data, collect it into internal enterprise systems, and then make it available to downstream customers, investors, and regulators. It provides a standard way to enable the necessary pre-conditions – standardized, verifiable and portable data - for traceability, and to discover and pull ESG performance data from a global supply chain of any size.

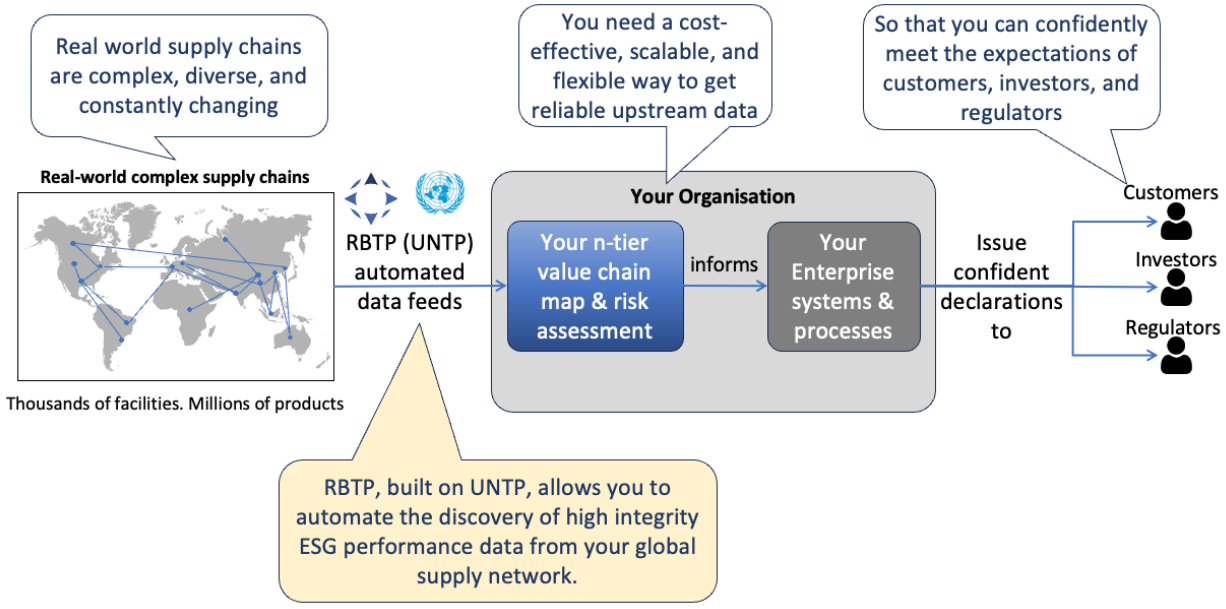


Figure 1 - The purpose of UNTP / RBTP

After review and information that will be provided in the following chapters, the UNTP model best meets RBA's guiding principles for a solution to enabling exchange of verified, trusted data between supply chain actors:

Guiding Principle	UNTP/RBTP
Sovereign systems, i.e. not all data will live in a single system and the best place for data to be located is with its owner	Data protocol; does not require data to live in a single system
Platform-agnostic	Any existing platform can be adapted to exchange UNTP-aligned data
Data security	Data can live within its owner's system and security dictated by that system
Data portability	Data is portable between systems that can exchange UNTP-aligned data
Data comparability	Different data sets, sources, etc. aligned to UNTP format can be compared more readily
Flexibility for industry customization	UNTP industry extensions allows for industry customizations
Leverage what data, standards, solutions, etc. already exist	UNTP built off of existing W3C verifiable credentials, existing traceability solutions and data sets can be aligned to UNTP
Approach with highest potential for uptake across the supply chain	Actors maintain sovereignty over their data and are not mandated to join a particular platform or solution

2.2 UNTP Core Concepts & Vision

Within the UNTP data framework, each party publishes data about their products and facilities and can link independent assessments to any sustainability or ESG claims they are making about them. The party makes the data discoverable from the product or facility identifiers, and each party retains sovereignty over their data and determines what level of information is discoverable to a particular requestor. The data is then verified by the buyer/requestor, both digitally and commercially. The data includes references to other products and facilities so that a series of links can be found and followed to create a supply chain map.

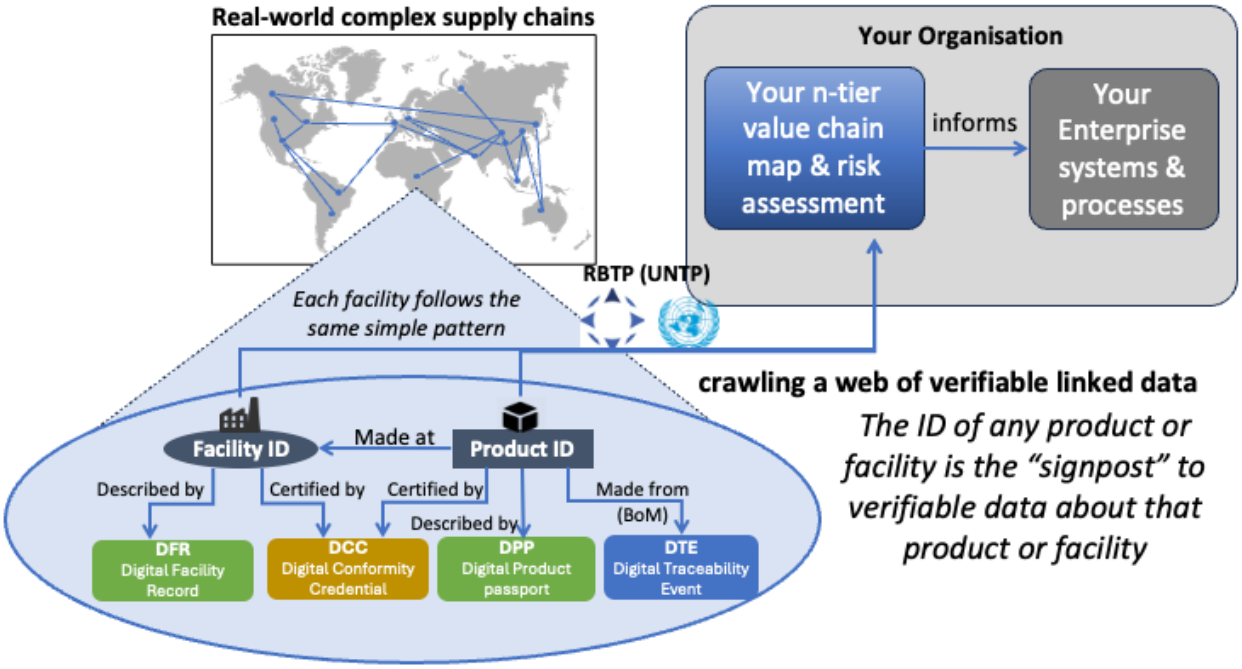


Figure 2 - Identifiers as the signpost to verifiable data

An example, from the RBA reference implementation with the RBTP extension, of how this would apply for a battery product in a laptop:

- A battery arrives at an electric computer manufacturing facility. A barcode on the battery can be resolved (using the UNTP Identity Resolver standard) to a web URL that returns a verifiable digital battery passport that includes ESG performance data about the battery.
- The computer manufacturer will create a laptop passport that includes the facility identifier of the factory that produced the laptop so the same "follow the identifier"

process can be used to get the Digital Facility record that includes the ESG performance data about the facility.

- The laptop passport also references a bill of materials that includes the material identifiers of the battery components including the laptop screen, keyboard, case, etc. The same identifier -> data process repeats to find the product passports for the input materials and then data about the fabrication facility the produced them.

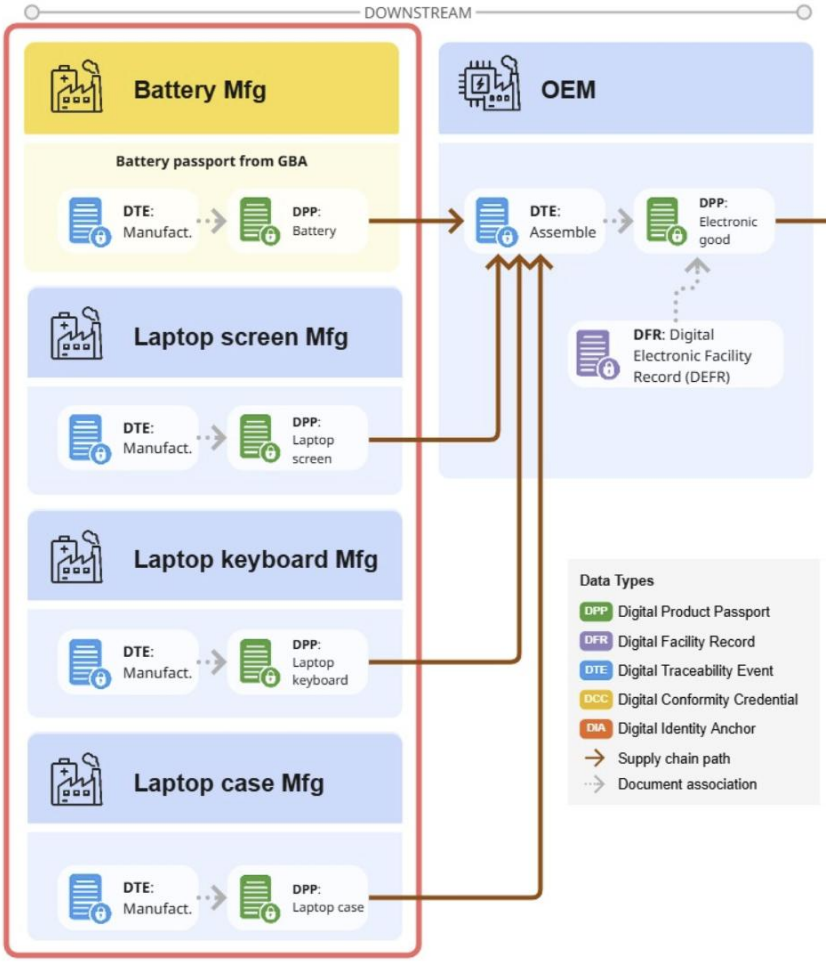


Figure 3 - Sample supply chain map with a simple HBOM

This pattern of discovering data that companies have published about their products and facilities can be repeated as far as the data allows or until an entire value chain map such as the example below is discovered.

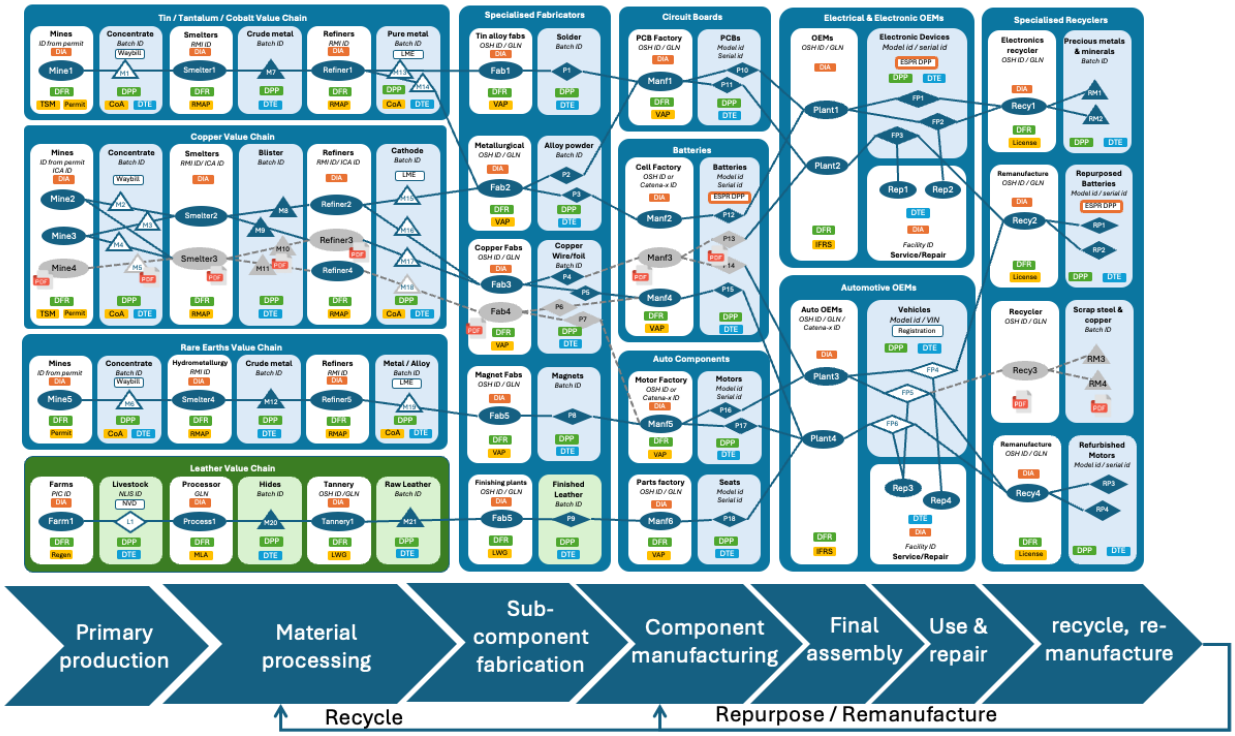


Figure 4 - A typical complex value chain

A larger printable version of the figure above can be found the [RBTP Knowledge Base.]

Each company publishes data about their products and facilities independently by using any UNTP-conformant software system. No customer needs to force a supplier to use a specific system or tool, and there is no need for system-to-system integration because data is linked via product and facility identifiers. These identifiers are usually already known to buyers and suppliers.

UNTP has been designed as a “minimum common core” that applies to all industry sectors. However, to operate effectively within a sector, UNTP should be extended to meet sector-specific needs. For example, the agriculture sector may extend the UNTP digital product passport to become a digital livestock passport. Similarly, there will be specific needs for the electrical, electronic and automotive parts sectors that are not covered by the UNTP core specifications. The UNTP defines an extensions governance framework that ensures all extensions are technically conformant with the UNTP core and are governed in accordance with UN open development standards.

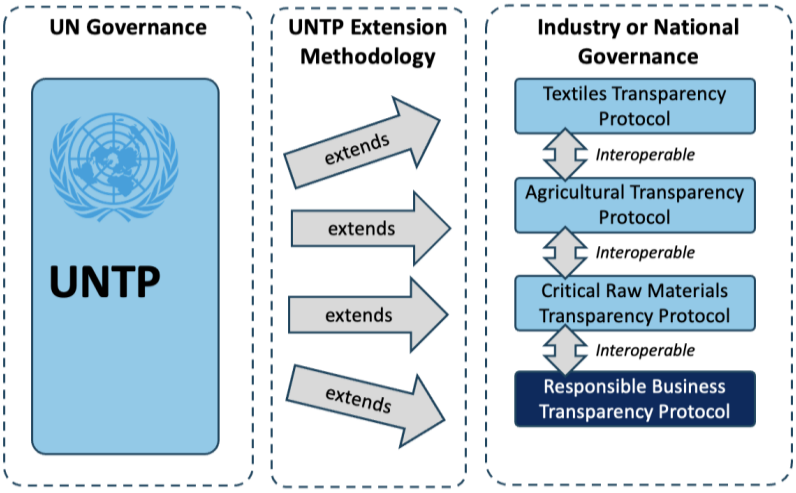


Figure 2 - UNTP Extensions model

2.3 UNTP Core Architecture

The United Nations Transparency Protocol (UNTP) is a collection of 12 loosely coupled specifications grouped into five pillars as shown in **Error! Reference source not found.**. The prior sections focused on "The DATA" component of UNTP, this section elaborates on the other components to provide a complete picture of how the protocol works.

- **The DATA**: These four components are the simple building blocks described in section 2.2. The product and facility information issued by producers, the conformity attestations issued by trusted independents, and the provenance/traceability data represented by bill of materials.
- **FIND the data**: The discovery protocol for finding data given a product ID or facility ID. Supports both registry-based identifiers (e.g. GS1 GTINs) as well as self-issued identifiers.
- **SECURE the data**: The technical protocols for data integrity, identity integrity, and confidentiality.
- **UNDERSTAND the data**: A framework for scheme owners to publish their sustainability scheme criteria in such a way that they can be uniquely and unambiguously referenced.
- **VALUE the data**: Comprising the individual level, community level, and global level business value proposition and performance measurement framework for UNTP implementation.

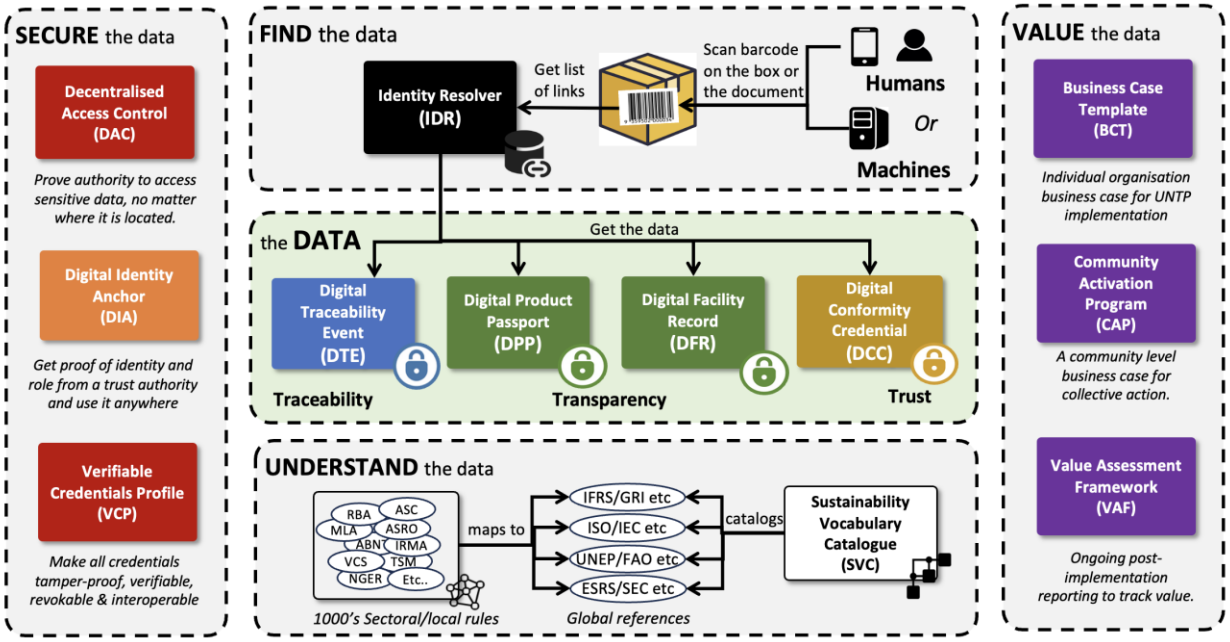


Figure 5 - UNTP Core Architecture

The sub-sections below summarize the purpose of each UNTP component by supply chain role.

2.3.1 Data Issuing and Verification by Supply Chain Actors

Actors in the supply chain that materially impact the lifecycle of products (e.g. miners, refiners, fabricators, manufacturers, OEMs, recyclers) would consume Digital Product Passports (DPPs), Digital Facility Records (DFRs), and Digital Traceability Events (DTEs) from their suppliers and would, in turn, issue DPPs, DFRs, and DTEs for their customers:

- **Digital Product Passports (DPPs)**: Standardized form for suppliers to share data for individual products or batches. The DPP can be used as a consistent message format for a wide variety of data.
- **Digital Facility Records (DFRs)**: Digital profiles of manufacturing and production facilities. These are shared by the manufacturer about locations where the products are produced.
- **Digital Traceability Events (DTEs)**: Records of supply chain movements and transformations. This enables suppliers to connect their upstream suppliers' DPP's and DFR's to the products that they are producing. DTEs created across n-tiers can enable a full traceability picture to be drawn.

2.3.2 Conformity assessment bodies add proof of claims in DPPs and DFRs

- **Digital Conformity Credentials (DCCs)**: Third-party verification of compliance with sustainability and due diligence standards. This enables suppliers to prove the claims they are making about their products (in DPP's) and facilities (in DFR's) by linking the DCCs to the claims that are made in DPP's and DFR's via deterministic links in a Sustainability Vocabulary Catalog (See SVC definition below). Conformity scheme owners clarify the rules.
- **Sustainability Vocabulary Catalog (SVC):** Allows conformity scheme owners—such as certification bodies, regulators, or industry groups—to publish their sustainability rules, criteria, and definitions in a machine-readable, unambiguous format. The SVC allows claims made in Digital Facility Records (DFRs) and Digital Product Passports (DPPs) to be directly proven by third party verification published in Digital Conformity Credentials (DCCs).

2.3.3 Identity registers provide supply chain links

- **Identity Resolver (IDR)**: Variations in digital maturity and RBTP participation can delay value realization across the supply chain. IDR addresses this by allowing the identity of a "thing" (product, facility, business, etc.) to act as a discoverable link to its related data. This means that data can skip low digital fidelity steps (like a distributor) if the product itself maintains the identifier that is used to manage its journey through the supply chain. Using the Identity Resolution Standard (ISO 18975), businesses can retrieve a complete list of information about a product, facility, or organization—whether identified by a barcode, RFID tag, QR code, batch number, or any other unique identifier.

2.3.4 Authorities anchor identity verification

Authorities such as business/facility/asset registers, permit & licensing authorities, and accreditation authorities are trust anchors in the ecosystem and issue DIAs.

- **Digital Identity Anchors (DIAs)**: DIAs enable businesses to digitally confirm that incoming data originates from a trusted identity within a decentralized publish-and-discover model.

2.3.5 Technical and security protocols

The underlying technology components are embedded into commercial and open-source software tools that can be used standalone or integrated with business systems.

- **Verifiable Credentials Profile (VCP):** As a simple subset of the W3C (World Wide Web Consortium) Verifiable Credentials standard, the VCP ensures that all data in the value chain is tamper-evident, non-repudiable, and revokable.
- **Decentralized Access Control (DAC)**: Protect sensitive information and share only the data that enhances your products' value. DAC ensures that suppliers retain full control over who can access their product and facility information, providing clear guidance on secure, value-driven data sharing.

2.3.6 Open Source Tooling for Technology Vendors

The UNTP toolkits are what the RBTP reference implementation and pilot infrastructure are built with and companies can use this as a starting point for building their own capability. For more information about how different supply chain actors can take advantage of UNTP and RBTP, see Appendix 6.2. It can issue RBTP/UNTP compliant credentials, verify credentials from suppliers and test if credentials are compliant. This open-source tool comes with 4 major components:

Tool	Link	Description
Project VC Kit	https://github.com/uncefact/project-vckit	This is a tool that verifies and issues credentials.
Mock Apps	https://github.com/uncefact/tests-untp/tree/next/packages/mock-app	Tool to build testable supply chain implementations to enable testing and validation of your DPPs and supply chain
Identity Resolver	https://github.com/uncefact/project-identity-resolver	Tool that enables to go from the identifier to more information about the identified object including a DPP
UNTP Test Suite	https://github.com/uncefact/tests-untp/tree/next/packages/untp-test-suite	Provides tooling for implementers to validate their DPP's across the 3 tiers (correct credential, correct schema, and correct choreography)

For more information on UNTP, please Visit https://spec-untp-fbb45f.opensource.unicc.org/ . Please note that this site will transition to https://untp.unece.org in the near future.

3 Responsible Business Transparency Protocol (RBTP): A version of UNTP for electronic & automotive sectors

3.1 RBTP – the UN-recognized extension for electronic and automotive sectors

Launched in February 2025, RBTP is a UN-recognized extension of UNTP designed to meet the needs of the electrical, electronics, automotive supplies, and related industries. Simplifying data exchange between suppliers and buyers by building an industry specific vocabulary. The scope of RBTP extension is shown in the figure below:

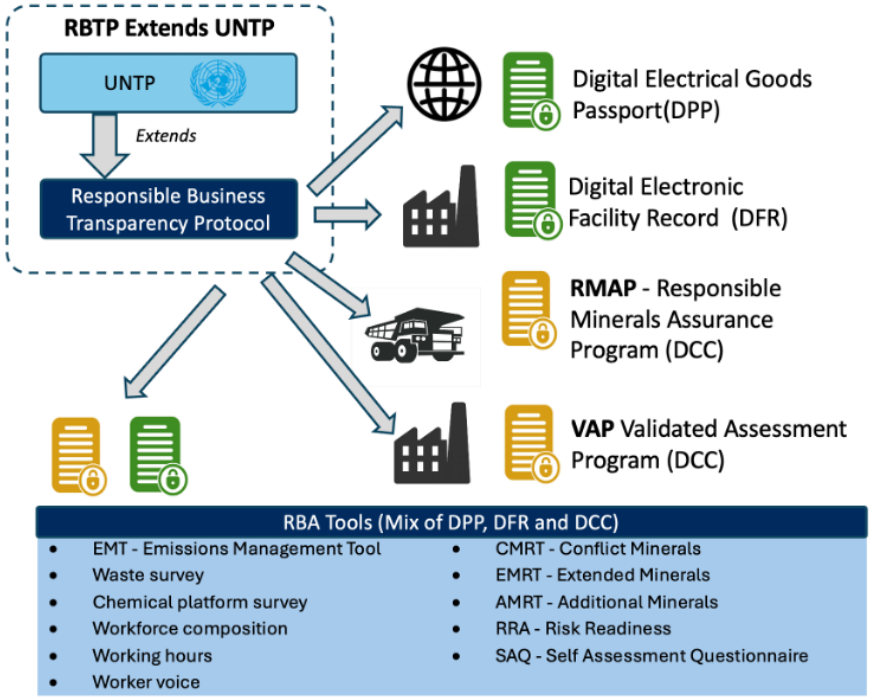


Figure 6 - RBTP Extension Scope

- Industry-specific **Digital Product Passports (DPPs)** – for example, the Digital Electronic Goods Passport.
- Industry-specific **Digital Facility Records (DFRs)** – for example, a Digital Smelter Record and a Digital Electronics Manufacturer Record.
- RBA Scheme-specific **Digital Conformity Credentials (DCCs)** – this includes VAP and RMAP credentials. This includes mapping the RBA schemes themselves as digital vocabularies in accordance with the UNTP Sustainability Vocabulary Catalog (SVC) standard.

- Implementation of an **Identity Resolver (IDR)** by RBA facility DB and Open Supply Hub so that DFRs and DCCs are discoverable from facility IDs (RBA Online and Open Supply Hub identities).
- Mapping RBA Tools, such as Emissions Management Tool (EMT) and RMI mineral reporting templates (CMRT, EMRT, AMRT), to UNTP so that they can also be digitalized.

At this stage, the RBTP extension is being validated through hands-on development and piloting with supply chain actors to ensure that the extension meets the needs of industry. Further information on individual components of the RBTP can be found in the Knowledge Base and Appendix B: How RBTP works.

For more information on RBTP, please refer to the Knowledge Base - https://docs.rbtp.pyx.io/ Please note that this site is being updated continuously to meet the needs of the RBA community.

3.2 The Sustainability Vocabulary - RBA as a Scheme Owner

The UNTP Sustainability Vocabulary Catalog (SVC) defines a standard way for any sustainability scheme owner to publish their standards as a digital vocabulary. The SVC allows claims in digital product passports and facility records to be linked to the corresponding independent assessments in conformity credentials. RBA will publish sustainability schemes, including VAP and RMAP, as digital vocabularies, and then RBA will issue facility credentials, such as VAP and RMAP certificates, as digital credentials that reference the criteria in the digital vocabularies.

Digitalising the RBA's assessments to the UNTP SVC, critically, enables interoperability of data between different initiatives and the comparability of claims made on the basis of RMAP or VAP to other industry assessments. Currently, companies undertake significant manual work to compare and benchmark assessments for supplier factories or mineral smelters/processors, and this is particularly acute and resource-intensive when drawing data from various internal and external sources, such as supplier-provided data and/or different assessment schemes. Additionally, as companies seek to leverage artificial intelligence within their organizations and supply chains, digitalising credentials to the SVC is the necessary precursor to enabling companies to optimize the use of AI for greater efficiency with their supply chain data and derive greater insights from their data.

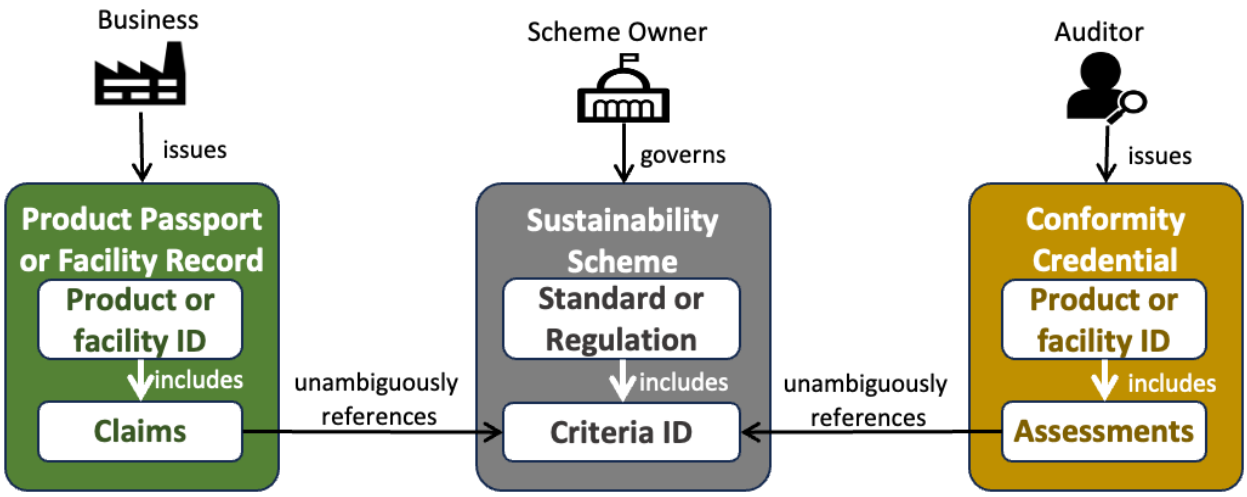


Figure 7 - How an SVC connects claims in a product passport or a facility record

RBA will also work to encourage other scheme owners, such as CopperMark and IRMA, to similarly publish their standards as SVC-compliant digital vocabularies. As more schemes provide digital vocabularies and credentials, more digital credentials will be able to automatically linked to facilities and products in companies' supply chains.

4 A four-stage RBTP implementation pathway

RBA has developed a four-stage implementation pathway to help businesses build the capability and pathway for enabling n-tier traceability through exchange of verified, portable and trustworthy data among supply chain actors. Implementing the Responsible Business Transparency Protocol (RBTP) involves organizations establishing digital trust infrastructure, supporting standardized data exchange, and issuing verifiable credentials across their supply chain. These changes include some investment in process and technology by each organization, and so it is important to build each company's understanding that is supported by evidence of feasibility, cost, and value.

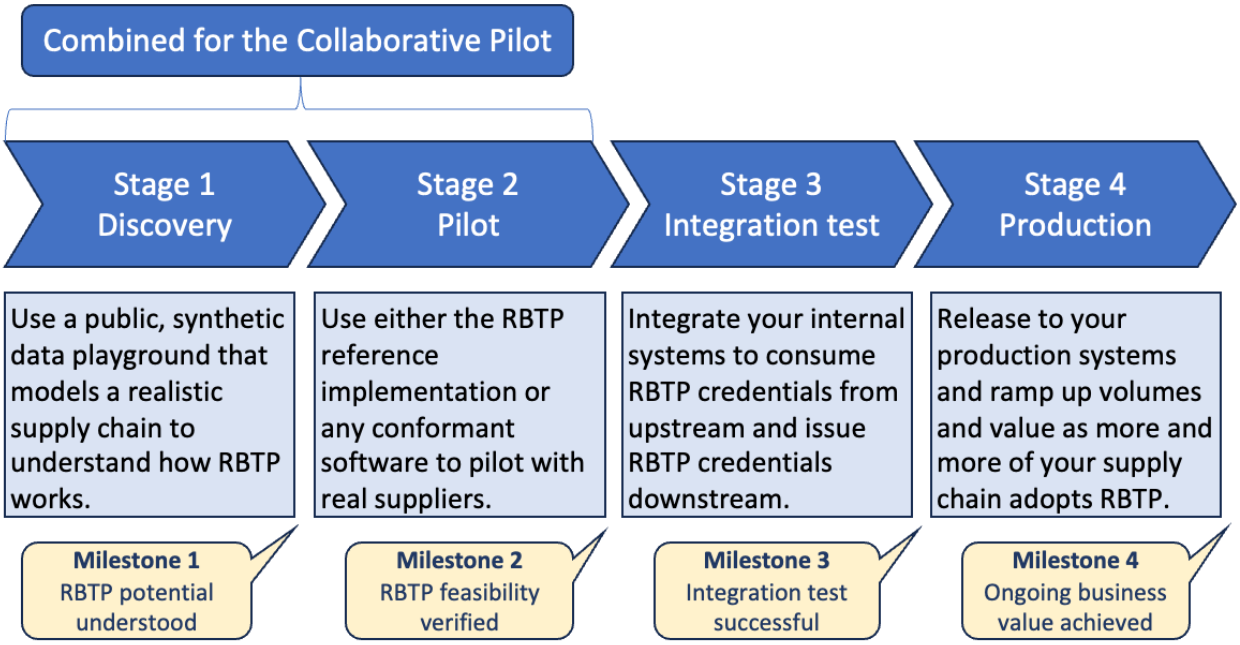


Figure 8 - Four stage implementation pathway

Throughout the journey, the RBA can support participants with tools such as open-source reference implementations and synthetic data. Implementation stages 1 and 2 are completed with RBA support and tools and have no impact on member internal business systems. Stages 3 and 4 involve the integration of organization's internal business systems and, whilst RBA support can be provided, such activities will typically be completed with the support of the implementer's preferred software vendors and systems integrators (see section 4.5).

4.1 Stage 1 - informed discovery

The first stage is ensuring that team members within a company understand how RBTP works for trustworthy data exchange, including some of the complex scenarios described in Appendix 6.1. Companies can walk through a series of self-service scenarios described in the RBTP Knowledge Base and implement them in a realistic, synthetic data sandbox.

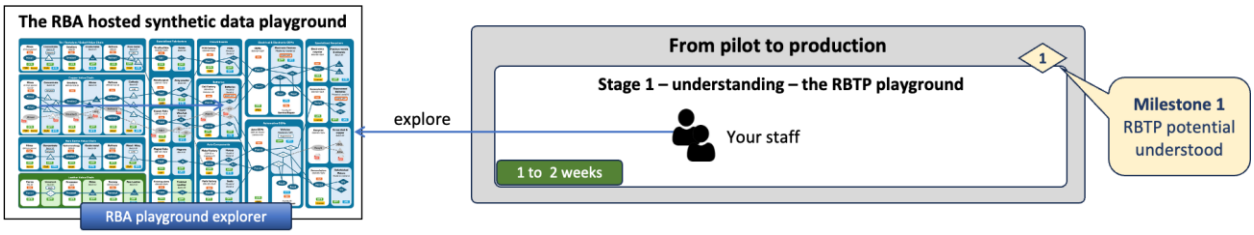


Figure 9 - Stage 1, Informed discovery

The outcome of this stage is that RBA members or their suppliers can position themselves in the ecosystem and understand their inputs and outputs – and have verified the viability of RBTP as a scalable transparency framework. In many cases, this stage will be combined with stage 2 as a single pilot activity.

4.2 Stage 2 - targeted pilots

This stage is designed to increase company participants' understanding of RBTP and to explore in detail key scenarios, such as a particular supply chain or data-sharing challenge, identified by the company. This stage will continue to use synthetic data that is more tailored to specific supply chain challenges and the identified real-world scenarios. It requires collaboration with at least the first tier of suppliers and customers, as applicable. Pilots are staged using either the RBTP reference implementation or any other software system that is RBTP-compliant. In this stage, more tailored data can be exchanged, and the capacity / readiness of a broader ecosystem can be evaluated. The intent of this stage is to gather the evidence necessary to support a decision to proceed to stage 3. Internal ICT departments, software vendors, and preferred system integrators would be participants in pilots so that they can accurately assess the scope and cost of the next phase.

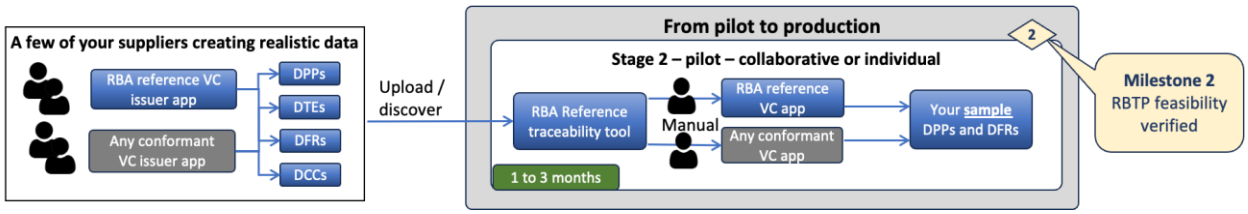


Figure 10 - stage 2, targeted pilots

Concurrent to actions that companies will take to test RBTP and determine path for deployment, the RBA is also supporting technical & operational capacity to scale adoption within the industry, including developing additional RBA software and tools to enable rapid deployment and cultivating networks of 3rd party implementers and vendors. Additionally, the RBA's RBTP Technical Sub-team and ongoing development of resources on RBTP supports capacity-building for companies' own IT, data, systems, etc. teams that will need to understand and deploy the RBTP within their organisations. To support companies in their implementation journey, the RBA continues to scope operational and technical needs that may lead to new collaborative work between companies and supply chain actors with support from the RBA, such as technical solutions to provide additional low-threshold methods for companies to quickly and easily start issuing DFRs, DPPs, etc. without huge development costs of sophistication.

4.3 Stage 3 - integrated system testing

Stage 3 represents a transition from pilot staging within the RBA reference implementation to full business system integration and testing. This stage employs real systems but in a test environment within your company's systems. It represents the last stage before production release and provides the confidence necessary to commence production operations. Successful testing with upstream suppliers and, where appropriate, downstream customers, all with different ICT systems and products, is an appropriate exit criterion for this stage.

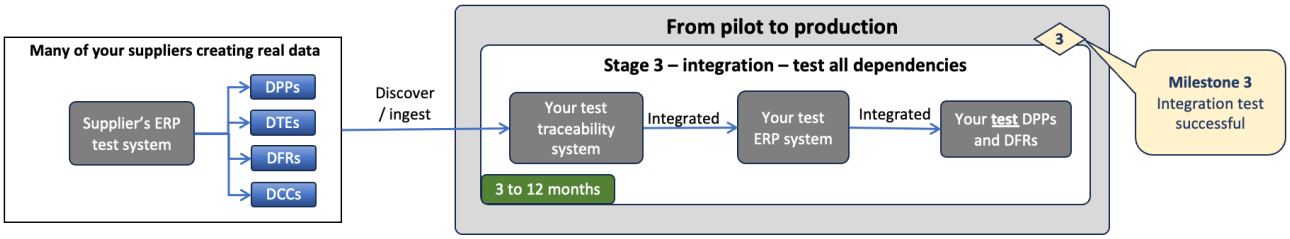


Figure 11 - Stage 3, integration testing

4.4 Stage 4 - scalable production value release

The last stage is the production implementation of the RBTP. This includes the collection and processing of your company's upstream credentials (DPPs, DFRs, DTEs, DCCs) and the issuing of credentials to your customers through systems used by your company.

Given the decentralized nature of UNTP/RBTP, implementation is likely to be gradual, sporadic, and initially somewhat disconnected, like pixels lighting individually on a TV screen until the entire picture is illuminated. The key focus of this phase is ongoing value assessments and prioritized engagement of your ecosystem of suppliers and customers. Each business partner will need to go through the same four-stage process and can benefit from the tooling and support available through RBA membership.

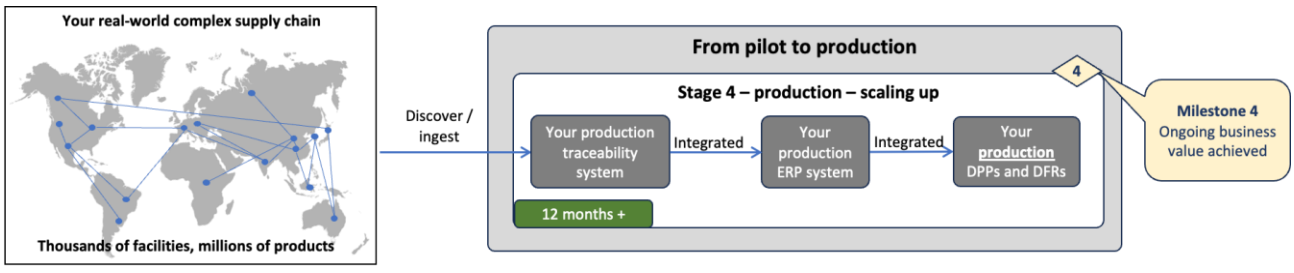


Figure 12 - stage 4, production and scaling up

Some organisations may fast-track this process when their business system software vendor supports UNTP or RBTP. In such cases, the complex integration and testing is performed by the software vendor and not by the business.

Each company and supply chain actor will have different systems, forms in which data is received, and specific data-sharing and data quality challenges, and some of these questions are included further in the Appendix and the Handbook will be further iterated based on lessons learned from pilot and implementation exercises as they take place. Some technical "how to" questions can be best addressed in a pilot setting or meeting between technologists at your organization and UNTP/RBTP experts.

4.5 Other Implementation Considerations: Supply Chain Engagement & Uptake

Beyond the actions that companies are taking either independently or as part of the collaborative pilot to test and implement the RBTP within their organisations and supply chains, the RBA recognizes that driving uptake of any approach to data standardization and exchange across the supply chain requires significant socialization and collaboration with a diverse set of actors. In view of this, the RBA is undertaking several actions to drive strategy & engagement for the uptake of the RBTP/UNTP:

- Establishing a Supply Chain Engagement & Strategy sub-team: RBA member company workgroup as focal point for supply chain engagement strategy, engage with vendors to drive adaption of systems/solutions to be UNTP-conformant, identify needs among supply chain actors for capacity-building, etc.
- Engagement with policymakers to support uptake and adoption of the UNTP across industries
- Engagement with other standard and data schemes, industry associations, etc. to drive adoption of UNTP-aligned extensions

5 Conclusion

RBTP provides RBA member companies with a scalable framework for enabling exchange of verifiable, interoperable supply chain data – the necessary precursor to enable n-tier traceability. Realizing ever-growing value provided by RBTP will depend on collaboration with organisations throughout the automotive, electronics, and mineral supply chains to socialize and drive uptake. For next steps with the RBTP or to continue to learn more, companies can:

- Join a collaborative industry pilot or undertake an individual company pilot to test specific supply chain and/or data-sharing scenarios
    - Register your interest for a pilot here
- Join the RBA Supply Chain Mapping workgroups:
    - Quarterly plenary
    - Sub-teams with active participation expected: Supply Chain Engagement & Strategy Sub-Team, and the Technical Sub-Team

6 Appendix A: Key Questions

6.1 FAQs: N-tier traceability challenges and how RBTP works

Whilst UNTP and RBTP may be new to many RBA members, the challenges associated with achieving traceability and transparency at scale across complex value chains are certainly not new. This section highlights some common challenges and how UNTP/RBTP may help mitigate them. Some of the problems have well-tested mitigation measures and some still need to be verified through RBTP pilots. As supply chain and data-sharing challenges and scenarios are tested and solutions developed to them determined through pilot activities, the Handbook will be subsequently updated to integrate lessons learned:

ID	Question	Response
1	**Platform boundaries** I've tried using traceability platforms to reach upstream suppliers but there are too many different platforms in use and my suppliers won't use my preferred platform.	**Protocol over platform** The UNTP/RBTP are an interoperability protocol, not a platform. They allow every actor in the value chain to pick any tooling they wish, so long as it conforms to the standard.
2	**Blockchain hype vs reality** We have experienced some considerable cost and complexity with blockchain based value chain traceability solutions that don't justify the cost.	**No blockchain** UNTP/RBTP do not depend on blockchain in any way. Trust is established through verifiable identity and tamper evident digitally signed credentials.
3	**Implementation Costs** We are in a commodity / low-margin business that pays little or no premium for proof of sustainability – so costs must be very low.	**Commoditization & open source** Standards drive commoditization. When there is no lock-in then there is competition. In addition, UNTP provides free open source tooling against which commercial offering must offer improvements.
4	**Human vs digital divide** As an issuer of digital credentials, how will I know which customers / verifiers are able to read digital data?	**Human readable** Every credential (DPP, DFR, DCC, etc.) is both machine and human readable – so that issuers can confidently adopt the protocol without any dependency on trading partner readiness.
5	**Confidentiality – of my supply** As a mid-stream actor, I don't want to tell my customers who my suppliers are - or that my competitors will find out – because that is business confidential/trade secret information.	**Selective disclosure** • Coarse grained – The digital transformation event (DTE) that contains the bill of materials (and therefore supplier identity) is a separate credential that can be made accessible only to authorized parties via the decentralized access control (DAC) standard.

		• Fine grained – when there is confidential data within an otherwise public credential then that data can be redacted using one of a few ZKP (zero knowledge proof) protocols.
6	**Comparability of topics & claims** As a reporting entity with supply chain risks, I am acquiring more and more upstream product and facility data that is harder and harder to compare because the claims and assessments are at different granularities and are made against different schemes and regulations.	**Sustainability Vocabulary Catalog** UNTP defines a standard (the SVC) for publishing schemes as a hierarchy of finer grained criterion which RBPT has implemented for VAP and RMAP. For example, the 35 ESG topics in 5 categories within VAP are individually referenceable as assessments within a VAP credential. Each criterion is classified against a UN standard sustainability topic. This allows downstream verifiers to collect claims and assessments in common topics (for example carbon footprint) across multiple nodes and thereby make meaningful and comparable risk assessments.
7	**Confidentiality – of my audit reports** As an audited facility, my compliance audits (against RBA or other schemes) contain confidential information, but I still want to advertise my conformity at the granularity of my choice.	**Selective disclosure** The RBTP fine grained RMAP/VAP disclosures empowers audit subjects with the ability to choose the granularity of performance disclosures to their downstream customers. They can choose to chare coarse grained or finer grained disclosures depending on their market demands.
8	**Conformity certificate validity** When comparing product claims with independent certificates, how can I be sure that the certificate is about the right product, and the right topic, and is issued by an accredited auditor?	**Linked Data Validation** RBTP allows downstream verifiers to automate conformity verification using linked data verification over multiple credentials. For example, • Same subject: That the facility ID in a facility record matches the facility ID in the independent conformity credential. • Same topic: That the conformity criterion ID in the DPP/DFR claim is the same as the criterion ID in the DCC assessment. • Authorized auditor: that the DCC is issued by an auditor that can present a digital identity anchor from the scheme owner or national accreditation authority.
9	**Identity fraud** How can I be sure that the issuer of product or facility data really is who they say they are? Especially when the data is issued by a party more than one tier away from me.	**Identity Anchor (business ID)** The UNTP/RBTP Digital Identity Anchor (DIA) provides a means to link the identity of a DPP or DFR issuer to an identity maintained by authoritative register such as a national business register.
10	**Counterfeiting**	**Identity Anchor (trademark)**

	How can I be sure that the issuer of product data such as a DPP is really the genuine manufacturer / brand owner of that product?	The Digital Identity Anchor issued by a national trademark register can be used to confirm ownership of a product or brand in the same way that a DIA from an authoritative business register conforms identity.
11	**Traders / resellers won't participate** My value chain has lots of actors who are commercial intermediaries but don't produce or materially change the products (e.g. traders, distributors). They often will not participate in traceability schemes.	**Identifier based discovery** The Identity Resolver (IDR) standard defines a way to find rich data about a product using only the product ID. In this way, data about a product that passes through multiple traders (e.g. copper cathodes traded on the LME) can still be accessed using the product ID.
12	**No agreed product ID scheme** There are no common standards for product identifiers in my industry. Everyone just puts a barcode with their individual serial but that's neither unique nor resolvable – so how will that work with UNTP/RBTP?	**Resolvable product IDs** Supply chain actors much choose one of two mechanisms for resolvable product identifiers. • Use an established scheme such as GS1 GTINs • Self-issue resolvable product identifiers as DIDs (W3C standard Decentralized Identifiers).
13	**Too many facilities registers & IDs** The facilities in my value chain are being asked to register with too many different facility registers. How do I know which one has the current data?	**Link all registers to one record** Under UNTP/RBTP, each facility publishes a digital facility record to any web location and then updates any number of registers to point to the same facility record.
14	**Unstructured data in the mix** It's not realistic to think my entire value chain will start issuing UNTP/RBTP credentials anytime soon. How do I handle a mix of digital and unstructured data like PDFs?	**Use AI to extract structured data** Ultimately, RBTP defines a mechanism to follow linked data identifiers to construct a supply chain map. When the linked data is already a UNTP/RBTP credential then it falls neatly into the map. When the linked data is unstructured (e.g. a PDF) then AI tooling can parse the data to find identifiers and related data and add them to the same graph, just with lower confidence and no cryptographic verification.
15	**Bulk materials** Barcodes on components and products work fine but how does UNTP/RBTP handle bulk material like ore from mine-sites?	**Consignment ID** Product classes (e.g. copper cathode, 99.9% pure) and batch numbers are identified in the same way as any other product, but consignment identifiers replace serial numbers (e.g. waybill numbers for international shipments)

16	**Mass-balance** How does UNTP/RBTP support the mass-balance chain of custody process where the properties of bulk inputs (e.g. ores) are correctly allocated to the outputs (e.g. refined metal) without double counting, even when outputs are shipped to multiple different customers?	**It's a journey** Mass balance in chain of custody verification requires the ESG performance different bulk input materials (e.g. metal ore) to be correctly allocated to the batch of output materials (e.g. refined metal ingots) without double counting. The typical fraud vector is to re-use the same high performance input material evidence in shipments of output materials to multiple different customers. Although there are purely digital solutions, the implementations are complex, diverse, and generally non-interoperable. Therefore, RBTP proposes a journey. • In the short term, input material evidence and its correct allocation to output material shipments is the domain of annual and audits. Digital Conformity Credentials can be issued by the auditor to attest to the accuracy of mass balance allocations for a given facility ID. • In the medium term, increased adoption of digital facility records with periodic facility level performance and digital product passports for both input materials and output products, each with product or shipment level performance – provides the potential for algorithmic auditing. • In the longer term, interoperable ledger technologies with standardized cross-ledger tokens, each representing a fungible unit of performance (e.g. one ton of CO2e) can be verifiably attached to inputs and consumed (once only).

6.2 How UNTP data moves between systems

UNTP (and hence RBTP) do not require system-to-system digital connections to transfer data between supply chain actors. UNTP data such as product passports and facility records is exchanged in a similar way to traveler data in e-passports. A passport issued and digitally signed by a national authority is carried by a traveler to a destination country where a smart gate reads the data and stores it in the destination country systems. Traveler data has been exchanged between countries because it was carried by the traveler and not because of any country-to-country system integration. The same is true of product and facility data that is described by UNTP product passports and facility records.

The underlying technical standard is defined by the World-Wide-Web Consortium (W3C) and is called "Verifiable Credentials (VC)". A W3C verifiable credential (VC) is a self-contained package of structured data that is digitally signed (tamper-evident), identity linked (non-repudiable), state managed (e.g. expired, revoked, etc.). It can also include a human "rendering template" so that the digital data is equally usable by humans and machines. However, as a self-contained verifiable data package, VCs do not depend on any specific exchange mechanism. They can be published and downloaded, or exchanged by email, or pushed to an API, or printed as a QR code on paper.

Further reading

- W3C VC specification - https://www.w3.org/TR/vc-data-model-2.0/
- Example human and machine readable DPP - https://spec-untp-fbb45f.opensource.unicc.org/docs/specification/DigitalProductPassport#sample-credential

6.3 How UNTP credentials map to RBA capabilities

RBA has mapped its data sets, tools, and assessments against RBTP credential types. The specific designation of a given tool or data set as a particular digital credential (e.g. DFR, DPP) is subject to change as digitization of RBA tools, data sets, and assessments continues:

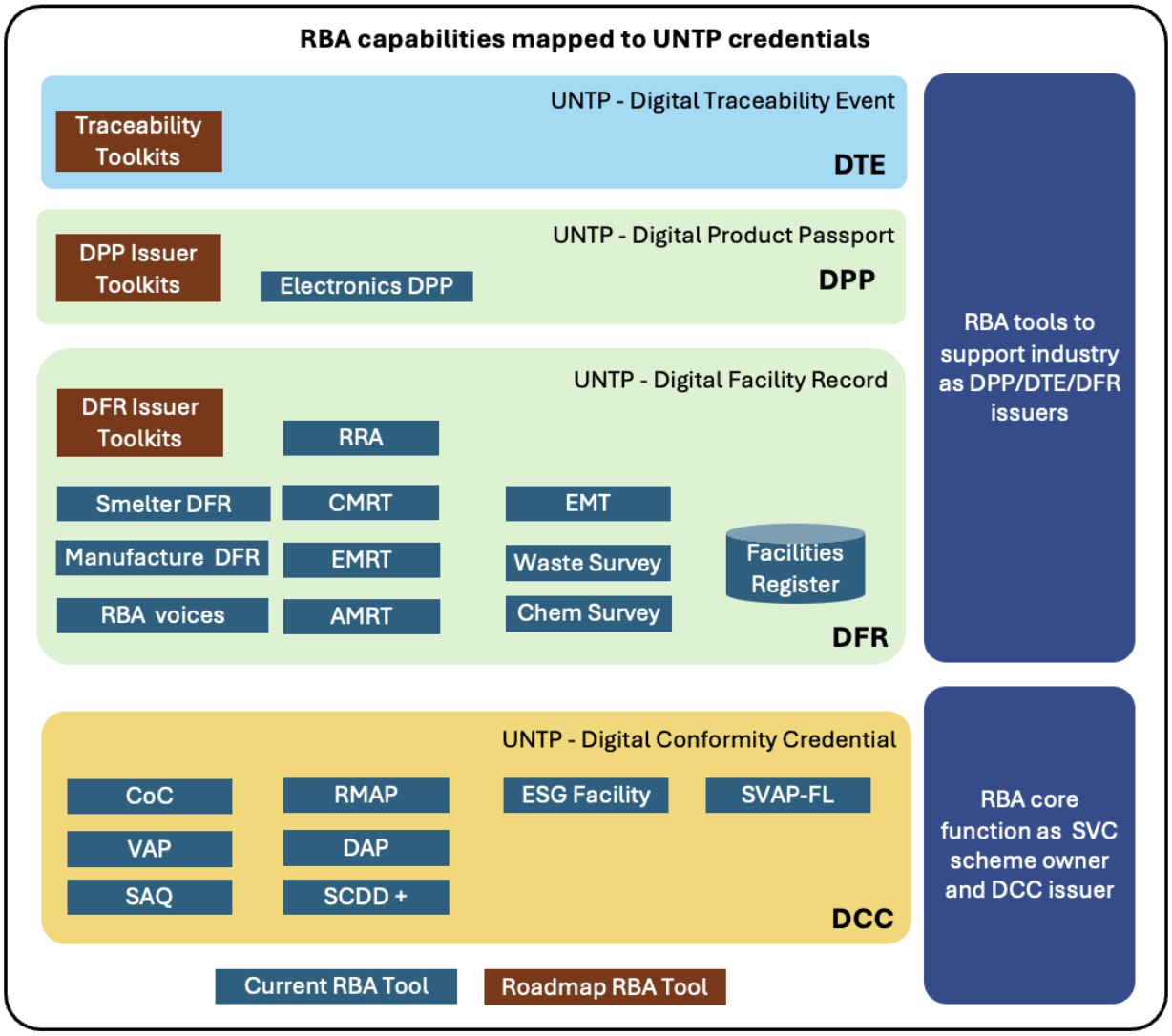


Figure 13 - RBA to UNTP mapping

The diagram above shows RBA capabilities in two groups:

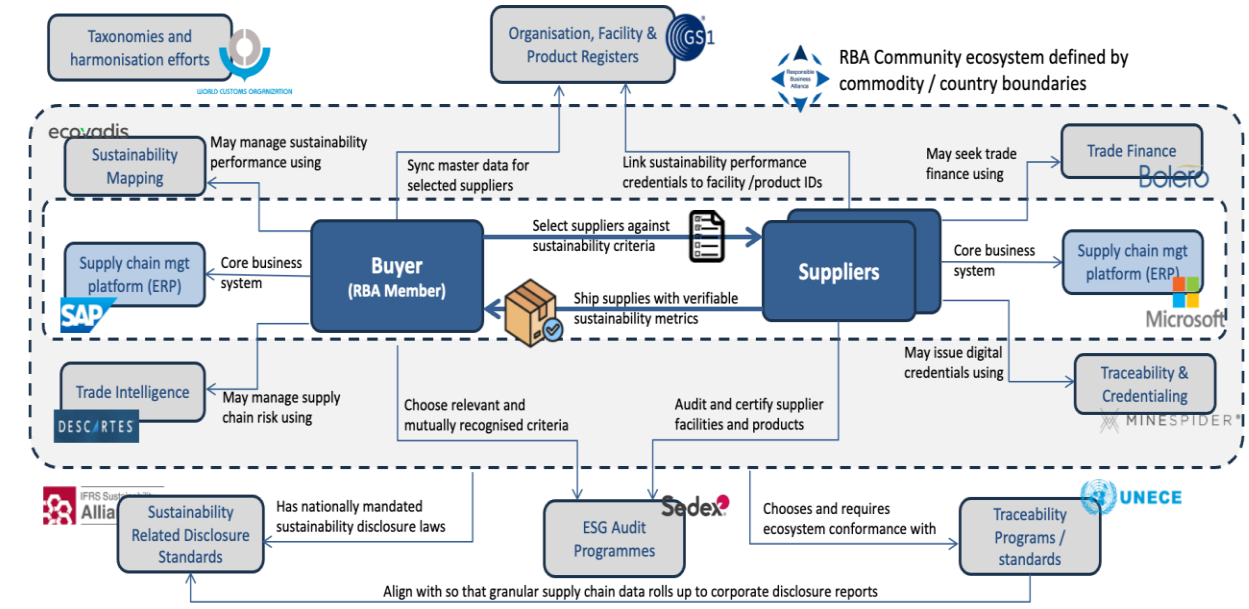
- RBA core function - Define sustainability performance criteria in various standards such as VAP and publish them as SVCs, and to issue digital credentials as DCCs (via audits or specialized tools) to the assessed facilities.
- RBA tools to support industry – RBA does not issue DPPs, DFRs, or DTEs because that is the role of supply chain actors that manufacture products and operate

facilities. However, RBA provides standards and tools to help its members issue interoperable supply chain credentials at low cost.

6.4 The Supply Chain Technology Ecosystem

There are many different types of software platforms/programs that each play some part in supply chain operations. This section defines four major groups and we anticipate that each group will adopt RBTP in different inter-related manner.

NOTE: All logos in this section are for illustrative purposes.



Note : Logos are just archetypes and do not indicate any preference

Group 1: Core Supply Chain Management Platforms (ERP, PLM)

Enterprise Resource Management (ERP) and Product Lifecycle Management (PLM) systems are at the heart of any product-centric business. ERPs financial accounting, purchasing and sales transactions, and trading partner master data. PLMs manage the product development lifecycle and so are the master for product data. These are the core systems that no product business can do without and with which all other more specialized system will integrate. As part of adoption of RBTP, It is anticipated that these core systems will increasingly offer the ability to ingest and issue RBTP (and other UNTP) compliant credentials.

Figure 14 - Core enterprise supply chain systems

Group 2: Specialized Supply Chain Platforms and Services.

The second group includes specialized services that may add value to the supply chain operations of any business but are not necessarily essential to support business operations. Sustainability mapping platforms allow businesses to assess the environmental and social impact of their products and to model the impact of changes. Trade intelligence platforms help to assess financial risk across a network of trading partners. Trade finance platforms integrate with financial service providers to improve cashflow and reduce payment risk. Traceability platforms map multi-tier value chains and provide visibility of supply, possibly back to primary production sources. Data interoperability via RBTP enables each of these platforms to add more value and simplify their offering by reducing data integration costs and delivering higher quality algorithmic based solutions.

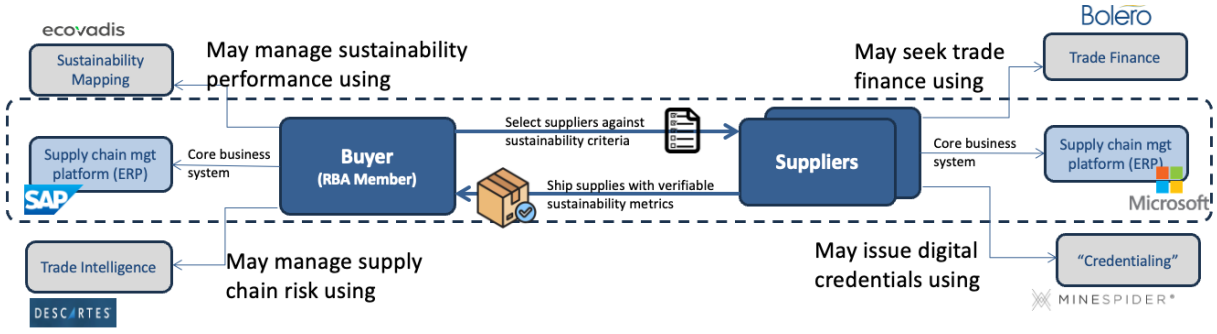


Figure 15 - Specialized Supply Chain Services

Group 3: Organisation, Facility, and Product Registers

The third group can be described as "Registry Operators". These include national business registers (typically government run), facility databases (such as RBA online), and product identity registers (e.g. GS1 Global product register). The purpose of these is to provide common identity and trust across geographic regions or entire value chains. Given any identifier (e.g. a product barcode scan), the registers provide the first port of call for further data about the identified entity (organisation, facility, or product). The register will usually contain only minimal data but will redirect queries to richer details typically hosted by the

brand or manufacturer. Furthermore, the registries can issue digital credentials to members that can provide proof of identity. Collectively, these registers provide the data integration fabric across value chains. These registry operators add more value to their members by providing Identity Resolver services that enable RBTP adoption.

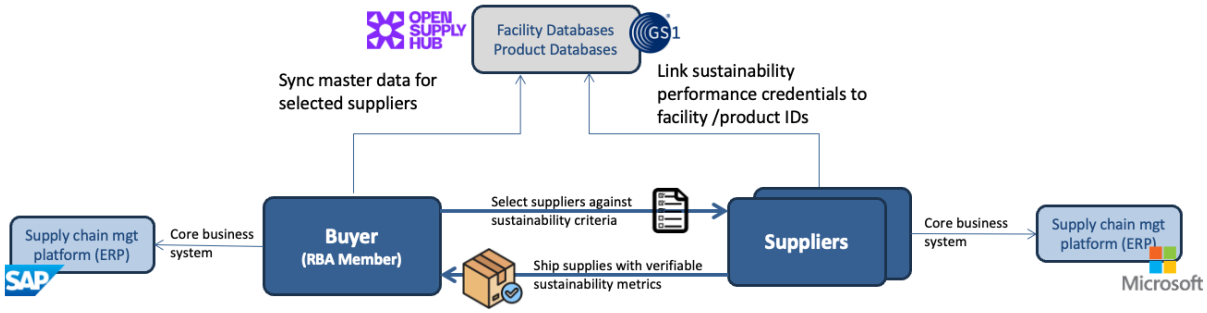


Figure 16 - Registry Operators

Group 4: Standards, Taxonomies, and Frameworks.

The last group are not software systems or platforms but are the standards and protocols that bring consistent meaning to data and performance measures across value chains. These include fundamental classification schemes such as the World Customs Organisations (WCO) Harmonized System (HS) of tariff codes, the United Nations standard industry classifications, or specialized codes such as the CAS registry of chemical substances. This group also includes interoperability standards such as the International Chamber of Commerce (ICC) Digital Standards Initiative (DSI) and the United Nations Transparency Protocol (UNTP). It also includes reporting and audit standards such as IFRS Sustainability reporting standards for corporate disclosures as well as hundreds of industry or geographic specific sustainability audit standards. RBTP is taking advantage of global standards and harmonization efforts to increase value to companies.

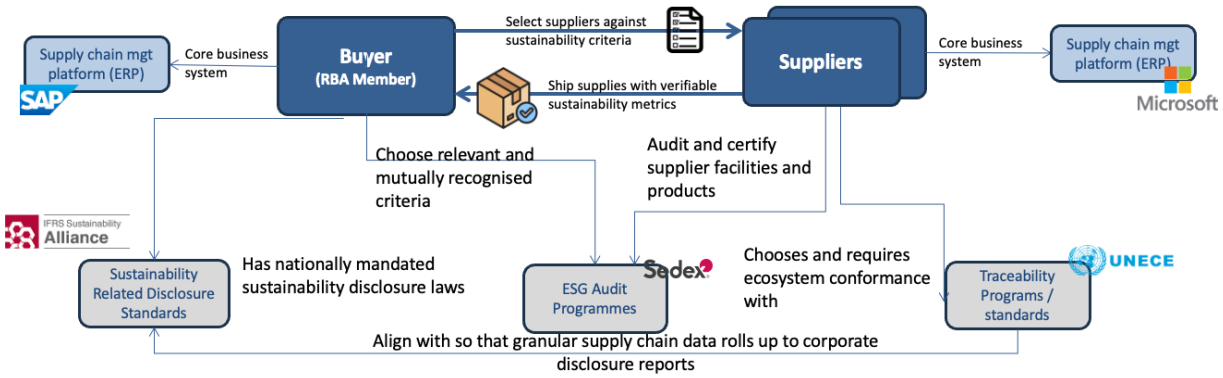


Figure 17 - Standards Taxonomies and Frameworks

6.5 Mapping Validated Assessment Program (VAP) and Responsible Minerals Assurance Process (RMAP) to the Sustainability Vocabulary Catalog (SVC)

As described in Section 3.2, the RBA has mapped the criteria of the Validated Assessment Program (VAP) to the UNTP Sustainability Vocabulary Catalog (SVC), as the underlying criterion framework for all sustainability claims made for a product or facility. The table below indicates where particular VAP criteria map onto the RBTP SVC:

VAP Criteria	SVC Categories
A.M - Labor Management System	8.1 - Systemic Sustainability - Sustainability Policies 8.7 - Systemic Sustainability - Compliance Verification
A1 - Prohibition of Forced Labor	2.6 - Human Equity and Welfare - Forced Labor Elimination
A2 - Young Workers	2.7 - Human Equity and Welfare - Youth Protection
A3 - Working Hours	2.2 - Human Equity and Welfare - Decent Work Conditions
A4 - Wages and Benefits	2.2 - Human Equity and Welfare - Decent Work Conditions
A5 - Non-Discrimination / Non-Harassment / Humane Treatment	2.1 - Human Equity and Welfare - Rights and Equality 2.8 - Human Equity and Welfare - Gender Equity
A6 - Freedom of Association and Collective Bargaining	2.5 - Human Equity and Welfare - Worker Representation
B.M - Health and Safety Management System	8.3 - Systemic Sustainability - Outcome Tracking 8.5 - Systemic Sustainability - Process Enhancement
B1 - Occupational Health and Safety	2.3 - Human Equity and Welfare - Workplace Safety 7.1 - Health and Safety Assurance - Workplace Hazard Control 7.5 - Health and Safety Assurance - Healthcare Access
B2 - Emergency Preparedness	7.2 - Health and Safety Assurance - Emergency Readiness
B3 - Occupational Injury and Illness	2.3 - Human Equity and Welfare - Workplace Safety 7.1 - Health and Safety Assurance - Workplace Hazard Control 7.6 - Health and Safety Assurance - Well-Being Support

B4 - Industrial Hygiene	7.3 - Health and Safety Assurance - Exposure Management
B5 - Physically Demanding Work	7.8 - Health and Safety Assurance - Ergonomic Design
B6 - Machine Safeguarding	4.1 - Product Integrity - Product Safety Standards 7.8 - Health and Safety Assurance - Ergonomic Design
B7 - Food, Sanitation and Housing	7.4 - Health and Safety Assurance - Living Conditions 7.7 - Health and Safety Assurance - Nutrition Standards
C.M - Environmental Management Systems	8.2 - Systemic Sustainability - Risk Identification 8.3 - Systemic Sustainability - Outcome Tracking
C1 - Environmental Permits and Reporting	4.6 - Product Integrity - Supply Chain Traceability 8.7 - Systemic Sustainability - Compliance Verification
C2 - Hazardous Substances	1.9 - Ecological Resilience - Chemical Safety 4.3 - Product Integrity - Substance Control
C3 - Solid Waste	1.4 - Ecological Resilience - Waste Minimization 4.8 - Product Integrity - End-of-Life Management 5.3 - Circular Value Chains - Resource Circularity
C4 - Air Emissions	1.1 - Ecological Resilience - Carbon Footprint Reduction
C5 - Water Management	1.3 - Ecological Resilience - Water Conservation
C6 - Energy Consumption and Greenhouse Gas Emissions	1.1 - Ecological Resilience - Carbon Footprint Reduction 1.2 - Ecological Resilience - Renewable Energy Use 1.5 - Ecological Resilience - Ecosystem Preservation 1.6 - Ecological Resilience - Forest Conservation 5.4 - Circular Value Chains - Energy Optimization
D.M - Ethics Management System	8.1 - Systemic Sustainability - Sustainability Policies 8.7 - Systemic Sustainability - Compliance Verification
D1 - Business Integrity and No Improper Advantage	3.1 - Ethical Governance - Anti-Corruption Measures 3.4 - Ethical Governance - Responsible Procurement
D2 - Disclosure of Information	3.2 - Ethical Governance - Open Reporting 3.3 - Ethical Governance - Legal Compliance 4.7 - Product Integrity - Consumer Information 8.8 - Systemic Sustainability - Transparent Communication
D3 - Intellectual Property	3.3 - Ethical Governance - Legal Compliance 3.7 - Ethical Governance - IP Protection
D4 - Fair Business, Advertising and Competition	3.4 - Ethical Governance - Responsible Procurement 3.8 - Ethical Governance - Competitive Fairness
D5 - Protection of Identity and Non-Retaliation	3.5 - Ethical Governance - Stakeholder Inclusion 8.6 - Systemic Sustainability - Feedback Channels
D6 - Privacy	3.3 - Ethical Governance - Legal Compliance 3.6 - Ethical Governance - Data Privacy
E.M - Supplier Responsibility Management System	5.7 - Circular Value Chains - Supplier Development 5.8 - Circular Value Chains - Supply Chain Risk Reduction
E1 - Company Commitment	8.1 - Systemic Sustainability - Sustainability Policies
E2 - Materials Restrictions	1.9 - Ecological Resilience - Chemical Safety 4.3 - Product Integrity - Substance Control

E3 - Responsible Sourcing of Minerals	4.6 - Product Integrity - Supply Chain Traceability 5.1 - Circular Value Chains - Ethical Material Sourcing
E4 - Supplier Responsibility	5.2 - Circular Value Chains - Supplier Sustainability 5.5 - Circular Value Chains - Supply Chain Labor Rights

Similarly, the criteria of the Responsible Minerals Assurance Process (RMAP) has also been mapped to the SVC:

RMAP Criteria	Mapped SVC Categories
1 - Minerals Sourcing Information	4.6 - Product Integrity - Supply Chain Traceability 5.1 - Circular Value Chains - Ethical Material Sourcing 5.6 - Circular Value Chains - Origin Tracking
2A - Establish strong company management systems - Adopt and publish a supply chain policy for covered minerals	3.4 - Ethical Governance - Responsible Procurement 8.1 - Systemic Sustainability - Sustainability Policies 8.8 - Systemic Sustainability - Transparent Communication
2B - Establish strong company management systems - Structure internal management to support supply chain due diligence	3.3 - Ethical Governance - Legal Compliance 8.4 - Systemic Sustainability - Capacity Building 8.5 - Systemic Sustainability - Process Enhancement
2C - Establish strong company management systems - Establish a system of controls and transparency over the covered minerals supply chain	4.6 - Product Integrity - Supply Chain Traceability 5.2 - Circular Value Chains - Supplier Sustainability 8.7 - Systemic Sustainability - Compliance Verification
2D - Establish strong company management systems - Strengthen company engagement with suppliers	3.5 - Ethical Governance - Stakeholder Inclusion 5.2 - Circular Value Chains - Supplier Sustainability 5.7 - Circular Value Chains - Supplier Development
2E - Establish strong company management systems - Establish company level grievance system	2.5 - Human Equity and Welfare - Worker Representation 3.2 - Ethical Governance - Open Reporting 8.6 - Systemic Sustainability - Feedback Channels
3A - Identify and assess risks in the upstream supply chain - CAHRA Determination	5.8 - Circular Value Chains - Supply Chain Risk Reduction 8.2 - Systemic Sustainability - Risk Identification
3B - Identify and assess risks in the upstream supply chain - Red Flag Review and Risk Assessment Tailoring	8.2 - Systemic Sustainability - Risk Identification 8.7 - Systemic Sustainability - Compliance Verification
3C - Identify and assess risks in the upstream supply chain - MINING OPERATIONS COBALT ONLY (LSM & ASM)	2.6 - Human Equity and Welfare - Forced Labor Elimination 2.7 - Human Equity and Welfare - Youth Protection 5.1 - Circular Value Chains - Ethical Material Sourcing
3D - Identify and assess risks in the upstream supply chain - Applicability	3.3 - Ethical Governance - Legal Compliance 8.7 - Systemic Sustainability - Compliance Verification
3E - Identify and assess risks in the upstream supply chain - High Risk Sourcing	5.1 - Circular Value Chains - Ethical Material Sourcing 5.8 - Circular Value Chains - Supply Chain Risk Reduction
3F - Identify and assess risks in the upstream supply chain - Specific Assessment of Due Diligence Practices and Qualitative Conditions	4.2 - Product Integrity - Quality Performance 5.2 - Circular Value Chains - Supplier Sustainability 8.3 - Systemic Sustainability - Outcome Tracking
3G - Identify and assess risks in the upstream supply chain - Community Participation - COBALT ONLY	2.4 - Human Equity and Welfare - Community Empowerment 3.5 - Ethical Governance - Stakeholder Inclusion

3H - Identify and assess risks in the upstream supply chain - Upstream Assurance Mechanisms	4.2 - Product Integrity - Quality Performance 4.6 - Product Integrity - Supply Chain Traceability 8.7 - Systemic Sustainability - Compliance Verification
3I - Identify and assess risks in the upstream supply chain - Risk Assessment for High Risk Sourcing	5.8 - Circular Value Chains - Supply Chain Risk Reduction 8.2 - Systemic Sustainability - Risk Identification
4A - Design and implement a strategy to respond to identified risks - Report findings to designated senior management	6.1 - Economic Sustainability - Business Resilience 8.3 - Systemic Sustainability - Outcome Tracking
4B - Design and implement a strategy to respond to identified risks - Devise and adopt a risk management plan	6.7 - Economic Sustainability - Economic Risk Management 8.2 - Systemic Sustainability - Risk Identification 8.5 - Systemic Sustainability - Process Enhancement
4C - Design and implement a strategy to respond to identified risks - Implement the risk management plan	8.4 - Systemic Sustainability - Capacity Building 8.7 - Systemic Sustainability - Compliance Verification
5A - Report annually on supply chain due diligence - Report	6.2 - Economic Sustainability - Sustainable Investment 8.3 - Systemic Sustainability - Outcome Tracking 8.8 - Systemic Sustainability - Transparent Communication
5B - Report annually on supply chain due diligence - Report (High Risk Questions)	3.4 - Ethical Governance - Responsible Procurement 8.2 - Systemic Sustainability - Risk Identification 8.3 - Systemic Sustainability - Outcome Tracking 8.7 - Systemic Sustainability - Compliance Verification

7 Appendix B: How RBTP Works

7.1 Credential Glossary & Families

Credential	Category	Brief Description
DPP – Digital Product Passport	Core UNTP	A Digital Product Passport is a tamper-evident digital record that captures and links an asset's identity, ownership, and compliance information throughout its lifecycle, with issuer attestations to enable transparent traceability and provenance.
DBP – Digital Battery Passport	Extended DPP	A Digital Battery Passport is a tamper-evident digital extension of the Product Passport that records battery chemistry, cycle life, and end-of-life data, with issuer attestations to enable transparent traceability and responsible lifecycle management.
DEGP – Digital Electronic Goods Passport	Extended DPP	A Digital Electronic Goods Passport is a tamper-evident digital extension of the Product Passport that captures electronics-specific attributes—chipsets, firmware versions, and EHS data—with issuer attestations to enable transparent traceability and compliance.
DFR – Digital Facility Record	Core UNTP	A Digital Facility Record is a tamper-evident digital profile of a facility—capturing location, operator details, and certifications—with issuer attestations to anchor facility-level claims and enable transparent auditability.

Credential	Category	Brief Description
DEFR – Digital Electronic Facility Record	Extended UNTP	A Digital Electronic Facility Record is a tamper-evident digital extension of the Digital Facility Record that captures electronics manufacturing specifics—clean-room class, SMT line configurations, and EHS controls—with issuer attestations to enable transparent auditability and compliance.
DCC – Digital Conformity Credential (e.g. RMAP)	Core UNTP	A Digital Conformity Credential is a tamper-evident digital record that captures claims about product quality and facility compliance, with issuer attestations to enable transparent auditability across the supply chain.
DTE - Digital Traceability Event	Core UNTP	A Digital Traceability Event (DTE) is a tamper-evident digital record and core UNTP record type—adopted in RBTP—that captures how, where, and by whom materials or products move, transform, or are assembled throughout a value chain, with issuer attestations for transparent traceability.

- **Core credentials** (DPP, DFR, DCC) implement the minimum viable data model defined by UNTP.
- **Extension credentials** (DEGP, DEFR, DBP) *inherit* the core schema, then add domain-specific fields so industries can comply with local regulations **without** breaking interoperability.
- All credentials share common building blocks—decentralized identifiers (DIDs), verifiable credentials (VCs), and JSON-LD contexts—so they can be mixed, matched, and verified by any UNTP-compliant wallet or service.

UNTP (and hence RBTP) do not require system-to-system digital connections to transfer data between supply chain actors. UNTP data such as product passports and facility records is exchanged in a similar way to traveler data in e-passports. A passport issued and digitally signed

7.2 RBTP Reference Implementation

A Reference Implementation is a suite of tools used to simulate how a UNTP solution would work in the supply chain of a given industry. It is used to demonstrate traceability, interoperability and scalability using the specifications of the United Nations Transparency Protocol.

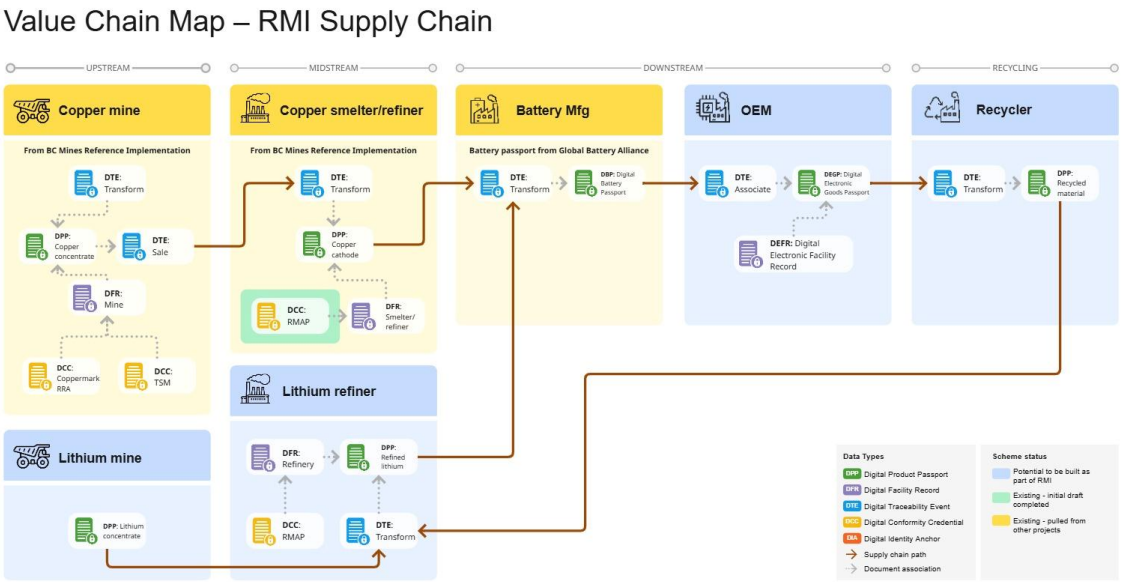
The RBTP Reference Implementation (RI) has built an Interactive Value Chain Map alongside with Table-Top Exercises focused on RMI and a few key members as the audience to demonstrate n-tier traceability including Tracing source materials upstream, Sharing a DPP, Issuing a DPP and Viewing a DPP

7.2.1 How to Use The Reference Implementation

To explore the Reference Implementation, an Interactive VC Map has been built with a set of instructions to enable users to familiarize themselves on how to use the RI.

Go to https://www.rbtp.pyx.io/interactive-vc-map

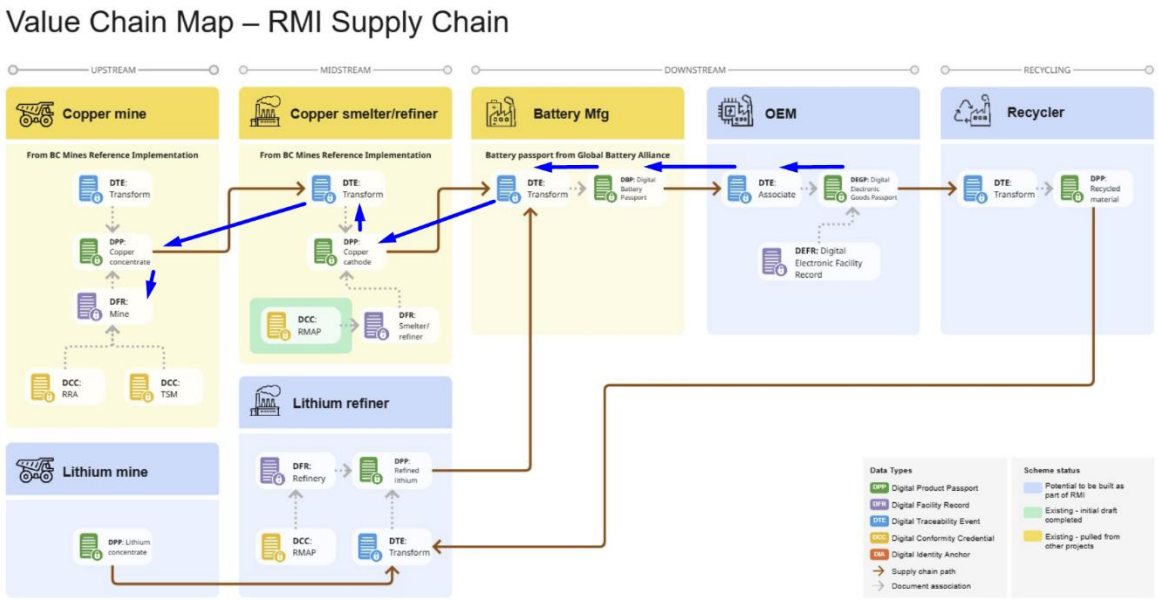
7.2.1.1 ***Interactive VC Map***



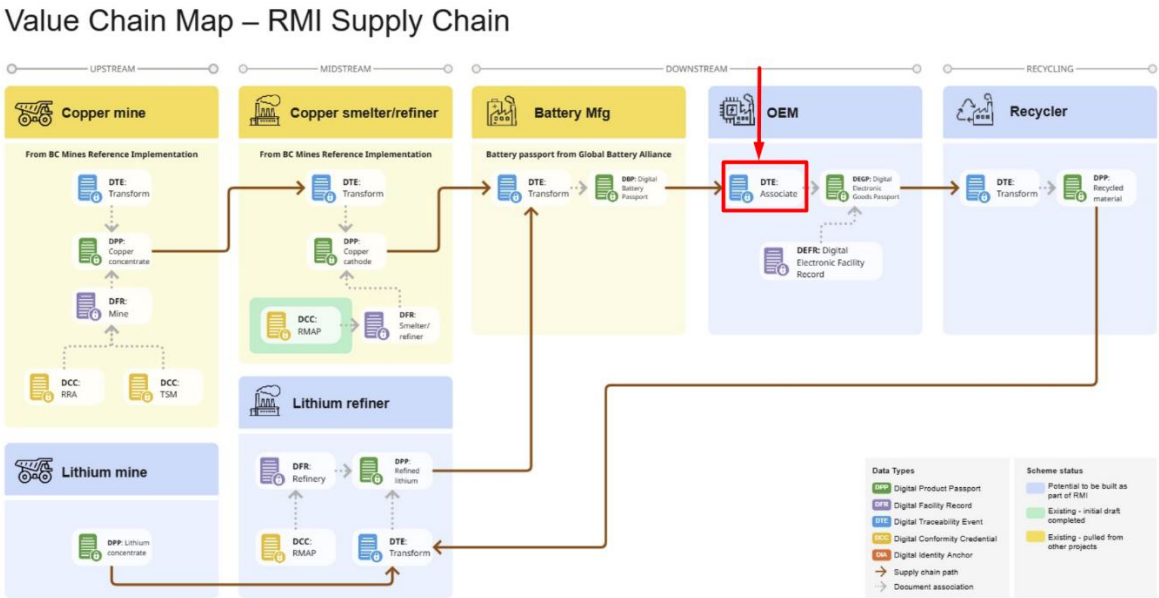
7.2.2 Tracing Example – Tracing Source Materials from OEM Product Passport to Mine

In this exercise we will demonstrate moving from an OEM Digital Product Passport downstream to the mine. The web page outline of this exercise is available here.

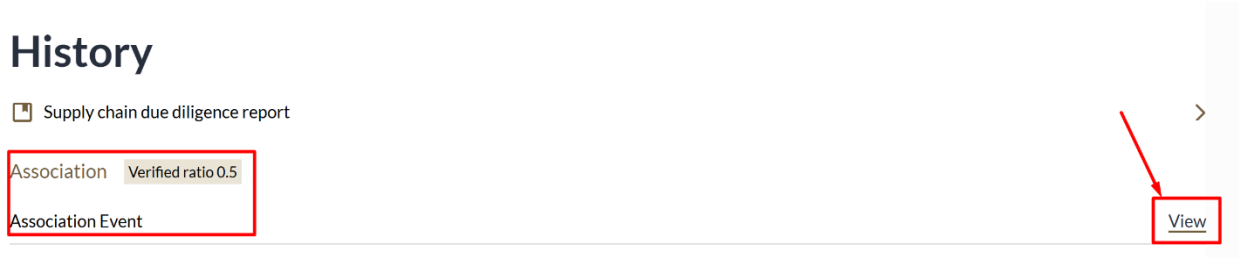
The blue arrows indicate the path we're taking.



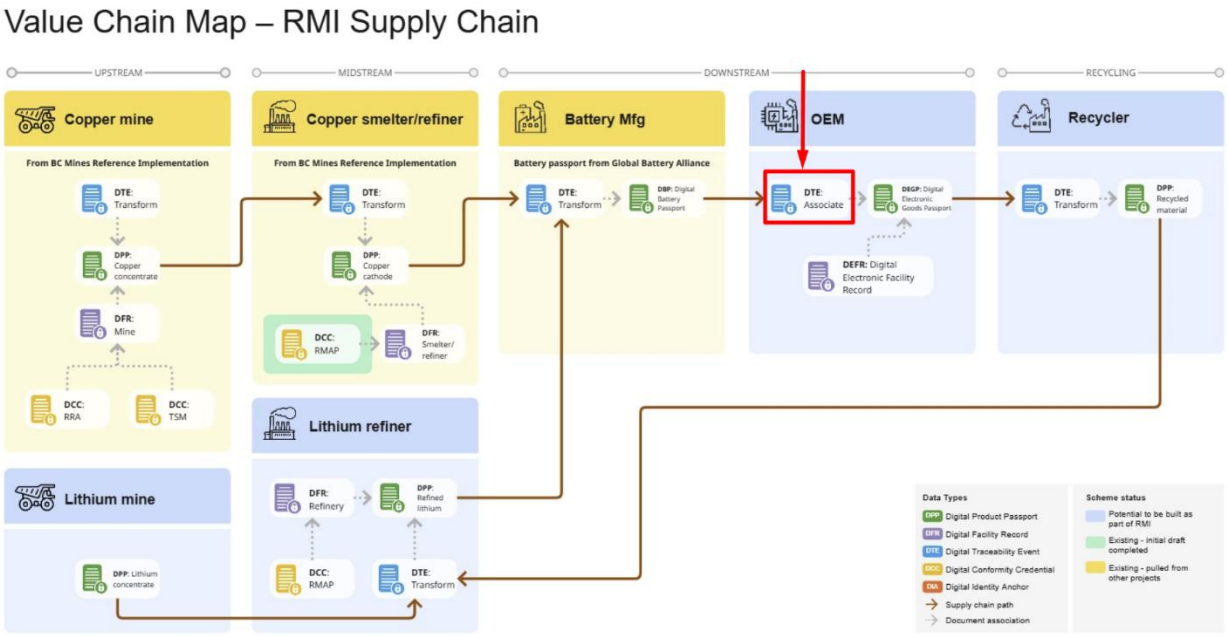
1. Visit the Interactive VC Map - https://www.rbtp.pyx.io/interactive-vc-map
2. OEM Product - Select Digital Electronic Goods Passport (DeGP)



3. Scroll Down to the History section. In the row labeled **Association Event**, click **View** on the far right.

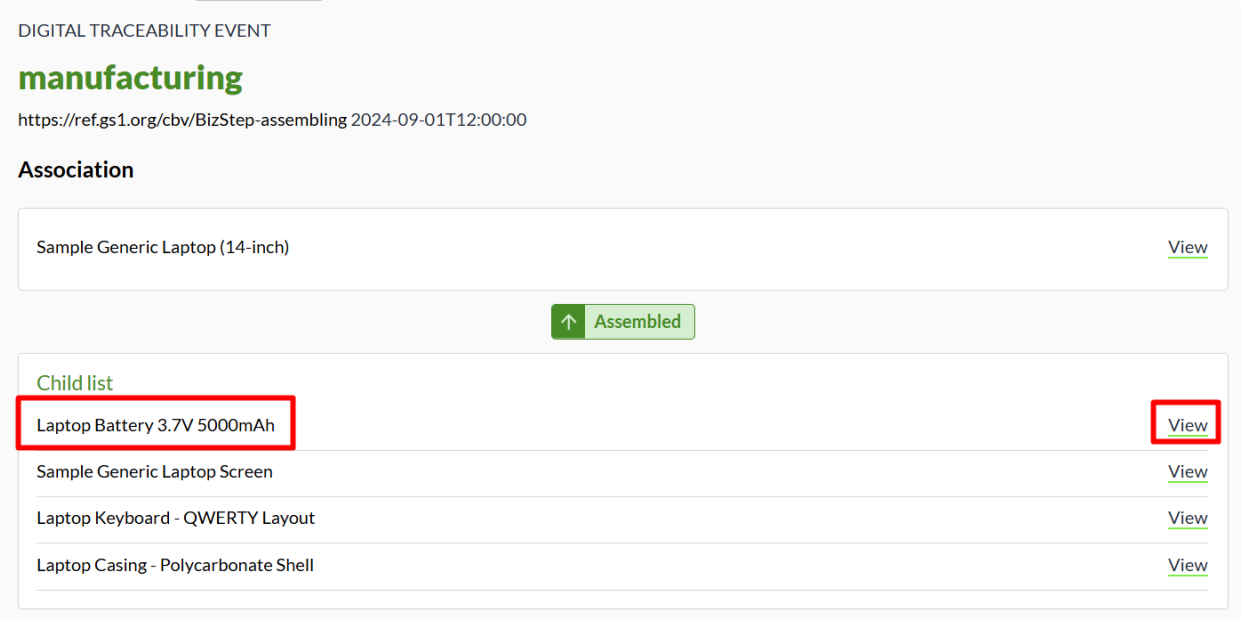


i. You are now viewing the Association Event where the battery was added to an assembled product (DTE):

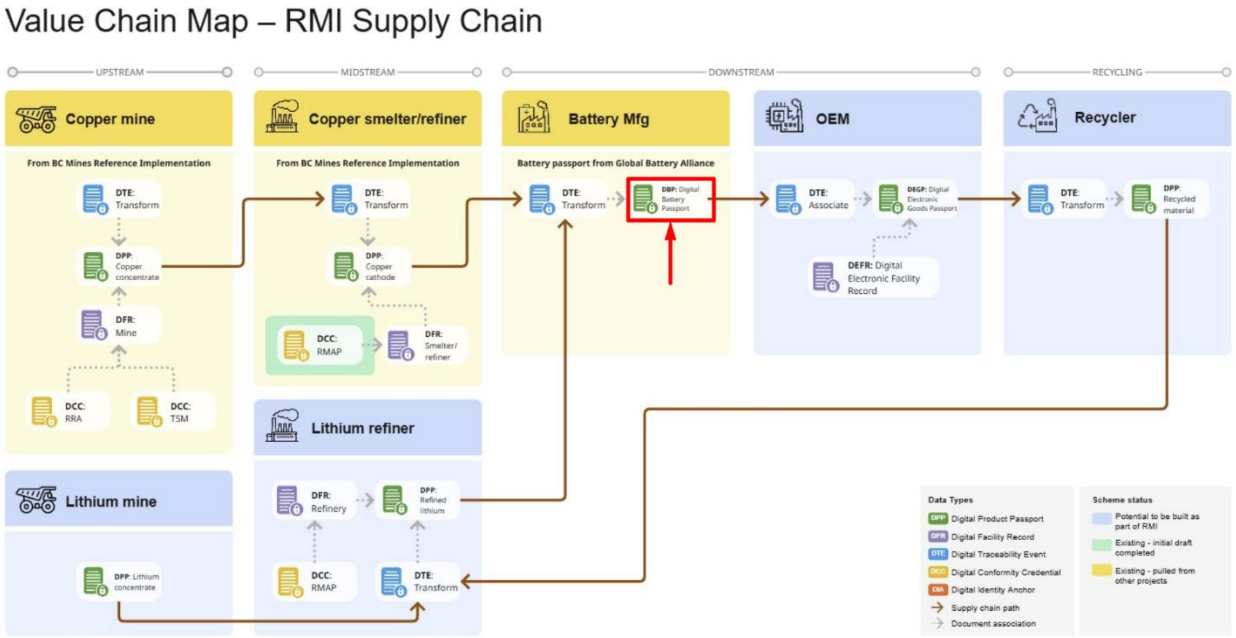


4. The Association (Manufacturing) Event shows upstream (Battery) and downstream (Assembled OEM Product)

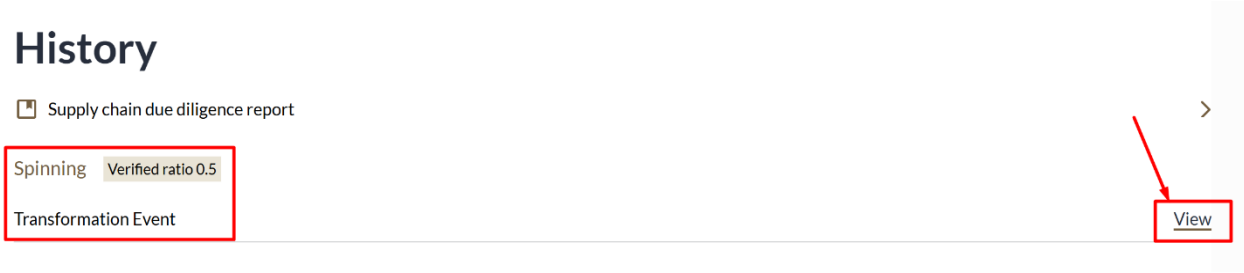
   i. To hop from the OEM Association Event to the suppliers DPP (Battery Digital Product Passport, select **View** from the Child List:



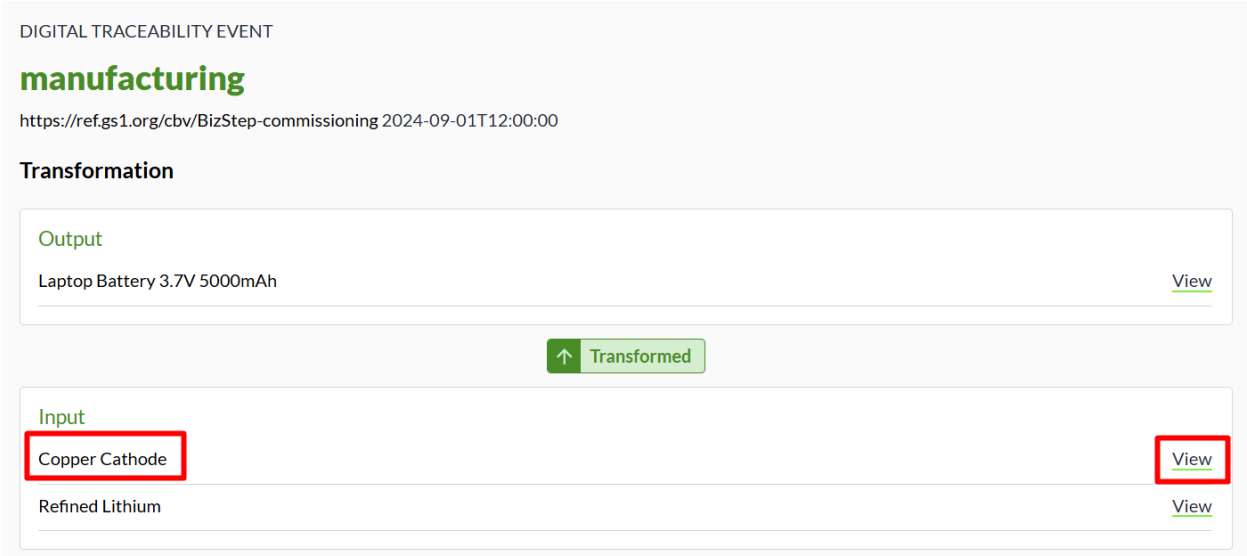
   ii. You are now viewing the supplier's upstream DPP for the battery that was used in the OEM Assembly.



5. To view the DTE (Transformation Event) that added the spun Copper Cathode to the Battery Assembly, you'll follow the same steps as before. Scroll down to **History** and select **View** in the row for the **Transformation Event**



   i. To view the DPP of the Copper Cathode, like before you will select **View** from the row labeled **Input**

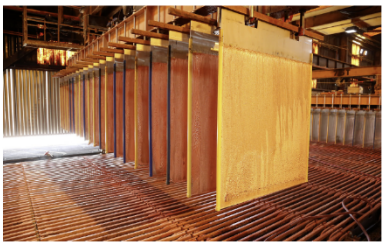


6. You are now viewing the Digital Product Passport for the BC Mines Reference Implementation

PRODUCT PASSPORT

Copper Cathode

ID: https://idr.rbtp.pyx.io/gs1/01/09359502000126/21/DPP_01 Batch: 20241111 Serial:

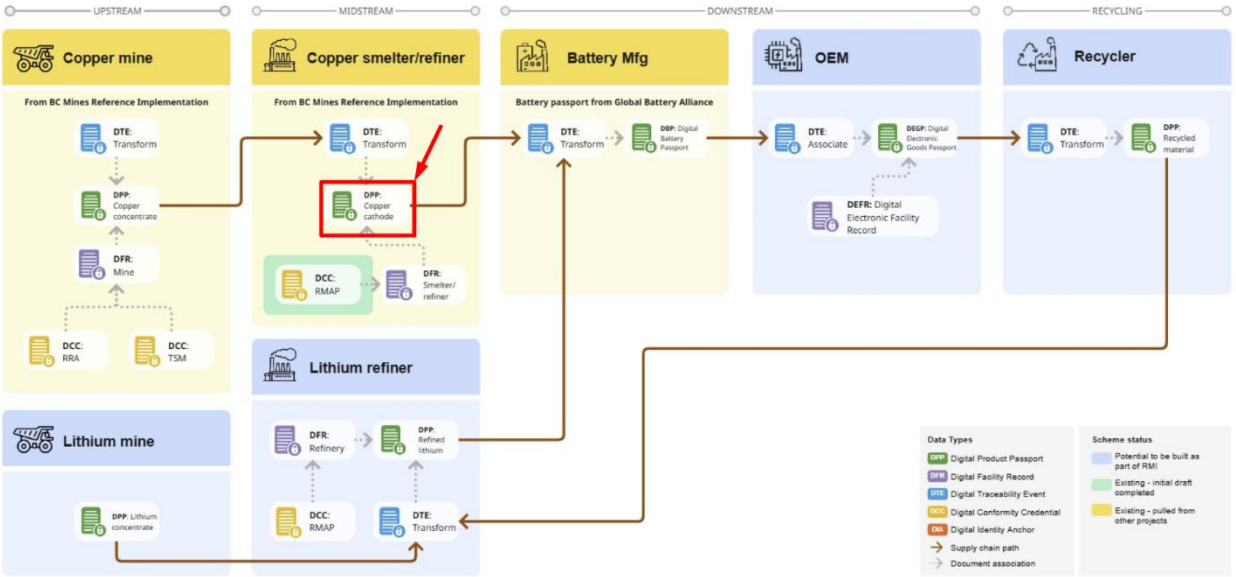


Sheets of High Purity Copper called cathodes to be used in products for everyday use.

Production

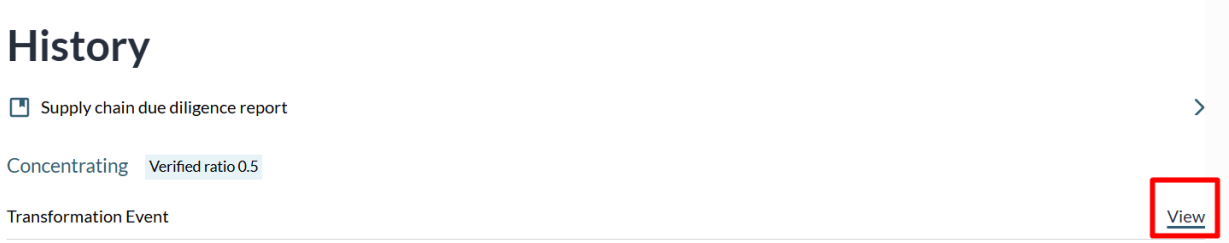
Product category	Refined copper and copper alloys, unwrought; master alloys of copper
Produced by	TEST Smelter Parent

Value Chain Map – RMI Supply Chain

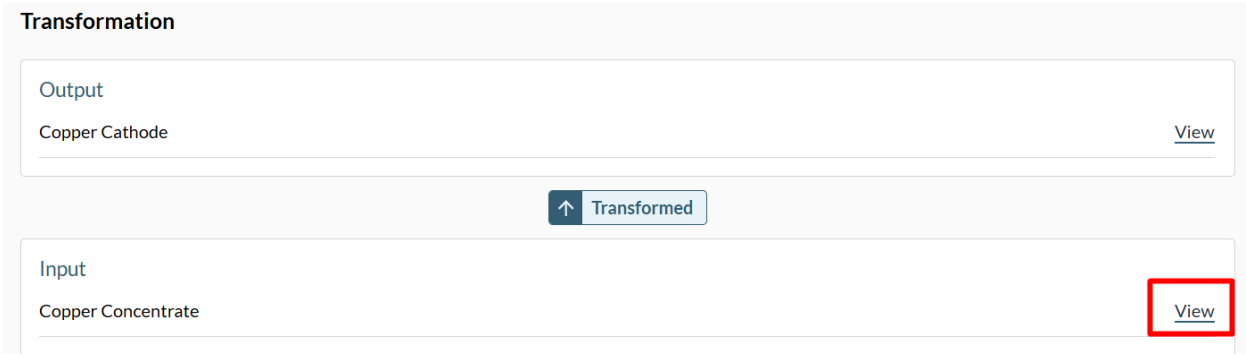


7. To view the DPP from the Copper Mine, you repeat the same pattern above.

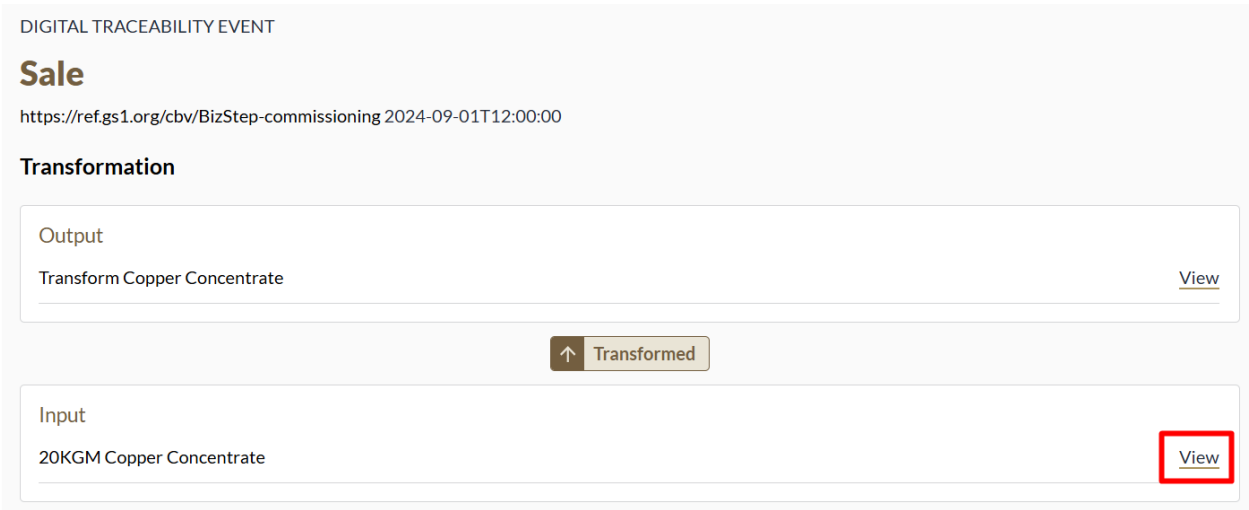
   i. Scroll down to the **History** Section and select **View** in the row labeled **Transformation Event**



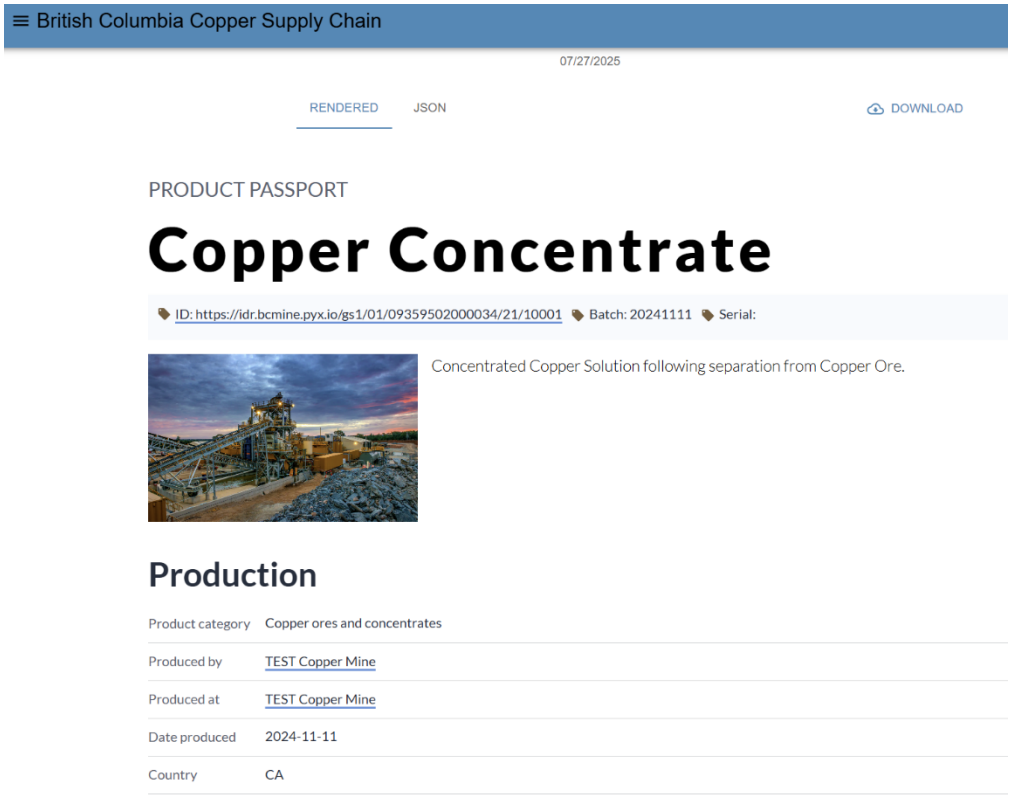
   ii. From the Traceability event, you will select the input mineral, copper concentrate and you will be taken to the sale event from the miner.



   iii. On the newly opened DTE page (smelting), in the Input section, select View in the row labeled Copper Concentrate. You're now viewing the Sale Traceability even from the miner.



iv. Select “View” in the row labeled 20KGM Copper Concentrate and you will be viewing the Digital Product Passport at the mine

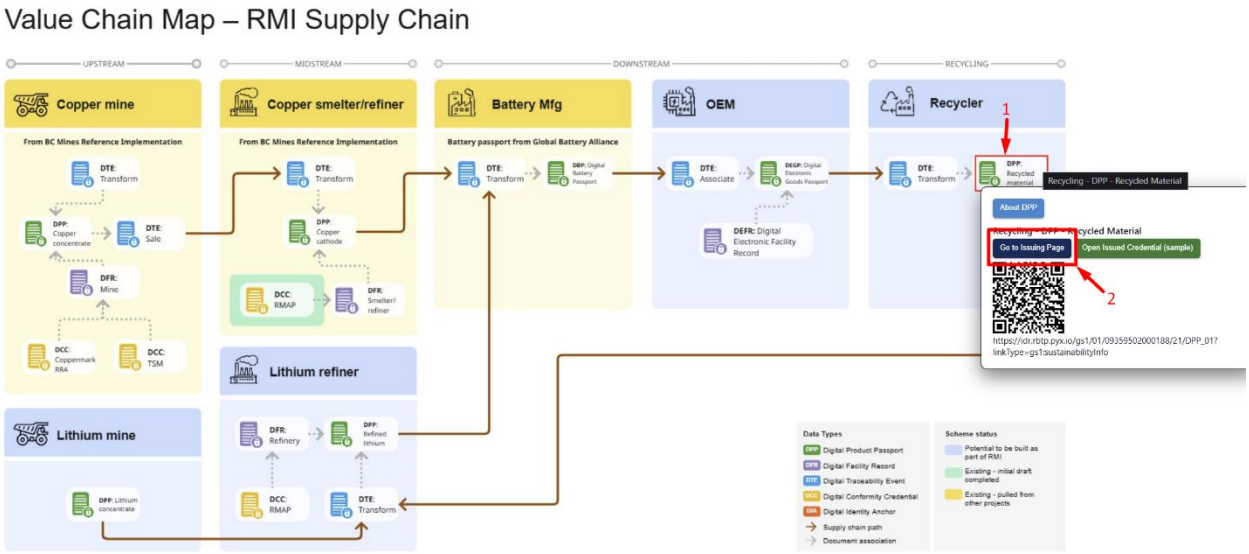


7.2.3 How to Publish a Digital Product Passport

1. Visit the Interactive VC Map - https://www.rbtp.pyx.io/interactive-vc-map

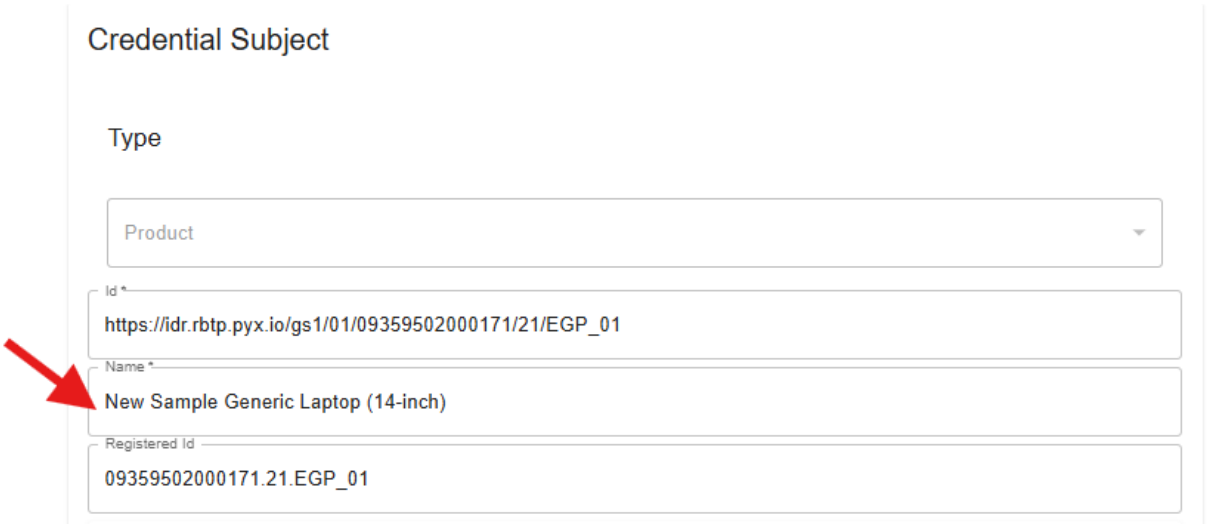
    i. Select the Digital Product Passport located at the Recycler

    ii. Then select “Go to Issuing Page” to open a form to create a DPP for a recycled battery. The process is the same for any DPP on this map.



2. On the issuing page, update one of the input fields for the DPP:

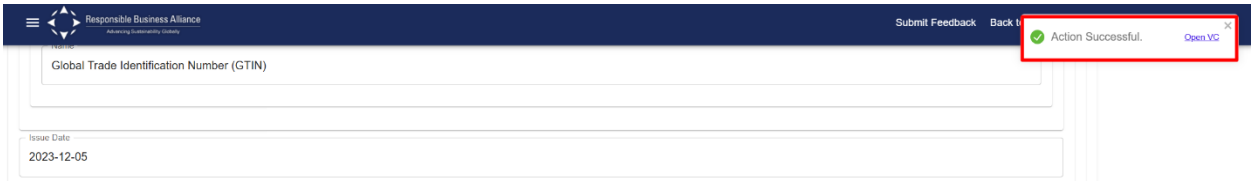
    i. Go to the **Credential Subject** section and update the **Name input field** to your liking



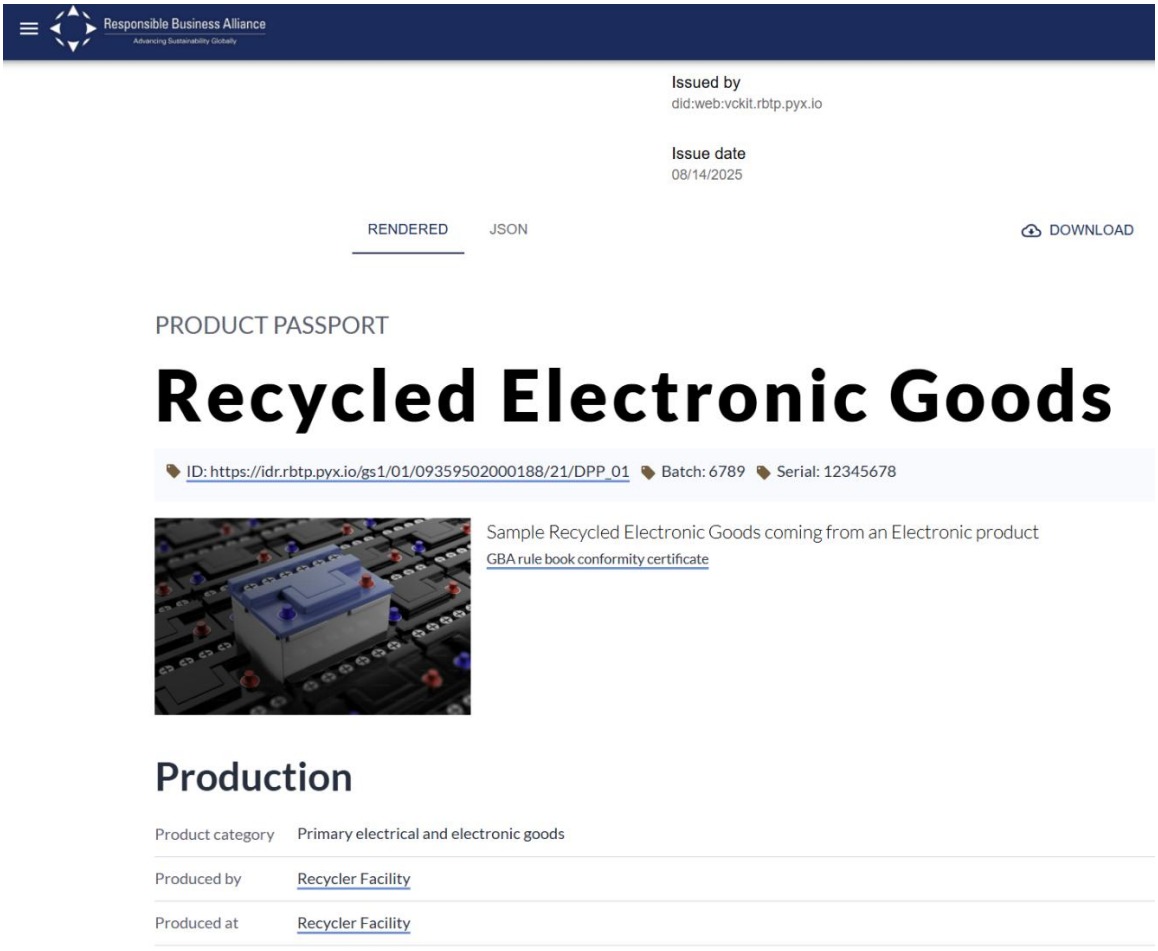
ii. For this exercise, we won't be updating the other fields, but please refer to the **“Input fields description”** below for more details on the meaning of the field

3. Click on “Submit” at the bottom of the page and you will have issued your Digital Product Passport for a Recycled Battery.

   i. In order to view the newly created DPP, a pop up in the upper right hand corner of the screen will show for you to select “Open VC.”



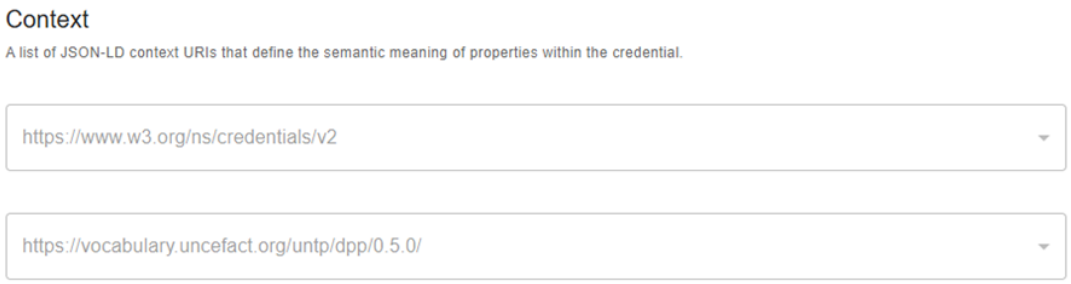
   ii. And now you are viewing your newly created DPP



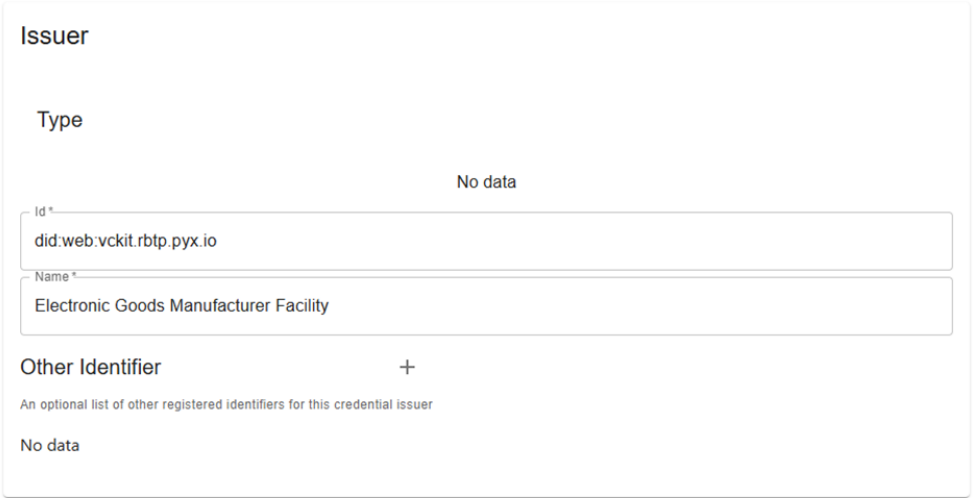
If you’d like to share this DPP, visit the DPP sharing exercise to learn how

7.2.3.1 Input fields description

- **Type:** specify the credential type
- **Context:** define the semantic meaning of properties within the credential.

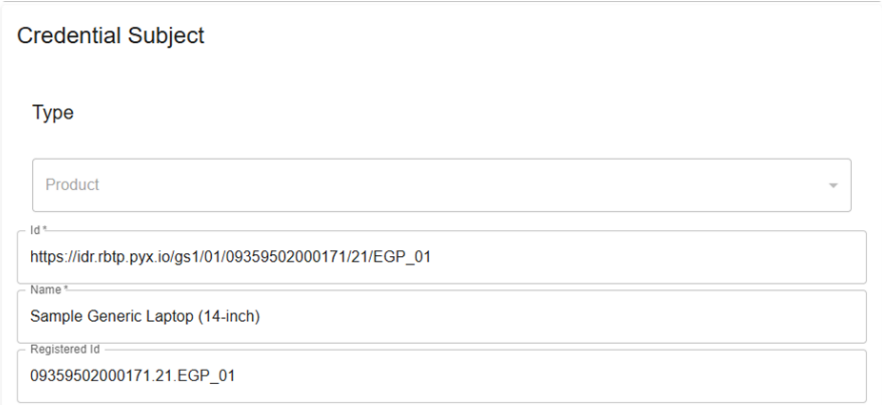


• **Issuer:** information about the issuer person or organization. You can modify the id and name.



- **Validity period**: You can specify the start and end dates for which the DPP is valid.

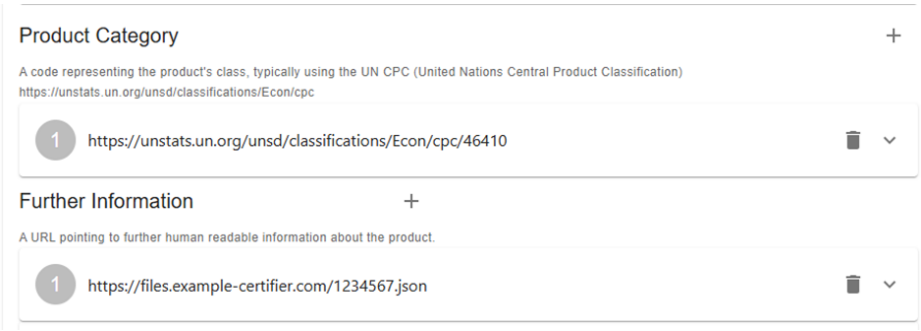
- **Credential Subject**: information about the product within the identifier scheme. You can modify the Id, Name and Registered Id.



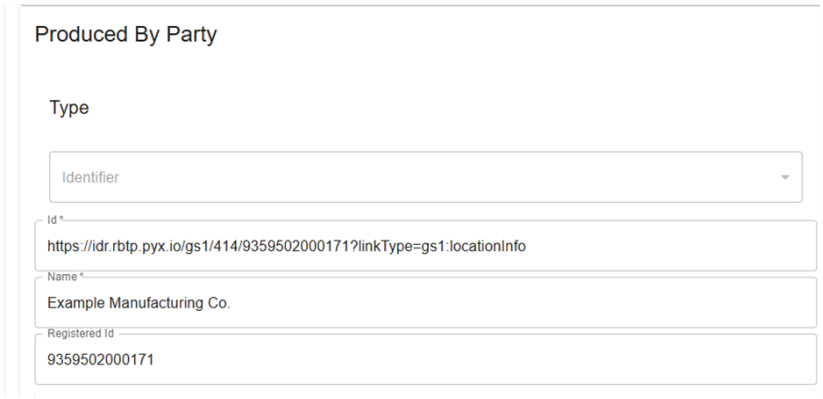
- **Id Scheme:** contains the identifier scheme type, id and Name. You can modify the Id and the Name.

- **Product Image:** contains the product image as a URL, name and type. All these fields can be modified.

• **Product Category:** code representing the product class, typically using the UN CPC.

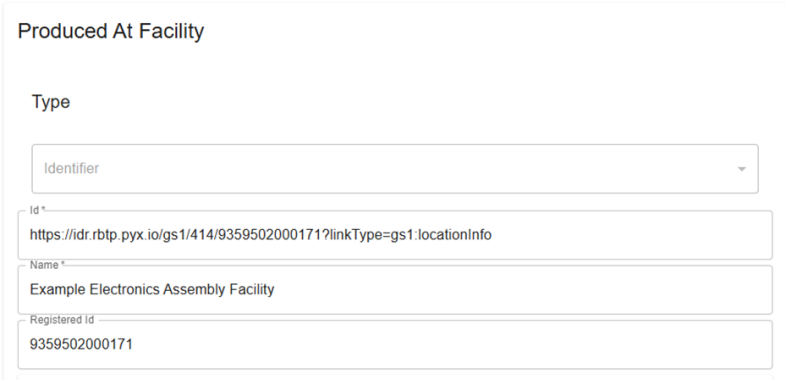


• **Produced by Party:** specify the information about the entity within the identifier scheme. You can modify the Id, Name and Registered Id.

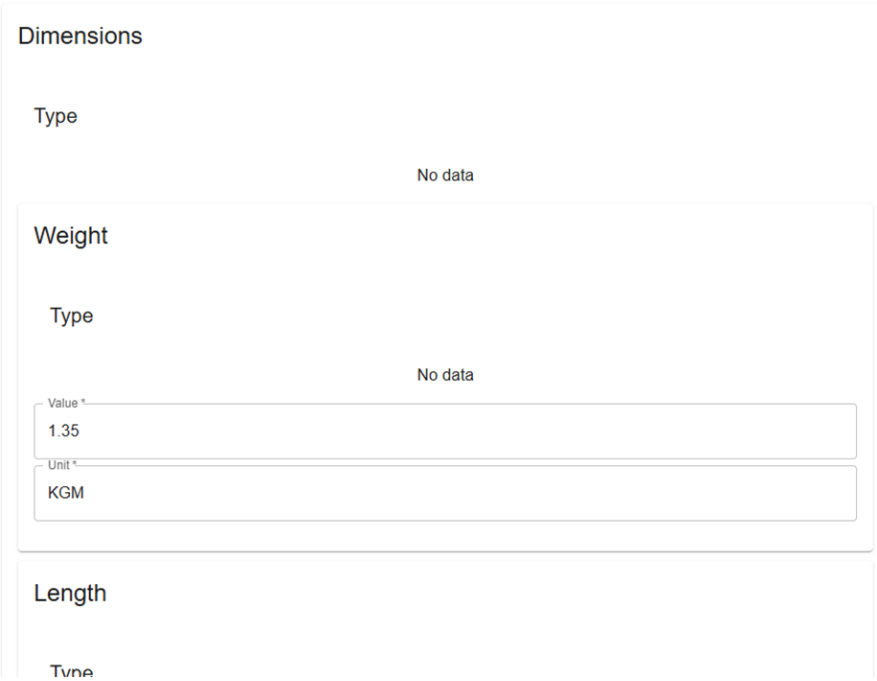


- **Id Scheme:** information about the registration scheme. You can modify the Id and Name.

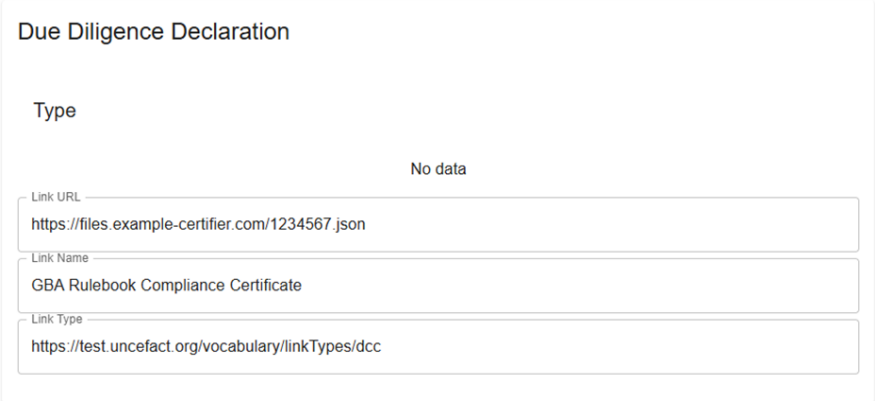
- **Produced At Facility:** information about the entity within the identifier scheme. You can modify the Id, Name and Registered Id.



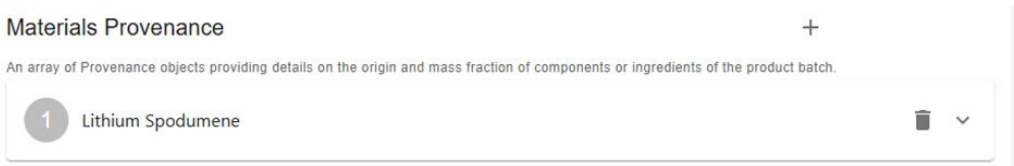
- **Dimensions:** it includes Weight, Length, Width, Height, and Volume. All these fields can be modified.



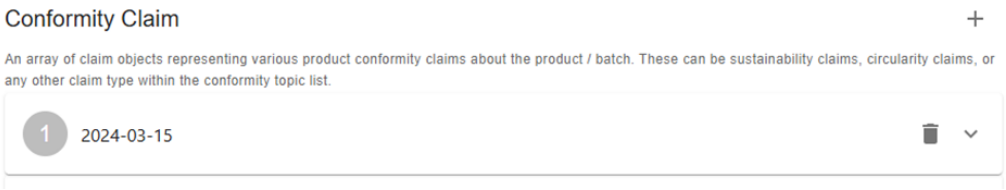
- **Due Diligence Declaration:** contains the target resource information. All these fields can be modified.



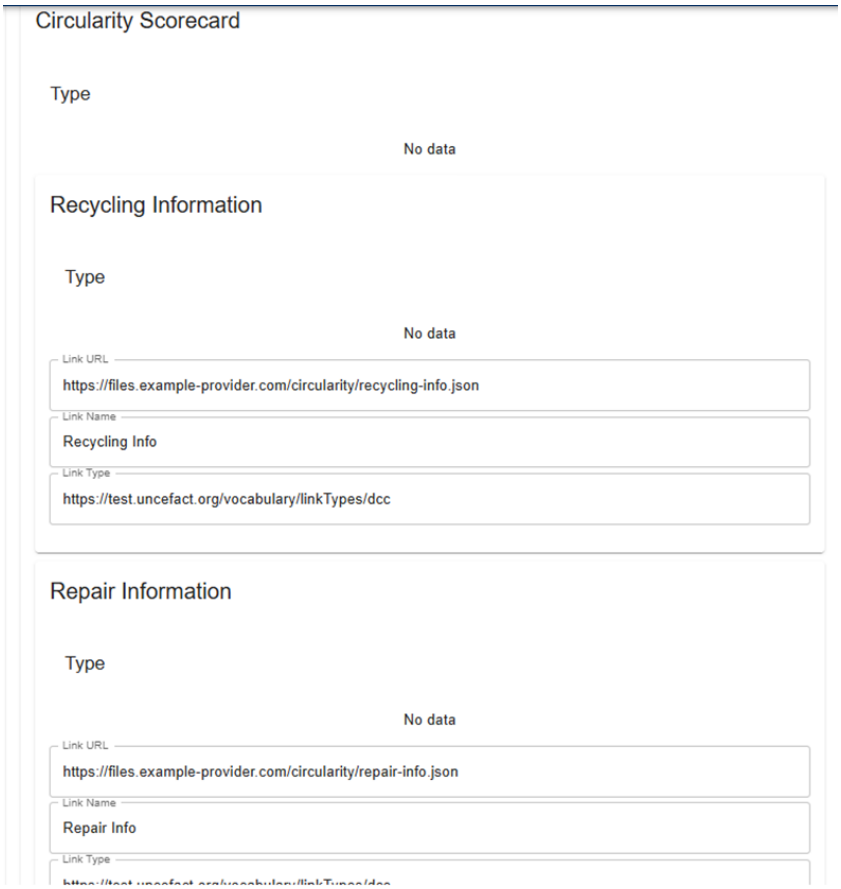
• **Materials Provenance:** details on the origin and mass fraction of components or ingredients of the product batch. You can click the "+" icon and add each component or ingredient.



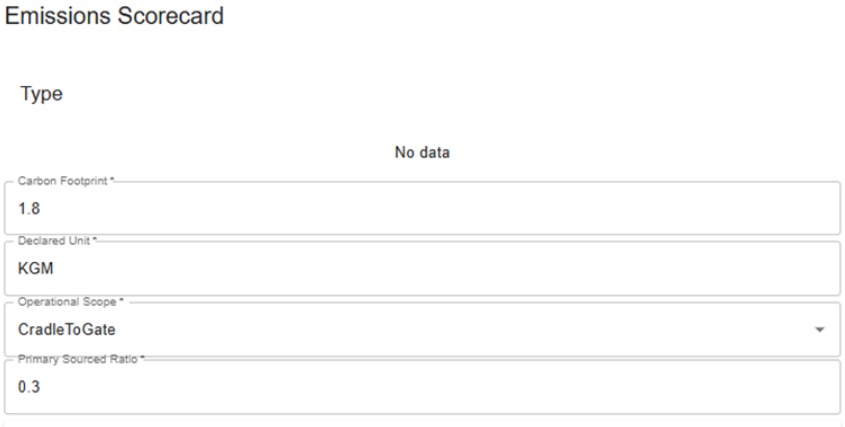
• **Conformity Claim:** contains product conformity claims about the product / batch. You can click the "+" icon and add each conformity claim.



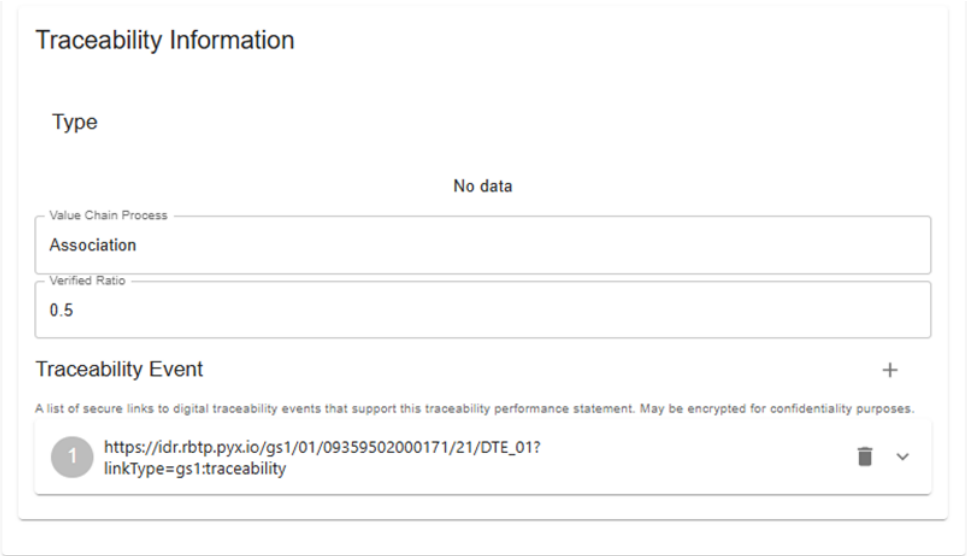
• **Circularity Scorecard:** provides a simple high-level summary of circularity performance of the product. You can modify the URL, Name and Type for the Recycling and Repair Information.



• **Emissions Scorecard** gives a clear snapshot of the product's greenhouse gas (GHG) emissions performance, providing a single indicator to assess its overall environmental impact. All these fields can be modified.



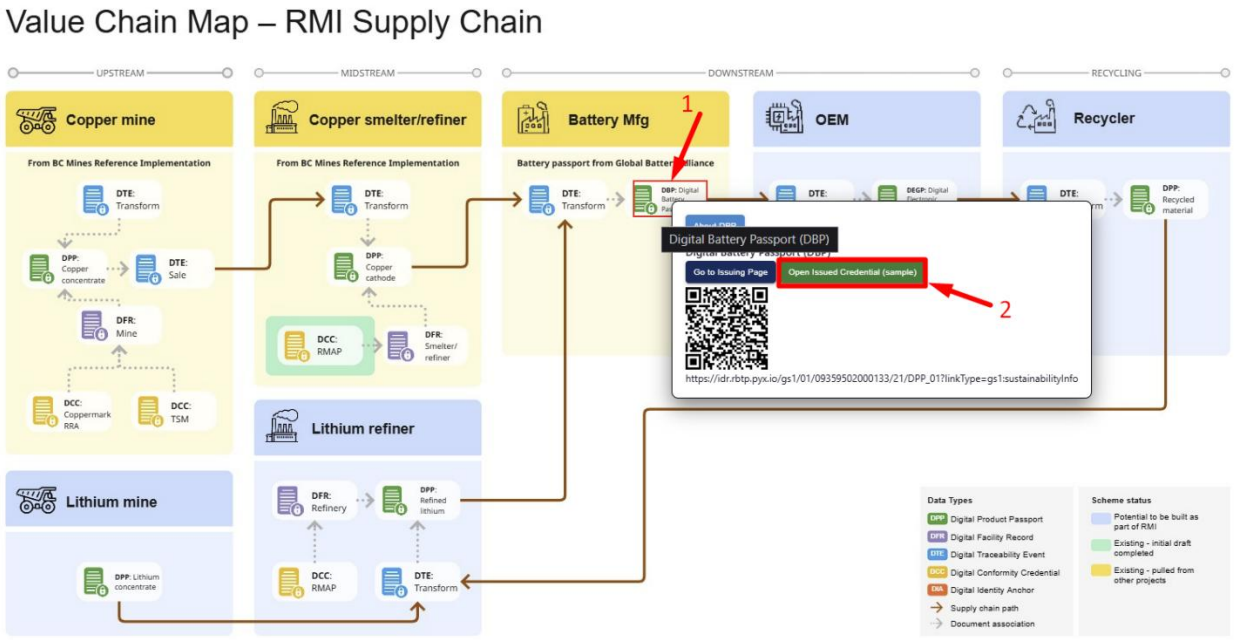
• **Traceability Information:** contains information about this traceability data set. You can click the "+" icon and add a Traceability Event and modify the Value Chain Process and Verified Ratio.



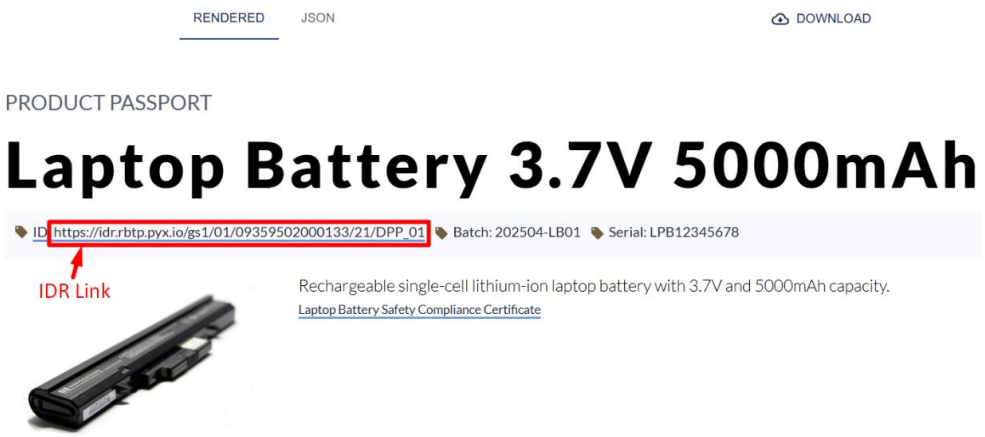
7.2.4 Sharing Exercise – Sharing DPP's with Supply Chain Actors

Within the RBTP Interactive Value Chain Map, you can select any Digital Product Passport from the Map, but in this exercise we will use the Digital Battery Passport that is issued by the Battery Manufacturer.

After selecting the DBP, choose "Open Issued Credential (sample)" to view the sample DBP.



1. Once the credential is opened, the IDR link can be copied and pasted.



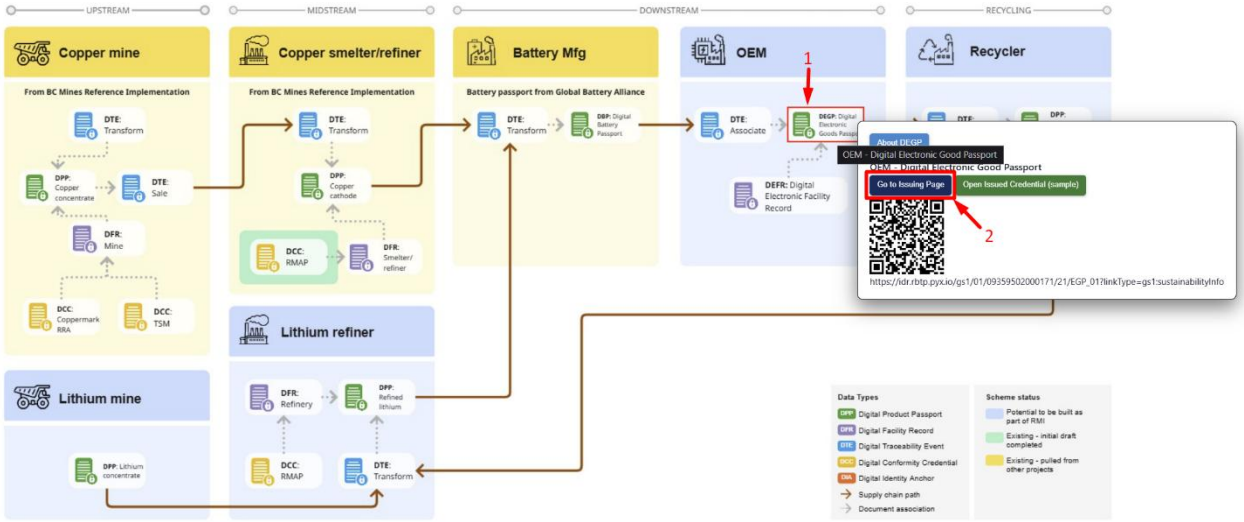
2. Send this link as you would any internet link (email, text, zulip) to share this with interested parties

7.2.4.1 Sharing a DPP Using a QR Code

Currently the QR code is only visible when you are issuing a credential, so this exercise will have the initial step of creating a Digital Product Passport

1. Visit the RBTP Interactive Value Chain Map

    i. Hover over and select any Digital Product Passport. In this exercise, we use the Digital Electronic Goods Passport



2. An Issuing page will open that you use to publish a credential. As you scroll down you'll see a QR code just below the map, and above the fields where data is entered

i. Use a snippet tool, or “Print Screen” key on your keyboard to capture a screenshot of the QR Code and save to your local device

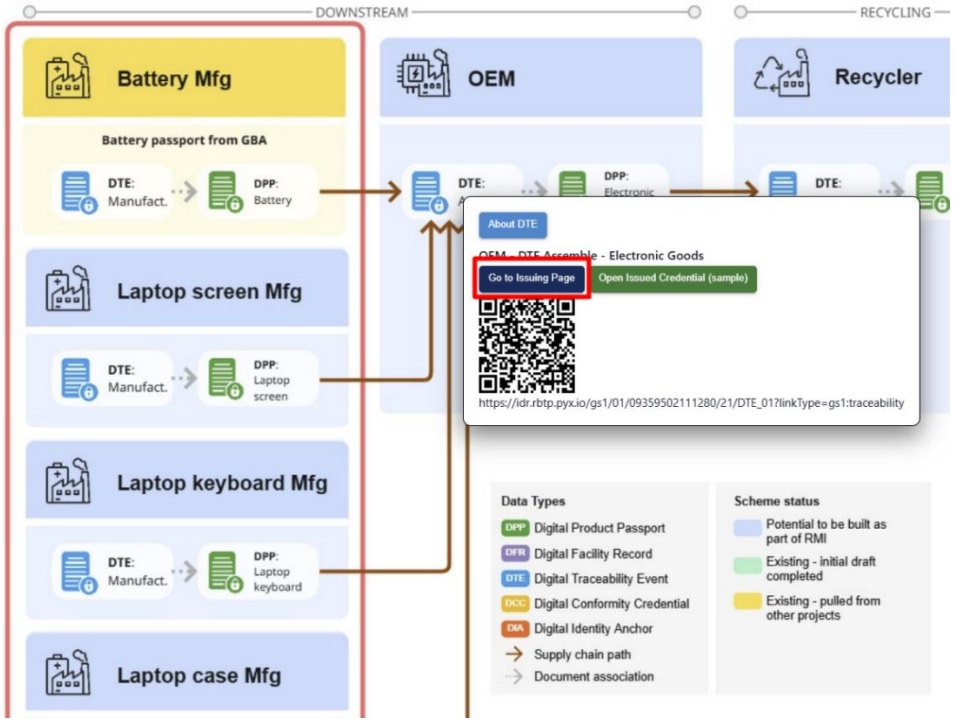
3. Complete the fields (or skip entirely, they are prepopulated with synthetic data to make things easier) and scroll to the bottom and click submit in order to publish your Digital Product Passport.
    i. The newly created digital passport is now discoverable by the QR code saved to your local device.
4. The code can be printed and placed on packaging, or displayed on a device and anyone with a QR Code reader can discover information about the product

7.2.5 HBOM Exercise – Creating an Assembly through a DTE that links many input DPP’s to a single Output DPP

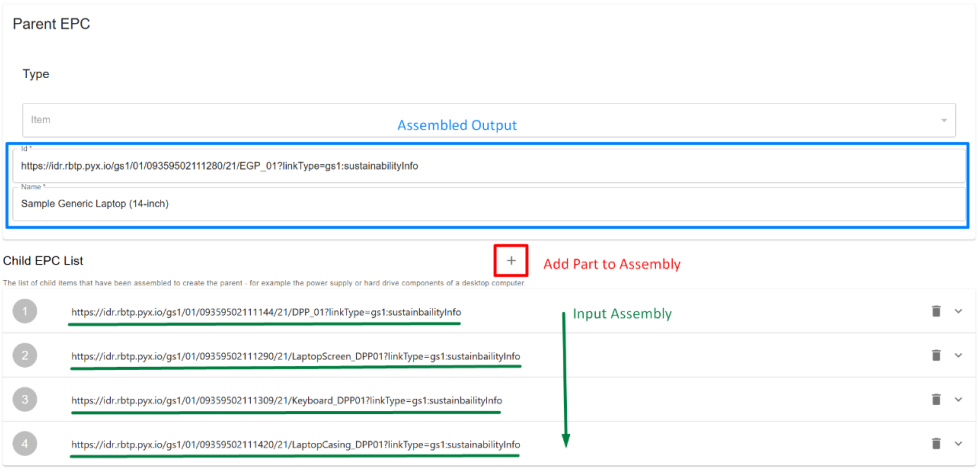
In practice, a downstream manufacturer will have DPP’s from the upstream supplier to complete this process. Here, we will use existing credentials to simplify the exercise. We also demonstrate how to add an additional item to the HBOM through the DTE (Digital Traceability Event)

This exercise is best done on 2 screens/windows with instructions on one screen, and the RBTP Reference Implementation on the other

1. Visit the Interactive VC Map for Pilot 003 - [Pilot 003 Basic HBOM]
    i. Select “Go to Issuing Page”



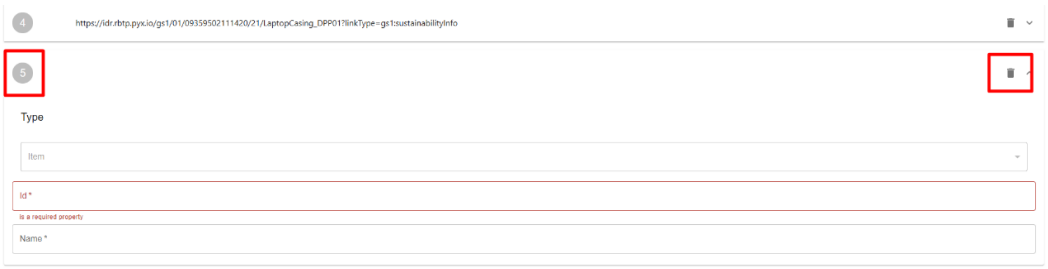
2. Scroll to bottom of Page where EPC (Electronic Product Codes) are organized
    i. The Parent EPC is the final assembled product shown in blue
    ii. The Child EPC List is the HBOM (Hardware Bill of Materials) shown in green
    iii. The “Add Part to Assembly” function is performed by using the “+” in the red square



iv. To see how a part would be added to the assembly, you can select the “+” sign highlighted by a red box and paste a supplied EPC (Electronic Product Code) into the form.

v. As this is a demonstration more than an exercise, we will delete the newly added Input to maintain the original version of the DTE (Digital Traceability Event)

a. Select the Trash Icon in the newly created EPC Input labeled with “5” and your input will be deleted



vi. List of Parts - Listing the EPC Codes below to be able to reset the DTE in case users accidentally delete

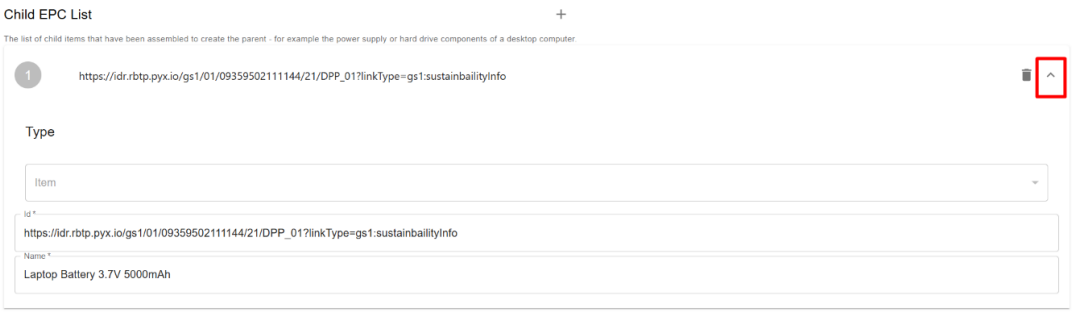
a. Laptop Battery
- https://idr.rbtp.pyx.io/gs1/01/09359502111144/21/DPP_01?linkType=gs1:sustainbailityInfo

b. Generic Screen
- https://idr.rbtp.pyx.io/gs1/01/09359502111290/21/LaptopScreen_DPP01?linkType=gs1:sustainbailityInfo

c. Laptop Keyboard
- https://idr.rbtp.pyx.io/gs1/01/09359502111309/21/Keyboard_DPP01?linkType=gs1:sustainbailityInfo

d. Laptop Casing
- https://idr.rbtp.pyx.io/gs1/01/09359502111420/21/LaptopCasing_DPP01?linkType=gs1:sustainabilityInfo

3. Select the carrot in the red box in order to expand the EPC item and see more details



4. Now the Assembled Product is linked to the inputs of the assembly through a DTE (Digital Traceability Event) and you have demonstrated how a very basic HBOM can be created in the RBTP Reference Implementation