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UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

UNITED NATIONS CENTRE FOR TRADE FACILITATION AND ELECTRONIC BUSINESS (UN/CEFACT)

BUSINESS REQUIREMENTS SPECIFICATION

(BRS)

Digital Product Conformity Certificate Exchange

- High Level Process

Approved: UN/CEFACT Bureau _____

Version: 1.0

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Document History

Phase	Status	Date Last Modified
Draft Development	Internal Review Processed	March 24, 2024

Change Log

Date of Change	Version	Paragraph Changed	Summary of Changes

1.0 Preamble

Unverified product claims provide potentially false assurance for purchasers and regulators. Conformity assessment processes are a key mechanism for providing global product assurance, however, conformity attestations that result from conformity assessment processes are still largely paper-based[1] or in electronic formats (e.g. PDF) which do not cater for easy data processing due to the lack of agreements on commonly used data elements and definitions. This situation is incompatible with regulator-driven digital initiatives, such as those directed towards sustainable trade outcomes. Market incentives for demonstrating sustainability claims may exacerbate the problem, by increasing incentives for falsifying or misusing evidence for such claims.

To facilitate efficient, informed processes for product acceptance and to mitigate the shortcomings of paper-based systems, this Business Requirements Specification (BRS) proposes a data structure for the exchange and verification of product conformity information. This is compatible with provisions of the World Trade Organization (WTO) Agreement on Technical Barriers to Trade[2] (TBT) regarding acceptance within an importing economy of the results of conformity assessment procedures arising in an exporting economy. This BRS also aligns with the International Organization for Standardisation (ISO) Conformity Assessment Committee (CASCO) standards[3] and the established global frameworks[4] operating in accordance with these standards for the facilitation and acceptance of conformity assessment outcomes, especially in the context of cross-border acceptance.

The intended audience for this BRS includes policy officials and private sector participants having responsibility for the quality, safety, environmental and social performance of products, the conformity assessment community and the community of solution providers who may be involved in technical implementation.

2.0 Executive Summary

For the products we consume and interact with, testing, inspection and certification provide the basis for market access requirements, especially those related to safety and quality characteristics but, increasingly, a broad range sustainability and social impact characteristics as well. New demands from governments, regulators and users, such as whole-of-life carbon accounting, are placing greater onus on data validation and discovery throughout the supply chain, to improve transparency and accountability.

[1] UN/CEFACT White Paper: Digital Product Conformity Exchange, August 2023

[2] https://www.wto.org/english/docs_e/legal_e/17-tbt_e.htm

[3] https://casco.iso.org/toolbox.html

[4] These frameworks include the global mutual recognition processes overseen by the International Accreditation Forum (IAF) [website] and the International Laboratory Accreditation Cooperation (ILAC) [website] as well as regional accreditation group mutual recognition arrangements.

Challenges with existing conformity data exchange systems are well established[5], including:

- attestations (e.g. certificates) are subject to revision, yet paper/PDF copies do not automatically update themselves;
- attestations are vulnerable to false connections being asserted between conformity data and the supplied product;
- the rigour of some conformity assessment outputs may be open to question, with the connection to global recognition not always obvious; and
- a single commercially sensitive data point means the entire attestation is removed from the pool of available data.

To support the transparency of product claims in the context of digital trade, this BRS proposes a data model for encoding key conformity assessment elements to enable automated verification. This can function independently of whether underlying attestation (certificate, report, etc) is digitalised, or even accessible. The data model is flexible enough to deliver comprehensive verification or may be implemented at more modest levels to reflect an evolving pathway toward supply chain digitalisation. A platform-independent mechanism for interoperable data access/exchange is also described, which is based on open standards and consistent with UN/CEFACT recommendations.

This BRS provides a vital technical underpinning for digital product passport initiatives and digital trade single windows, while empowering conformity assessment bodies (CABs) to maintain control over the integrity of their data and to address their customer's requirements.

3.0 References

The following resources have been fundamental to the development of this BRS:

1. ISO/IEC 17000:2020 Conformity assessment - Vocabulary and general principles
2. UN/CEFACT White Paper: Digital Product Conformity Exchange, August 2023 https://unece.org/trade/documents/2023/10/white-paper-digital-product-conformity-certificate-exchange
3. UN/CEFACT White Paper: eData Verifiable Credentials for Cross Border Trade https://unece.org/trade/documents/2023/10/white-paper-edata-verifiable-credentials-cross-border-trade
4. UN/CEFACT Business Requirements Specification: Traceability and Transparency in the Textile and Leather Sector, Part 2: Use Cases and CCBDA Data Structures, Product Circularity Data Use Case Extension (publication pending) https://uncefact.unece.org/download/attachments/182976575/ProductCircularityDataUseCase-v3A-Extension-TL_TT_BRS_Part%20II-UC_CCBDA.pdf?api=v2
5. UN/CEFACT Modelling Methodology v2.0
6. UN/CEFACT Core Component Library 21A

[5] UN/CEFACT White Paper: Digital Product Conformity Exchange, August 2023

4.0 Objective

This BRS seeks to outline a basic framework enabling any participant or stakeholder in a product supply chain to access sufficient reliable product conformity information to gain assurance about a product claim. Trusted trade demands a standardised approach for securing reliable assurances regarding the attributes of a product.

The framework should be equally applicable for applications involving digital product passports or for the direct sharing of conformity information between supply chain participants. The approach should be suitable for parties operating at various levels of digital maturity.

Use of the described data structure by any participating party should be voluntary but there is potential for this to become an important element of future secure digital supply chains.

5.0 Scope

5.1 Non-regulatory context

This BRS describes access to conformity assessment attestations having relevance to claims that are made about products, especially when moving across borders. Aspects of conformance are not limited to physical attributes and may encompass sustainability measures, for example. Attestations may address conformance with voluntary standards, voluntary certification and/or national/jurisdictional laws and may include statements regarding attributes of products and/or processes and/or organisations having relevance to a product. The BRS does not seek to address all forms of evidence, such as purchase receipts or data captured by production machine sensors, that may be presented as evidence in support of a product claim but is concerned specifically with outputs of product conformity assessment processes.

The BRS deals with data elements and linkages that can give confidence and utility to conformity attestations. Some aspects considered include: verifiable connections to supplied products (see note); the status of an issued attestation; the authority under which it was issued and digital access to any reported metrics and conformance thresholds. While the BRS does not directly address the reliability of statements supporting product promotion or product descriptions, it would enable interested parties to be equipped with means for substantiating any claims regarding product attributes.

> **Note**: From a conformity assessment perspective, references to ‘product’ may be taken as having applicability to both tangible and intangible purchases, including services. However, a lack of verifiable identifiers for intangible products makes the application of this BRS more difficult, particularly for services. As work continues to develop in this area, it is possible that pathways for applying this BRS to intangible products, including services, will become clear.

5.2 Regulatory Context

Where legislative processes exist for establishing product conformity within a jurisdiction, this BRS only seeks to describe the exchange of CAB outputs up until the point in the value chain at which a regulator, or other authority, takes control of product conformity (as applies, for example, in the case of European CE Mark approval). Any further exchange of CAB outputs beyond that point would occur in a manner defined by the legislator. Outside of the defined jurisdiction, this BRS may still have relevance for the purpose of export (that is, to address overseas market requirements). Also, even within the jurisdiction, products may still be subject to voluntary conformity assessment processes that relate to product attributes not covered by legislative approvals and so this BRS may have relevance, for example, to sustainability assessment for products subject to CE Mark approval.

6.0 Business Requirements Elaboration

6.1 Business Requirements List

A list of business requirements is provided in Annex 1.

6.2 Glossary and Definitions of Business Terms

A list of business terms having relevance to this BRS is provided in Annex 2.

6.3 Business Requirements View

6.3.1 Business Domain View

The International Supply Chain Reference Model (ISCRM) covers the set of processes following the recognition of need by a customer for a product or service up until the fulfilment of an order by a supplier and the resulting financial settlement. The product conformity process may be part of Buy (Trade) and Ship (Transport & Logistics) within the supply chain. For example, verifying evidence of product attributes could be executed on request of any party involved in, or considering, purchasing a product (such as exporter, importer, reseller, end-consumer) to meet their due diligence obligations or their own requirements for the product or by any party responsible for checking or enforcing requirements (typically a governmental authority, such as a customs authority or agency tasked with local regulatory approvals pertaining to products).

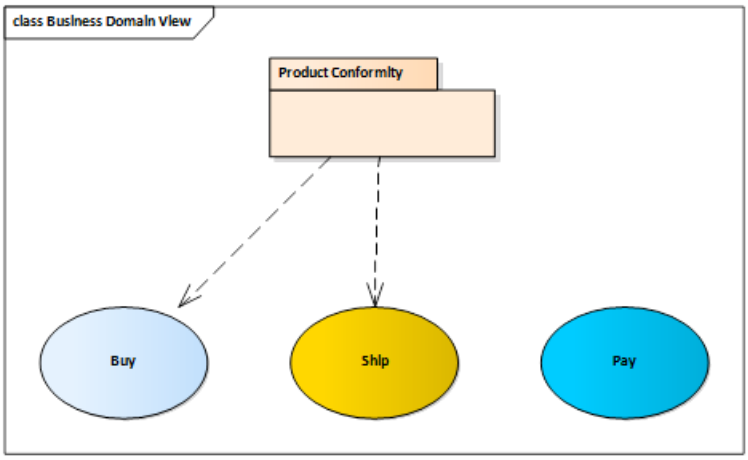


Figure 1 Business domain view

Categories	Description and Values
Business Process	BUY-SHIP-PAY/ProductConformity
Product Classification	All
Industry Classification	All
Geopolitical	Global
Official Constraint	None
Business Process Role	Requestor: Purchaser (such as Exporter, Importer, Reseller, Procure/specifier, Producer, Manufacturer, End-consumer), Governmental authority (such as Customs authority or Regulatory agency) Responder: Supplier (such as Producer, Manufacturer, Reseller), CAB
Supporting Role	Requestor: Industry associations, Consumer groups Responder: Scheme owners (and other Authorised source for conformity attestations other than CABs)
System Capabilities	No limitations

Table 1 Context categories

Several specific business use cases within the Product Conformity domain view are depicted below. The following abbreviations (see Annex 2 for associated definitions) are used:

- CAB = Conformity Assessment Body
- URI = Universal Resource Identifier

Use case 1.0 - Product Conformity

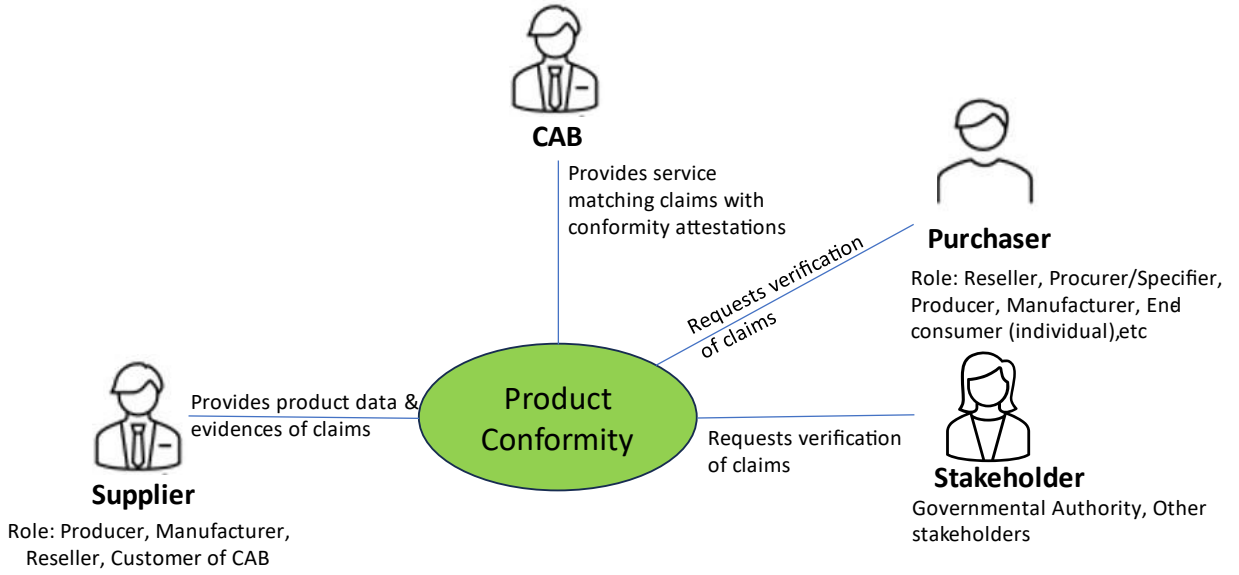


Figure 2 Use case 1.0

Use case 1.1 - Registration & discovery of product URIs

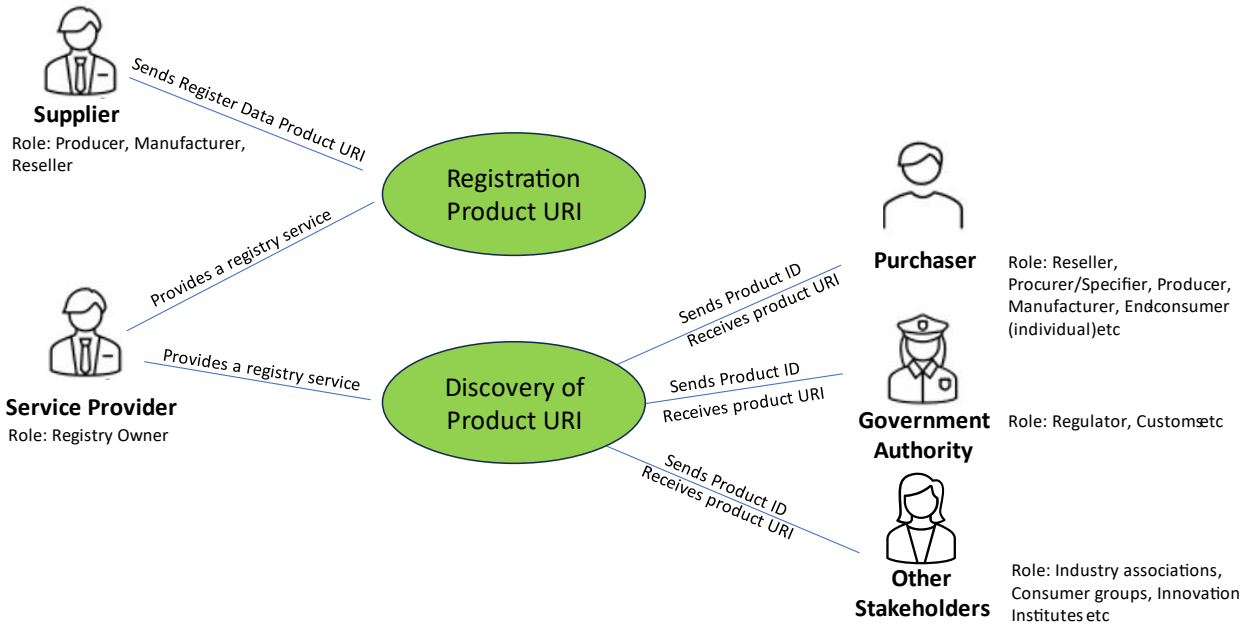


Figure 3 Use case 1.1

Use case 1.2 - Collecting product data using a product URI

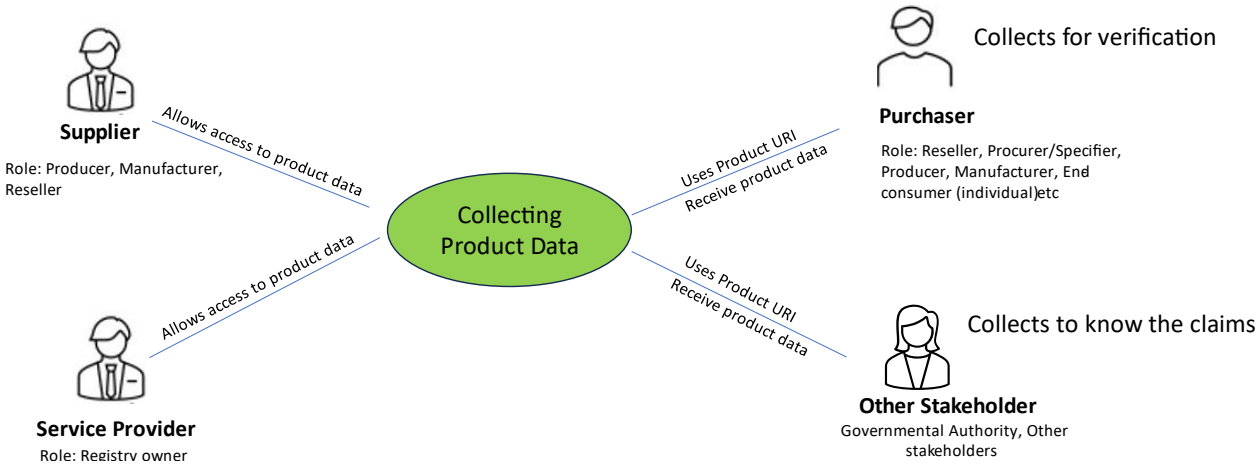


Figure 4 Use case 1.2

Use Case 1.3 - Transmitting conformity data to purchasers and governmental authorities (no registry involvement)

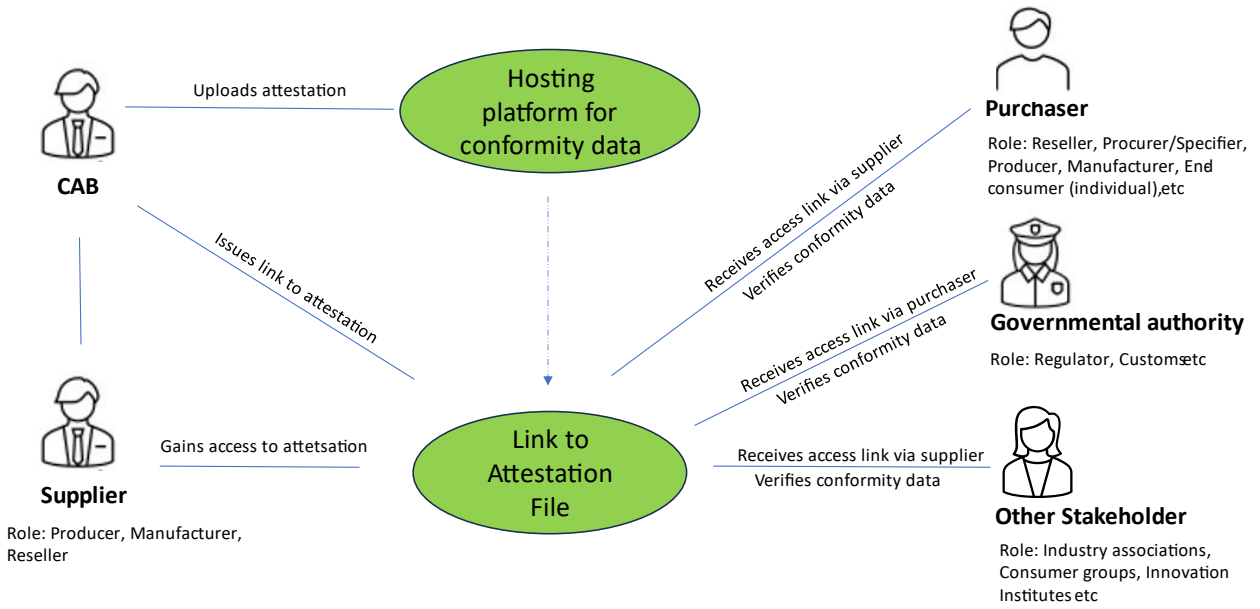


Figure 5 Use Case 1.3

Use Case 1.4 - Matching conformity attestation with claims

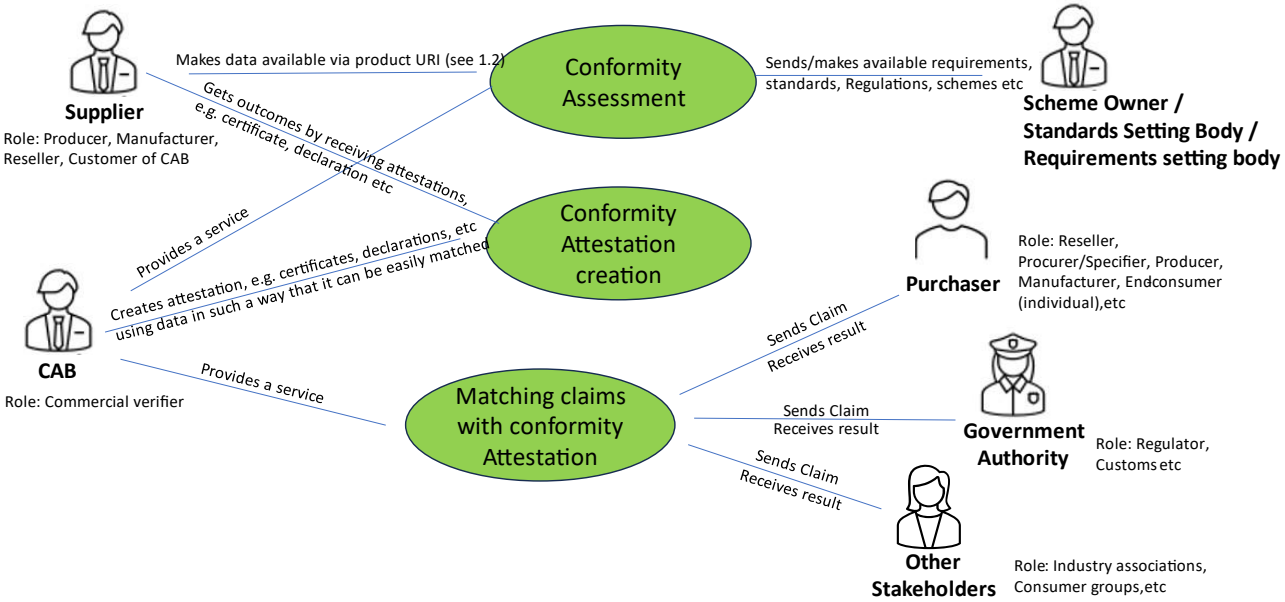


Figure 6 Use Case 1.4

Use Case 1.5 - Linking attestations to assurance credentials issued by an Authority

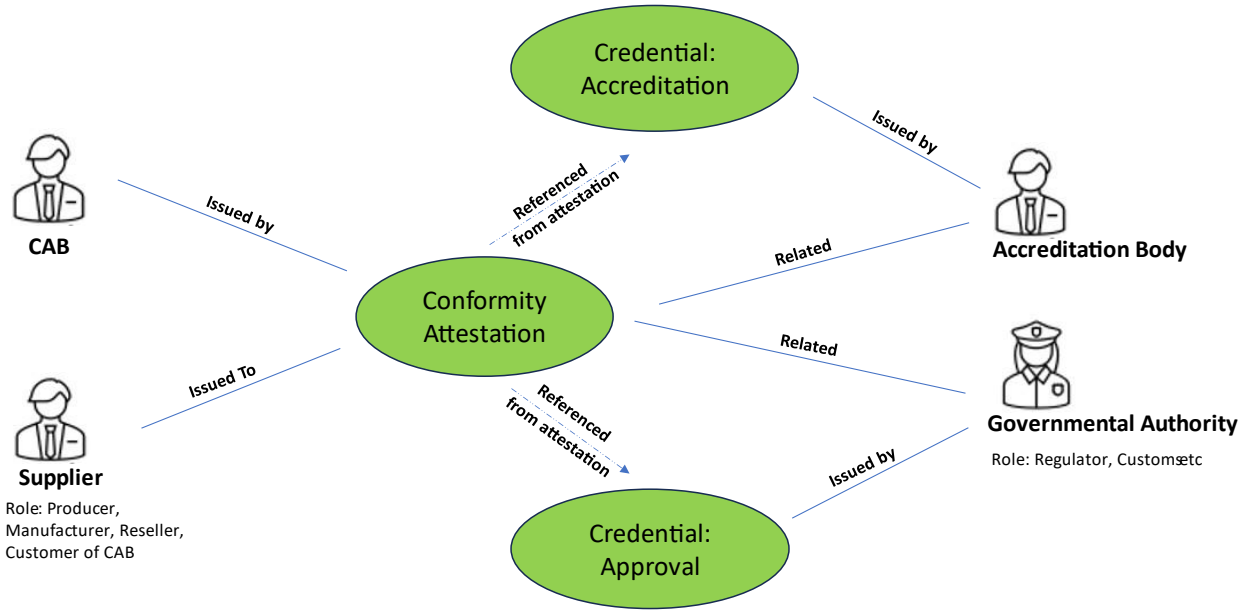


Figure 7 Use Case 1.5

Use Case 1.6 - Linking attestations to assurance credentials issued by a CAB

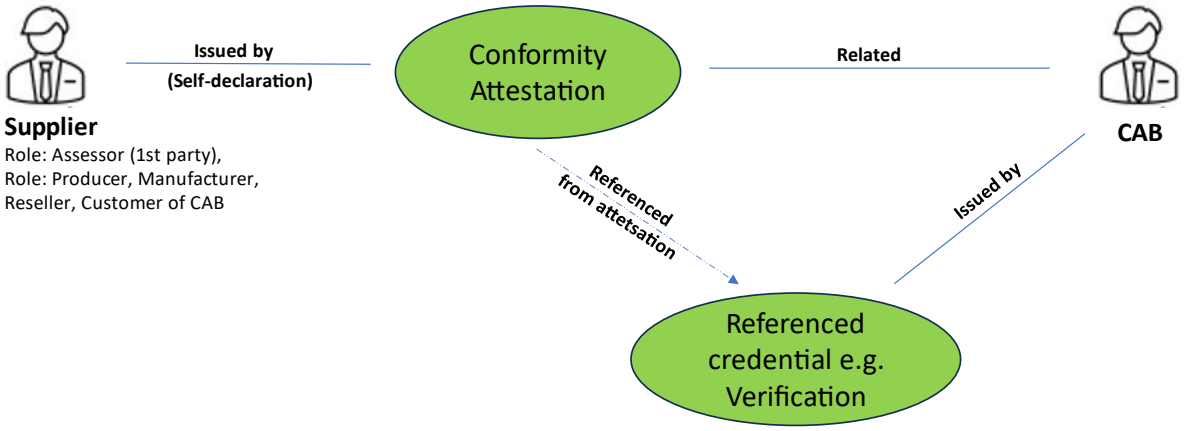


Figure 8 Use Case 1.6

The above use cases are all supported by the business requirements provided in Annex 1.

6.4 Business Partner View – Participants and Stakeholders

A list of participants and stakeholders in the domain under consideration is provided in Annex 3.

This list also includes any specifically defined roles that parties (that is, participants or stakeholders) may fulfil.

6.5 Business Entity View– Entity States, Lifecycle and Conceptual Model

6.5.1 Entity types

A list of entities and their current or proposed UN/CEFACT Core Component Library (CCL) definitions is provided in Annex 7.

6.5.2 Global context for acceptance of conformity assessment outputs

This BRS addresses the outputs of conformity assessment processes which are presented in the form of attestations relating to product conformity. The conformity assessment activities having relevance to this BRS may pertain to the attributes of a product or may pertain to the attributes of a process, producer, facility, supplier or other body having relevance to a product claim.

Conformity assessment is not limited to independent ('third party') assessment activity, although in some circumstances this may be a regulated requirement. Suppliers may perform self-assessments ('first party') or interested parties (such as purchasers) may conduct their own conformity assessments ('second party'). Attestations arising from self-assessment ('first party')

are commonly referred to as ‘declarations’ or ‘self-declarations’ - these may be presented as evidence to substantiate a product claim and may be acceptable for some purposes.

Approaches regarding the acceptance of conformity assessment outputs may vary depending upon the nature and degree of the risk involved in the product(s) and the required level of protection or other relevant public interest. The WTO TBT Agreement[6] provides a framework for the acceptance in an importing economy of the results of conformity assessment procedures arising in an exporting economy. The basis of acceptance is that the importing economy is satisfied that assurance of conformity with applicable technical regulations or standards is equivalent to that achieved by the importing economy’s own procedures (Article 6.1). To achieve satisfactory understanding of the adequate and enduring technical competence of the relevant conformity assessment bodies, the importing economy is required to take into account “verified compliance, for instance through accreditation, with relevant guides or recommendations issued by international standardizing bodies”, as an indication of adequate technical competence (Article 6.1.1).

This BRS recognises and facilitates a gradation of assurances that are more demanding than the lowest level (self-declaration) and provides a blueprint for varying contexts and use cases.

An individual product may have many claimed attributes (these may include conformance with both legislation and voluntary standards) and multiple threads of evidence may be provided in support of any single attribute. As a result, the supporting evidence for any single product may comprise a complex and extensive mix of evidence types. This BRS deals only with conformity assessment outputs (whether first, second or third party) and so does not attempt to address the entire set of possible evidence that might be provided to support claims made about a product.

Known challenges[7] with existing processes for accessing conformity data include:

- attestations (e.g. certificates) are subject to revision, yet paper/PDF copies do not automatically update themselves;
- attestations are vulnerable to false connections being asserted between conformity data and delivered products;
- the rigour of some conformity assessment outputs may be open to question, with the connection to global recognition not always obvious; and
- a single commercially sensitive data point means the entire attestation is removed from the pool of available data.

6.5.3 Discovery

Before an attestation can be verified, it must first be discoverable in a recognizable context. A key concept within this BRS is that trust is gained by processing information elements that are:

[6] https://www.wto.org/english/docs_e/legal_e/17-tbt_e.htm

[7] UN/CEFACT White Paper: Digital Product Conformity Exchange, August 2023

- collected from the source of issuance and
- linked to the product of interest

A proposed starting point for considering discovery and verification of attestations is for any attestation to be discoverable through a unique URI, where this is consistent with the confidentiality requirements of the customer of the CAB.

> **Principle 1:** To enable attestations subject to discovery to be uniquely referenced by means of a web link (where this is consistent with the legally entitled confidentiality requirements of the customer of the issuing CAB), a unique authorised source for any given issued attestation must be determined by the issuing CAB. [Annex 1 - Business Requirement B1]

Parties that may act as an authorised source for attestations can include scheme owners, accreditation bodies, verification bodies and other parties. Refer Section 7.3 for more detail.

For an attestation to have value in substantiating product claims, there must also be a demonstrable link between the attestation and the product of interest. Refer Annex 13 for information on identification systems.

> **Principle 2:** When undertaking conformity assessment of products, CABs can respond to the increasing use of unique identifiers[8] for traceability purposes by developing the capacity to capture any available unique and verifiable product identifier(s), if available at the level of resolution appropriate for the type of attestation, and to include such identifier(s) within the issued attestation. [Annex 1 - Business Requirement B3]

> **Note:** In the case of testing and inspection, a batch or serial number is normally applicable, in addition to the product type identifier. Refer Annex 11 for further insight.

Where the link from conformity assessment to a product is indirect, for example, where the object of assessment is an organisational management system or a production facility, unique identifiers still hold relevance. This is because a product claim may depend on a connection that is drawn between an organisation (holding a management system certification, for example) or location (such as a production facility) and the specific desired attributes for a product (such as its sustainability or quality performance).

> **Principle 3:** When undertaking conformity assessment of organisations and/or locations, CABs can respond to the increasing use of unique identifiers for traceability purposes by developing the capacity for capturing unique and verifiable identifier(s) such as legal entity identifiers or location identifiers, if available, and to include such identifiers within the issued attestation. [Annex 1 - Business Requirement B3]

[8] UN/CEFACT White Paper Globally Unique Identifiers in Supply Chains – Discoverable, Resolvable, Verifiable (pending publication)

Regardless of identifier type, an identifier is only of value where the basis for confidence in the link from the attestation to the object of conformity assessment is made clear. CABs are in the unique position of being able to attest to the circumstances under which the object of conformity assessment has been identified. For example, it may be that the CAB was responsible for scanning a product barcode or may have directly undertaken (or witnessed) the process of product sampling from a defined product batch. On the other hand, if the CAB was supplied with an identifier by the party requesting the conformity assessment, without any separate validation process, then this would represent a lower level of confidence regarding the link between the attestation and the stated object of conformity.

> **Principle 4:** CABs can ensure a clear basis for confidence regarding any traceability link from the attestation to a specific object of conformity assessment, by confirming that the quoted identifier(s) for the reported object of conformity have been verified by the CAB. [Annex 1 - Business Requirement B3]

As products are typically transformed along supply chains, there arises a need for reconciling captured identifiers for 'input' products with the identifiers for 'output' products. While this is likely to be performed at a generic level by CABs during assessment activities, making traceable product-specific connections available to external parties is more challenging and is beyond the scope of this BRS. The United Nations Transparency Protocol[9] (UNTP) represents a generalised approach for addressing this. Regardless of approach, the product identifiers reported by CABs at any given stage of supply are likely to represent an important part of robust solutions.

6.5.4 Nature of attestation

The acceptability of an attestation may be informed by such considerations as the type of assessment carried out, as well as indicators of assurance framed in terms of the impartiality of the assessing party as well as any authority (such as an accreditation of the CAB or a verification of the attestation) relevant to a specific attestation.

> **Principle 5:** Given the wide variety of attestation types and the non-equivalence of the various means of assurance, standardised vocabularies for the type of attestation and assurance descriptors are necessary, so that the issuing CAB may report this information in a digitally accessible manner to support reliable conformity assessment data exchange and verification. [Annex 1 - Business Requirement B8]

Example vocabulary structures for these elements are provided in Annex 4.

6.5.5 Evidence for assurance over an issued attestation

This BRS proposes that CABs provide formal links from issued attestations to any external assurance over the attestation, whether this relates to an independent accreditation, regulatory

[9] https://uncefact.github.io/spec-untp/docs/about

approval or (in the case of self-declarations) a verification/validation of the attestation by a CAB. This provides a clear basis for confidence in the issuing party and aligns with WTO TBT[10] Article 6 provisions.

Regulators in many sectors specify the use of conformity assessment by referring to a set of international standards, known as the CASCO Toolbox[11] which includes provision for independent assessment of a CAB, through a process known as accreditation, conveying formal demonstration of competence, impartiality and consistent operations in performing conformity assessment activities. Some certification schemes extend this provision, such as in the European Notified Body system[12], where accreditation is followed by notification and alternatives for accreditation exist. Apart from this, there are myriad standalone forms of regulatory approval in place around the world for bodies carrying out conformity assessment activities.

> **Principle 6:** To demonstrate the basis for confidence in an attestation, CABs can provide a verifiable link to the source of any authority under which the attestation has been issued, whether that be a regulatory approval, an accreditation by a national or regional accreditation body or other form of assurance. [Annex 1 - Business Requirement B6]

6.5.6 Attestation status (entity states)

Conformity attestations may be current, expired, suspended or withdrawn/revoked and the manner in which the state of an issued attestation can be determined at any time is important (refer Annex 5 for an entity state diagram).

For paper-based attestations that exist in the public domain, it is becoming more common for an issued document to contain a link to the online hosted version, so that status at any time may be determined. However, this concept can break down for documents that are not publicly accessible to begin with or are no longer available, especially on multi-decade timeframes demanded for some regulated products, or as may apply for some circular economy initiatives (such as building product recycling).

A persistent digital layer or supporting structure (referencing the hosted attestation) may enable more reliable version control. Persistent data structures of this type may be achieved through various means and, in the case of involvement of third party platforms or use of portable data packets such as verifiable credentials (see 7.4), may last beyond the lifetime of the issuing CAB.

> **Principle 7:** For attestations subject to digital discovery, a supporting data structure containing a status field and dates of validity (i.e., start, end) will enable discovery of information regarding the status of an attestation, for example, to support activities such

[10] https://www.wto.org/english/docs_e/legal_e/17-tbt_e.htm
[11] https://casco.iso.org/toolbox.html
[12] Decision No 768/2008/EC Article R23 (4) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008D0768#d1e872-89-1

as potential product recycling, even if the original attestation file (i.e., certificate, report, etc) is no longer verifiable for reasons such as certificate expiry or cessation of trading by the issuing CAB. [Annex 1 - Business Requirement B5]

Annex 5 provides insight into how entity states may be managed through a supporting data structure.

6.5.7 Confidentiality and sensitivity issues

Many attestations are not freely available to all parties. Information may be confidential for reasons including commercial sensitivity.

> **Principle 8 -** CABs are the custodians (refer Annex 12) of the attestation data that they issue and so provision is needed to enable CABs to address the legally entitled requirements of their customers regarding data confidentiality and sensitivity. [Annex 1 - Business Requirement A1]

Suppression of the underlying paper-based or hybrid document sources (e.g. PDF) may undermine manual verification efforts. Where sharing of attestations is problematic, meta data insight into some less sensitive content (e.g., test thresholds) may represent an acceptable solution. The advantage with this is that a degree of digital verification may be carried out, even if the underlying attestation remains suppressed.

In a digital setting, there is also scope for file encryption so that only approved parties (holding decryption keys) may access the data. This BRS makes provision for a range of measures that are supportive of confidentiality:

1. Potential for encryption of the referenced attestation file (i.e., certificate, report etc), accessed through file hash permission functionality within the data model
2. Potential for encryption of portions of the underpinning conformity data addressed through division of material into an attestation file and an evidence file having potential for differing permission levels (refer Annex 12 for further detail)
3. Potential for selective redaction by any party of elements of the data structure supporting the attestation file when exchanged in the form of a digital credential (refer Section 7.4)

6.5.8 Verification of product claims based on the content of attestations

Initiatives such as digital product passports indicate a need for digital access to a range of conformity assessment information, such as whether a product meets specific performance standards. Verification at this level necessarily extends into the *content* of an attestation, not just the data about the nature of the attestation. This includes the possibility for establishing digital connections between identifiers (such as might be contained within a product barcode and recorded within an attestation) and the conformity data which relates to those identifiers.

In Section 6.5.6, a simple data structure associated with an attestation was proposed in the context of enabling issue status verification. This concept can be further developed to address regulatory, or other, drivers for digital access to specific content within a non-digital certificate.

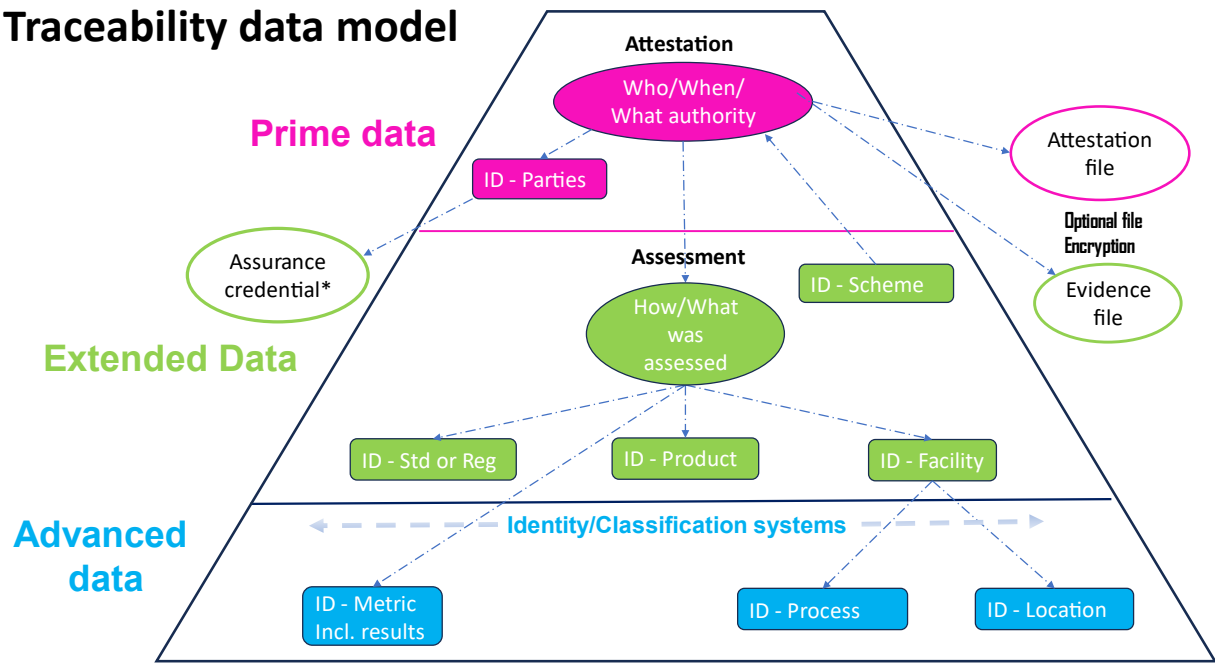
While it is unlikely to expect more complex models to be adopted in the immediate term, it is possible that certain industries may move more quickly towards digital exchange of conformity data than others, possibly in response to regulatory drivers.

Standardisation of machine-readable data elements to support product verification, including increased reliability of sustainability claims, would increase the value of conformity attestations in the context of international trade. However, there are several variables that will affect the complexity of the encoded elements necessary for digital verification. Significant contributions to complexity are listed below:

1. Use of formal identification and/or classification systems (such as data dictionaries) to enable machine-identifiable products, organisations, locations, measurement types and units of measurement.
2. Machine-readable references to the authority under which the attestation was issued (such as independent accreditation and/or regulatory approval).
3. Whether outcomes of conformity assessment can be expressed as a simple indicator for conformance (‘yes/no’)
4. Whether the outcomes of a conformity assessment apply equally to all listed objects of the assessment (such as products or facilities)
5. Whether the attestation is confidential in nature and the type of data protection measures desired
6. Whether details (e.g., numerical values) for product attributes are also required to be machine readable.

6.5.9 Conceptual model and UN/CEFACT Modelling Methodology (UMM)

A conceptual model of the relationships between element groupings essential to the traceability of conformity data may be represented as follows.



** Credentials may be issued by Governments, Accreditation Bodies or CABs (verification/validation)*

Figure 9 Conceptual model

Conceptual model terms for prime data:

- **Attestation** (as a data object) refers to the data set within the model that contains the link to the **Attestation file**, which is the original form of the attestation (i.e., certificate, report etc) and which may be in digital, paper-based or hybrid format (it may also be encrypted or otherwise protected from public access). The attestation data object also contains the following meta-data relating to the originally-issued attestation:
    1. Unique identifier
    2. Type of attestation (refer Annex 4)
    3. Identifying URI for the issuing CAB
    4. Status, date of issue and (if applicable) end data for validity of the attestation
    5. Assurance descriptors (refer Annex 4)
- **Party** identifiers will relate to the issuer and recipient of the attestation and may also relate to one or more additional parties providing assurance of any kind over the attestation, such as a regulator, an accreditation body or (in the case of verification/validation) a CAB.

Conceptual model terms for extended & advanced data:

- **Assessment** (as a data object) refers to the data set within the model that references the object(s) of assessment and the assessed requirements. There may be multiple assessments contained in a single instance of the data model.

- **Scheme** refers to the conformity scheme(s) or program(s) under which the attestation has been issued, where applicable.
- The objects of the conformity assessment are shown above as **Product, Facility, Process** and **Location** and may each be singular or multiple (that is, a 'one to many' relationship). Within this BRS, 'product' refers to the entity being purchased (which may be a service), whereas 'process' refers to an activity contributing to the creation of the purchased entity.
- **Std or Reg** is an abbreviation for 'Standard or Regulation' and refers to the specified requirements that the listed objects are assessed against and is intended to encompass a range of types of standards or regulations, each identified as a URI.
- **Identity/classification systems** refers to the vast range of formal systems that exist for defining identifiers and classification systems relevant to either physical or conceptual objects. These systems can operate at a local industry level, country level or international level and may take various forms, including inter-governmental agreements, lists published by standards bodies and private sector code lists or allocation systems. Further explanation is provided in Annex 13.
- **Metric** refers to the results (numerical or non-numerical) of an assessment for defined parameters and may call up a specification (which is treated within the data model as a type of Standard) to provide the criterion, against which conformance may be specified.
- **Assurance credential** reflects a record of assurance related to an attestation and which is issued by a party other than the issuer of the attestation.
- **Evidence file** is an optional file (or files) for supporting documentation contributing to, or resulting from, the assessment and which may have a different level of confidentiality assigned than the attestation file.

It is recognised that identification for the elements described above may be achieved in various ways, at varying levels of specificity, so the intent of the data model is not to prescribe any particular approach to identification. It is also the case that formal identifiers are not currently available for some items on any consistent basis.

For these reasons, digital discovery of conformity data might be best viewed as a journey. As an initial target, digital discovery would be greatly facilitated through the digital capture of the 'prime data' (i.e., meta-data about the attestation itself) as well as identifiers, in some form, for at least the following:

1. applicable conformity scheme (or program), if applicable
2. referenced standard(s) and/or regulation(s)
3. object(s) of conformity assessment

Principle 9: Data elements needed to support verifiability can vary widely depending on the nature, content and sensitivity of the attestation, as well as any legislative or other requirements that may define the verifications which are to be undertaken. Nonetheless,

it is possible to define a general set of data elements from which subsets of data may be drawn to suit particular instances. [Annex 1 - Business Requirements: B4, B7, B8]

A comprehensive structure for delivering the model described above is shown in Annex 6 and is based on the UMM approach to data modelling. A Data Requirements list supporting this model is also provided in Annex 7. To promote flexibility in implementation, almost all of the identified data elements are indicated as being optional.

Both the UMM representation and the Data Requirements list are expressed using the specialised terms and definitions drawn from the UN/CEFACT Core Component Library (CCL). The expression of this model also harmonises with recent UN/CEFACT modelling[13] for textile circularity.

6.5.10 Verifying the status of entities referenced from the conformity attestation

While standards/specifications, regulations, schemes/programs are all subject to revision/withdrawal after issuance of an attestation, it is not the responsibility of the CAB to monitor this in respect of an attestation that has already been issued. Therefore, the onus is on the party accessing the attestation to establish to their own satisfaction that the date of issue recorded by the CAB for any referenced entity is the relevant one for the purpose of the verification being undertaken. There is also potential to automate this process by setting the acceptable issue dates for a given entity as being equal or greater than an allocated value.

6.5.11 Technical implementation examples

General features of steel and cotton garment supply chains are explored in detail in Annexes 8 & 9. The UMM representation of conformity data is illustrated in Annex 10 for various examples of attestation types, selected for relevance to steel supply and cotton garment supply.

A further implementation of the model including schema files can be found at the United Nations Transparency Protocol (UNTP) site[14].

7.0 Data exchange considerations

7.1 Electronic access to data

The described data model could take a variety of forms, including:

1. Data directly transmitted between parties in a supply chain
2. Data accessible from platforms (e.g. product passports) designed to add value to the information

[13] https://uncefact.unece.org/download/attachments/182976575/ProductCircularityDataUseCase-v3A-Extension-TL_TT_BRS_Part%20II-UC_CCBDA.pdf?api=v2

[14] https://uncefact.github.io/spec-untp/docs/specification/ConformityCredential

3. Data hosted at a web location which may referenced from an external link
4. Any combination of the above

Since the data model described within this BRS does not require a specific data standard for exchange, it is flexible enough to be structured to meet the needs of specific platforms, such as digital public infrastructure[15] initiatives.

7.2 Non-digital transmittal of attestations

Addressing varying levels of digital maturity of supply chain actors is another important consideration.

> **Principal 10:** For attestations that are subject to discovery and where CABs are issuing attestations with a supporting data structure, the inclusion of a data carrier within the referenced attestation file (i.e., certificate, report, etc) pointing to the corresponding digital support structure will enable full verifiability, even in the cases where the attestation has been transmitted as a raw document, without its supporting data structure. [Annex 1 - Business Requirement A2]

Some CABs may prefer to also include a data carrier on their issued attestation documents that encodes an address linking to their own verification system. This is not in conflict with the intentions of this BRS.

7.3 Role of scheme owners and other parties

Depending on the type of conformity assessment, use of the data model could represent a complementary process to existing models for hosting conformity data.

For conformity schemes (or programs) involving attestations that are designed to be publicly accessible, or otherwise subject to discovery, a scheme owner (or a party responsible for a program) may determine that the data model described in this BRS represents a suitable protocol for data discoverability. Adoption of the data model may be relatively straightforward where a scheme owner has sole responsibility for issuance of all attestations.

Apart from Scheme Owners, there are also other parties (including accreditation bodies, some verifying bodies, and the IAF, which operates the global CertSearch register) that currently act as hosting platforms for conformity attestations that are drawn from multiple sources. The raw data currently being provided to these parties might be used to implement some of the provisions outlined in this BRS, serving a complementary purpose to existing hosting activities. Some CABs may prefer such parties to act on their behalf in implementing these provisions.

[15] https://www.undp.org/sites/g/files/zskgke326/files/2023-08/undp-g20-accelerating-the_sdgs-through-digital-public-infrastructure.pdf

7.4 Verifiable credentials

To enhance the potential for adoption at global scale, use of a common exchange protocol could reduce the need for mapping arrangements between different platforms, based on Application Programmable Interfaces (APIs) or similar. The World-Wide-Web Consortium[16] (W3C) has defined a standard called Verifiable Credentials[17] [18]. The UN has previously assessed this standard and has recommended its use for a variety of cross border trade use cases in a recent White Paper[19].

A verifiable credential is a portable digital version of everyday credentials like education certificates, permits, licences, registrations, and so on. They are digitally signed by the issuing party and are tamper proof, privacy preserving, revokable, and digitally verifiable. A related W3C standard called Decentralised Identifiers[20] (DIDs) provides a mechanism to manage the cryptographic keys used by verifiable credentials and also to link multiple credentials into verifiable 'trust graphs'. These standards are not tied to any platform provider or software developer and are an open-source development provided through the W3C open web development platform. UN/CEFACT makes available a free, open-source tool (vckit[21]) for the purpose of creating W3C verifiable credentials.

From the perspective of this project, the W3C verifiable credential property of revocation means that it is instantly revoked everywhere, regardless of how many parties are holding it. The functionality of W3C verifiable credentials is explored in detail on the W3C.org website, including the capacity for selective redaction (see note) of digital elements by any party which enables individual data elements to be suppressed by any party prior to transmission, while the residual content retains verifiability back to its source.

> **Note**: Selective redaction refers to the suppression of specific data elements within a data packet and is different from the whole-of-file (password-type) access protection that is also part of the described data model

A consistent basis for implementation makes it possible to support interoperable implementation (that is, independent of any platform) in a globally standardised manner. This would enable any supplier of products to choose a service provider, where they may register the link to their product and associated product data ('product passport') which, in turn, would contain the necessary links to commence verification of the originating source of the data that is being presented in support of product attributes.

> **Principle 11:** For attestations that are subject to discovery and are issued with a supporting data structure, maximum benefit to society arises from an agreed

[16] https://www.w3.org/
[17] https://www.w3.org/TR/vc-data-model/
[18] https://www.w3.org/TR/vc-data-model-2.0/
[19] https://unece.org/trade/documents/2023/10/white-paper-edata-verifiable-credentials-cross-border-trade
[20] https://www.w3.org/TR/did-core/
[21] https://github.com/uncefact/project-vckit-examples

interoperable exchange protocol. UN/CEFACT recommends the use of W3C Verifiable Credentials. [Annex 1 - Business Requirement A1]

CABs and other relevant organisations are encouraged to consider:

a) applying W3C data standards for verifiable credentials whenever issuing conformity attestations in the form of digital credentials, or;
b) requesting that the W3C standards be applied when such credentials are issued by an authorised party acting on their behalf (e.g., scheme owner, accreditation body or other hosting party, such as a verifying body).

7.5 Credentials issued to CABs

The data model has provision for CABs to reference credentials from accreditation bodies and/or regulators. While the onus is on the party accessing the attestation to take note of whether credentials referenced from the attestation credential remain valid, this confirmation can be automated in the case of W3C verifiable credentials (or any other machine-readable credential type).

> **Principle 12:** To support reliable conformity assessment for the purpose of digital trade, accreditation bodies and government authorities having responsibility for the recognition of competence and/or authority of CABs will be responsible for issuing secure digital credentials containing issue and revocation dates to accredited/approved CABs. [Annex 1 - Business Requirements B6]

It is acknowledged that that reference to a webpage maintained by the accreditation body or government authority may be a necessary alternative in the short term.

> **Note**: While it is expected that a credential issued by an accreditation body would list any Schemes covered by the accreditation, there are often further levels of technical detail necessary to fully define the technical scope of accredited coverage. This is recognised in the data model in the form of the 'Referenced Document' entity. While the accreditation technical scope documentation may be amended frequently (in comparison with accreditation credentials), it is conceivable that such documents could still be issued as secure digital credentials, with issue and revocation dates. Irrespective of whether the accreditation body issues such a secondary credential regarding technical coverage, it will always be clear through the reference made to the accreditation credential whether or not the CAB is declaring their attestation to have been issued within the technical scope valid at the time.

8.0 Supply Chain Examples - Building Products and Textile Products

Application of the principles outlined in this BRS is explored in respect of two specific supply chain examples:

1. Annex 8: Building products – Example of structural steel, from mill to as-built

2. Annex 9: Textile products – Example of cotton garments, from harvesting to recycling

The selected examples reflect divergent regulatory environments, reflecting industrial versus retail environments, while providing opportunity to highlight a range of significant and varied sustainability impacts. The supply chains involved draw upon mining, agricultural and industrial raw materials and reflect diverse, cross-border production chains.

9.0 Conclusion

The proposed data model enables key data elements necessary for verifying product claims to be digitally captured in the form of a supporting structure for non-digital attestations. This approach should provide a vital technical underpinning for digital trade initiatives, including digital product passports and digital trade single windows.

This approach addresses problems highlighted in section 6.5.2, including revisioning and falsification of claims, while establishing greater levels of transparency and accuracy along supply chains, without compromising information security.

The proposal for encoding key conformity assessment elements can function independently of whether underlying attestation (certificate, report, etc) is digitalised, or even accessible. This offers a means for addressing the problem of attestations not being accessible in raw form (for reasons of confidentiality), such that even manual verification would not otherwise be possible, but where high level data may be extracted without compromising sensitive information.

This BRS is not proposing a universal schema for digitalising attestations. Rather, it seeks to address critical short-term and medium-term trade digitalisation needs, while providing a transition pathway towards full digitalisation, on a timeframe that may be more manageable for CABs.

The data model empowers CABs to maintain control over the integrity of their data and to address their customer's requirements. The model is also flexible enough to enable delivery of comprehensive verification or implementation at more modest levels to reflect an evolving pathway toward supply chain digitalisation.

List of Figures

Annex 1 - List of Business Requirements

ID	Business Requirement Statement	Business Transaction Name for this Requirement
A1	Any party may scan a data carrier (such as a barcode) for a product, without prior knowledge of the product supplier's identity or the data platform chosen by the supplier and without using any specific proprietary tool, to access a set of links enabling discovery of attestations that substantiate product attributes claimed by the supplier in a manner consistent with permissions regarding confidentiality and meeting the verifiability criteria detailed in B1 and B2.	Attestation discovery and verification
A2	Where an attestation has been issued in a manner compatible with the provisions of A1, it should also contain a data carrier such that any party in possession of a copy of such an attestation, including in paper or PDF form, may verify the attestation without prior knowledge of the supplier's identity or the data platform chosen by the supplier and without using any specific proprietary tool. While online access to the original attestation may be subject to confidentiality provisions (determined between the CAB and their customer), the embedded data carrier should allow access to information meeting the verifiability criteria detailed in B1 and B2 **Note:** This can be applicable in the context of participants having limited digital maturity who may wish to capture the analogue form of an attestation and then convey this to other participants.	Standalone attestation verification
B1	Any attestation subject to discovery and verification (A1) must be accessed from, or be verifiable to, an Authorised Source (regardless of whether the referral process provides copies of attestations, in addition to the Authorised source links).	Access from Authorised source
B2	For each attestation subject to discovery (A1), access is available to access the attestation from an Authorised source to achieve the requirements of B3, B4, B5 and, if applicable, B6 and B7.	Verification by User
B3	For each attestation subject to discovery (A1), access will be provided to information that identifies the object of the conformity assessment in a manner unequivocally linked through recognisable identifiers to either the product or the organisation of interest, depending on the type of attestation.	Discovery of the object of conformity assessment
B4	For each attestation subject to discovery (A1), access will be provided to confirm the voluntary standards (and, if applicable, the specification) and/or laws/regulations and/or the applicable	Discovery of conformity assessment undertaken

ID	Business Requirement Statement	Business Transaction Name for this Requirement
	conformity scheme to which the conformity assessment was undertaken and the relation of the CAB to the object of the assessment.	
B5	For each attestation subject to discovery (A1), access will be provided to verify the attestation remains current or, if not, the date on which it ceased to be.	Attestation status discovery
B6	For each attestation subject to discovery (A1), access will be provided to information necessary for establishing the nature of any authority or support for attestation, such as formal recognition by a Governmental authority or an Accreditation Body, discoverable through a digital link to an assurance credential that has been securely issued by the responsible body.	Discovery of assurance credentials
B7	For attestations subject to discovery (A1), an optional advanced pathway is available by which CABs may also provide digital access to any applicable conformance metrics and criteria, facilitating verification of specific performance measures for a product.	Discovery of conformance metrics and criteria
B8	Data elements necessary for verifying attestations as described in B1-B7 are defined within a flexible data model adopted by the CAB, or by an authorised party acting on their behalf.	Attestation data model

747 Table 2 List of Business Requirements

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Annex 2 - List of Business Terms

Business Term	Description
Accreditation	Third-party attestation relating to a conformity assessment body, conveying a formal demonstration of its competence, impartiality and consistent operation in performing specific conformity assessment activities (from ISO/IEC 17000:2020)
Assurance credential	Evidence that an attestation has been issued under some form of authority or other approval. Such evidence may include: ● A statement or certificate issued by a governmental authority to a CAB indicating approval for issuing a specific type of attestation, for the purpose of satisfying some regulatory purpose. ● A statement or certificate issued by an accreditation body (see Note) to a CAB which serves to indicate coverage for a particular form of accreditation when linked from a specific attestation. ● In the case of self-declarations, an assurance credential may take the form of evidence of external verification or validation of the attestation undertaken by an independent CAB. **Note**: For an accreditation body's credential to be effective, it must always be clear under which accreditation coverage (and associated accreditation Rules) a specific attestation has been issued. For this reason, the credential will typically include a unique CAB identifier, issued by the accreditation body, since a CAB may hold accreditation with more than one accreditation body and an accreditation body may also issue multiple identifiers to a single accredited party (reflecting different aspects of capability). The accreditation credential may also incorporate the applicable Accreditation TrustMark (i.e. symbol) of the accreditation body, so that the associated Rules for use (and penalties for misuse) of this symbol will also apply when the credential is referenced from a specific attestation.
Assurance descriptors	Sets of standardised descriptions that indicate categories for the impartiality and authority of the assessing body.
Certification	A third-party attestation related to an object of conformity assessment, with the exception of accreditation (from ISO/IEC 17000:2020)
Conformity assessment ('Assessment')	Demonstration that specified requirements are fulfilled (from ISO/IEC 17000:2020)
Conformity attestation ('Attestation')	A formal document or declaration issued by a manufacturer, supplier, conformity body or responsible party stating that a product, system, or process complies with specific standards, regulations, or requirements.

Business Term	Description
Conformity scheme ('Scheme')	A set of rules and procedures that describes the objects of conformity assessment, identifies the specified requirements and provides the methodology for performing conformity assessment (from ISO/IEC 17000:2020). **Note:** ISO/IEC 17000 also notes the term 'programme' as an equivalent term to 'scheme' and for the purposes of this BRS, the term conformity scheme is taken to mean either a conformity scheme or a conformity programme.
Declaration	1st party attestation. Also referred to as a self-declaration.
Data model	A visual representation of an information system using text and symbols to represent the data and connections between data elements.
Digital Product Passport	A tool for collecting and sharing data about a product used to demonstrate product attributes, such as sustainability performance. **Note:** There is a wide variety of potential types of digital product passports and the term, as used in this BRS, may refer to any type.
Digital trade single window	A digital reporting platform which enables the exchange of information between industry and government agencies as may apply, for example, for customs purposes.
Inspection	Examination of an object of conformity assessment and determination of its conformity with detailed requirements or, on the basis of professional judgement, with general requirements (from ISO/IEC 17000:2020).
Multi-lateral recognition (MLA)	In the context of this BRS, the term refers to an international arrangement providing for formal recognition of mutual acceptance of conformity assessment outcomes. Synonym of Mutual recognition arrangement (MRA).
Object of conformity assessment	The entity to which the specified conformity assessment requirements apply.
Process	An activity contributing to the creation of a product.
Product	The result of a process (from ISO IEC 17065:2012). **Note**: In this BRS it refers to the entity that is being purchased (which may be a service).
Product claim	A statement made by a manufacturer, distributor, or seller about a particular attribute or characteristic of a product (including sustainability attributes), which may be substantiated through conformity assessment.
Product requirement	Specific criteria, conditions, or standards that a product must meet to be considered in conformance with established regulations, specifications, or industry standards.

Business Term	Description
Registry	A platform that provides links to related information.
Testing	Determination of one or more characteristics of an object of conformity assessment according to a procedure (from ISO/IEC 17000:2020). **Note:** This BRS uses the term 'attributes' in place of characteristics
Universal Resource Identifier (URI)	A unique sequence of characters that identifies an abstract or physical resource, such as resources on a webpage
Validation	Confirmation of the plausibility for a specific intended use or application through the provision of objective evidence that specified requirements have been met (from ISO/IEC 17000:2020).
Verification	Confirmation of the truthfulness through the provision of objective evidence that specified requirements have been fulfilled (from ISO/IEC 17000:2020).

Table 3 List of Business Terms

Annex 3 - List of parties (participants and stakeholders), including specific roles that they may fulfil

Party	Type	Description
Accreditation body	**Party**	Party attesting to the competency of the body responsible for a conformity assessment.
Assessor	**Role**	Role of carrying out a conformity assessment activity, especially if the party involved would not normally be described as a CAB, such as a supplier carrying out a 1st party assessment of their product.
Authorised source	**Role**	The provider of access to the attestation that is either a) the CAB that has issued the attestation or b) a party authorised by that CAB issuer to act on their behalf in hosting the attestation or reissuing the attestation in a new form (some other parties, eg, accreditation bodies, scheme owners, may fulfil the role of Authorised source).
Conformity assessment body (CAB)	**Party**	Party responsible for carrying out a conformity assessment. CABs may also have a Role as Authorised Source
Customer of CAB	**Role**	Role of placing an order with a CAB to undertake conformity assessment. This role is typically fulfilled by the party to which the attestation is issued (the same party that normally determines the manner of distributing the attestation).
Customs	**Role**	Role of administering and enforcing customs and related legislation
End-consumer (individual)	**Role**	Role of purchasing goods for the purpose of consumption (rather than for transforming or reselling)
Governmental authority	**Party**	Party such as customs or consumer protection that may require access to attestations for legal purposes
Manufacturer	**Role**	Role of transforming products into different products for sale.
Procurer/specifier	**Role**	Role of acting on behalf of the purchaser in selecting products that meet product requirements
Producer	**Role**	Role of making products, including those which may represent raw materials for other parties to transform or consume.
Purchaser	**Party**	Party that seeks to acquire goods on their own behalf or for another party, for any purpose including re-selling, value adding or consuming. Specific roles for a purchaser party may

Party	Type	Description
		include: reseller, procurer/specifier, manufacturer or end-consumer (individual).
Scheme owner	**Party**	Party responsible for publishing a conformity scheme
Supplier	**Party**	Party, such as a manufacturer or reseller, who supplies products. The supplier can also take the role of Customer of CAB, since the supplier may seek evidence to demonstrate the validity of products claims on the basis of conformity assessment.
Registry owner	**Party**	Party responsible for a registry, such as a product registry of the type used to support digital product passports.
Regulator	**Role**	The role of making and/or enforcing legislative rules.
Requirements setting body	**Party**	Party responsible for establishing product conformity requirements, which may be in the form of a specification (voluntary) or a regulation (mandatory)
Reseller	**Role**	Role of purchasing goods for the purpose of resale. This may include the activity of importers, exporters, wholesalers and retailers/stockists.
Standards setting body	Party	Party responsible for developing, promulgating and maintaining standards that may be specified in product conformity requirements.

Table 4 List of parties

The list of actors may also be presented diagrammatically, as follows. Actors shown in blue colour within the list of actors diagram are also used within the use cases in section 6.3.1. Other listed actors can either be mapped to those actors, or do not yet participate in the process of product conformity.

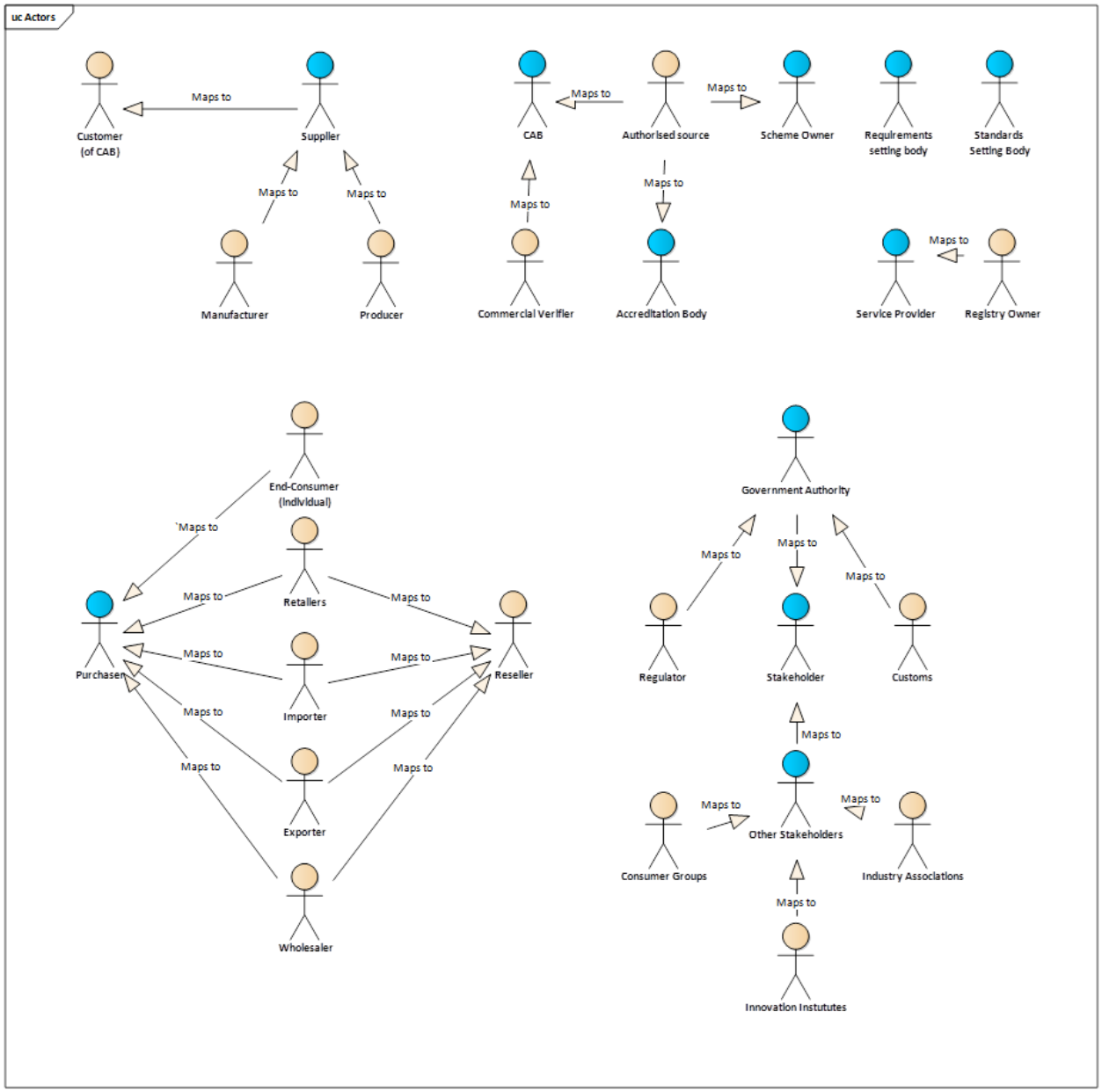


Fig 10 List of actors

Annex 4 - Vocabulary for describing the nature of attestations

This appendix provides further detail in relation to matters dealt with in Section 6.5.4.

Below is an example vocabulary set for Attestation Type:

Certification
Declaration
Inspection
Testing
Verification
Validation
Calibration (see Note)

Table 5 Attestation type

Note: Calibration represents a major type of conformity assessment activity, although connection with trade is indirect. In any case, the Digital Calibration Certificate[22] (DCC) initiative *[footnote]* is well-established and involves full-certificate digital encoding such that further digital support should not be necessary.

Below is an example vocabulary structure for Assurance descriptors:

Assurance Descriptors	Abbreviation
Assurance pertaining to assessor (relation to the object under assessment)	
• self-assessment	Self
• conformity assessment by related body or under commercial contract	Commercial
• conformity assessment by potential purchaser	Buyer
• conformity assessment by industry representative body or membership body	Membership
• conformity assessment by party with unspecified relationship	Unspecified
• 3rd party (independent) conformity assessment	3rdParty

[22] https://www.ptb.de/dcc/

Assurance Descriptors	Abbreviation
Assurance pertaining to assessment (any authority or support for the assessment process)	
• conformity assessment delivered under authority granted by national government	GovtApproval
• conformity assessment delivered under authority granted by IAF/ILAC signatory body	GlobalMLA
• conformity assessment delivered under an independent accreditation	Accredited
• conformity assessment externally verified	Verified
• conformity assessment externally validated	Validated
• conformity assessment claiming no external authority or else unspecified	Unspecified

Table 6 Assurance descriptors

Annex 5 - Attestation entity lifecycle

This appendix provides further detail in relation to matters dealt with in Section 6.5.6.

Below is a life cycle diagram for an attestation.

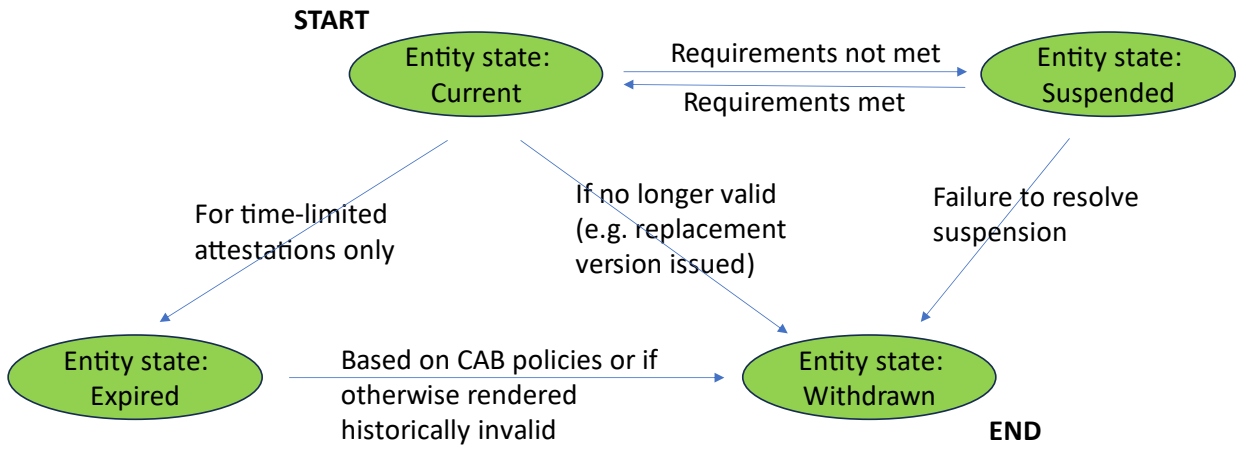


Figure 11 Attestation entity lifecycle diagram

Commentary on managing entity states

1. Attestations that are current may represent an originally-issued attestation, a revision of a withdrawn attestation, a reissue of an expired attestation or a reactivation of a formerly suspended attestation. It is not critical that these alternative manifestations of a current attestation be digitally differentiated, but relevant information (such as the identity of the previous version which is being replaced) would normally be available at least in human-readable form within the referenced attestation. The ISO 17000-series[23] of conformity standards make specific provision for CABs to provide such detail within attestations.
2. Should a CAB seek to revise a previously-issued attestation, the earlier version changes status to 'withdrawn' and so a new supporting data structure needs to be created in support of the updated attestation file to ensure the traceability of status dates. The same would apply for reinstatement of a suspended attestation (that is, suspension reversal).
3. The detailed content of attestations having a status of 'withdrawn' (equivalent to 'revoked') should, in general, not be accessible without special arrangements with the CAB. However, to ensure there is no misunderstanding upon attempts to verify the attestation, a record should remain discoverable that states the attestation is withdrawn and the date on which it ceased to be valid. This remains the case even though the referencing link to the original attestation file (i.e., certificate, report etc) will, in most cases, have been disabled.

[23] https://casco.iso.org/toolbox.html

4. Attestations having expired or suspended status may or may not remain accessible, but the status will be evident from the data structure regardless, serving to differentiate the referenced attestation (certificate, report etc) from a current attestation. Expired or suspended attestations may have relevance to the conformity verification for historically purchased products (subject to historical matching with any expiry or suspension dates listed in the historical attestation) and such verification could still be performed based on the supporting data structure, regardless of whether the attestation itself remains accessible.
5. If a CAB has ceased trading, without provision for hosted attestations to be carried forward, then access to the attestation files referenced from the described data structure will cease, regardless of the status of the attestations. In this situation, a current product supplier may need to arrange a new conformity assessment, to provide ongoing assurance to would-be purchasers that there exists a CAB that will support conformity claims. However, for goods already sold, prior attestations could still hold relevance and so the associated data structure could ensure that some basic information regarding product conformity remains accessible. This may be sufficient to support the requirements of any future activities, such as product recycling.
6. For high risk or high value products, it is reasonable to expect that the receiver, or end-user, of the purchased product may have made provision to retain a copy of the full attestation file, as a safeguard against potential loss of information in the future (this may even be a regulatory requirement for some product types).

Annex 6 - Conceptual model framed in UN/CEFACT Modelling Methodology

The conceptual model (Section 6.5.9) can be represented using the UMM approach, which incorporates specialised terms and definitions that are contained in the UNCCL. One of the features of UNCCL is that a term can be used within different domains to differentiate the contextual usages of the same term. For brevity, such domain prefixes (such as 'Trade' or 'Production') have generally been omitted within this document but are necessary to formally define context, in accordance with UMM principles.

As a way of introducing a formal UMM representation, the depiction below shows how the entities from the conceptual model may be mapped to UNCCL terminology.

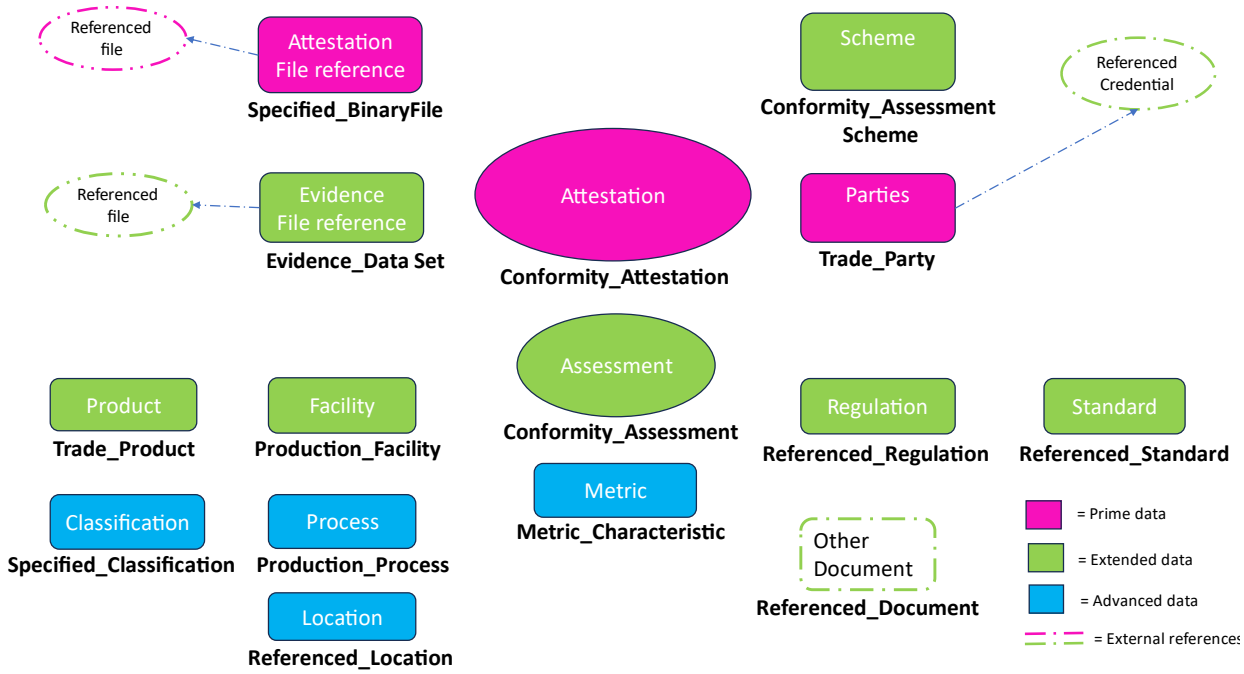
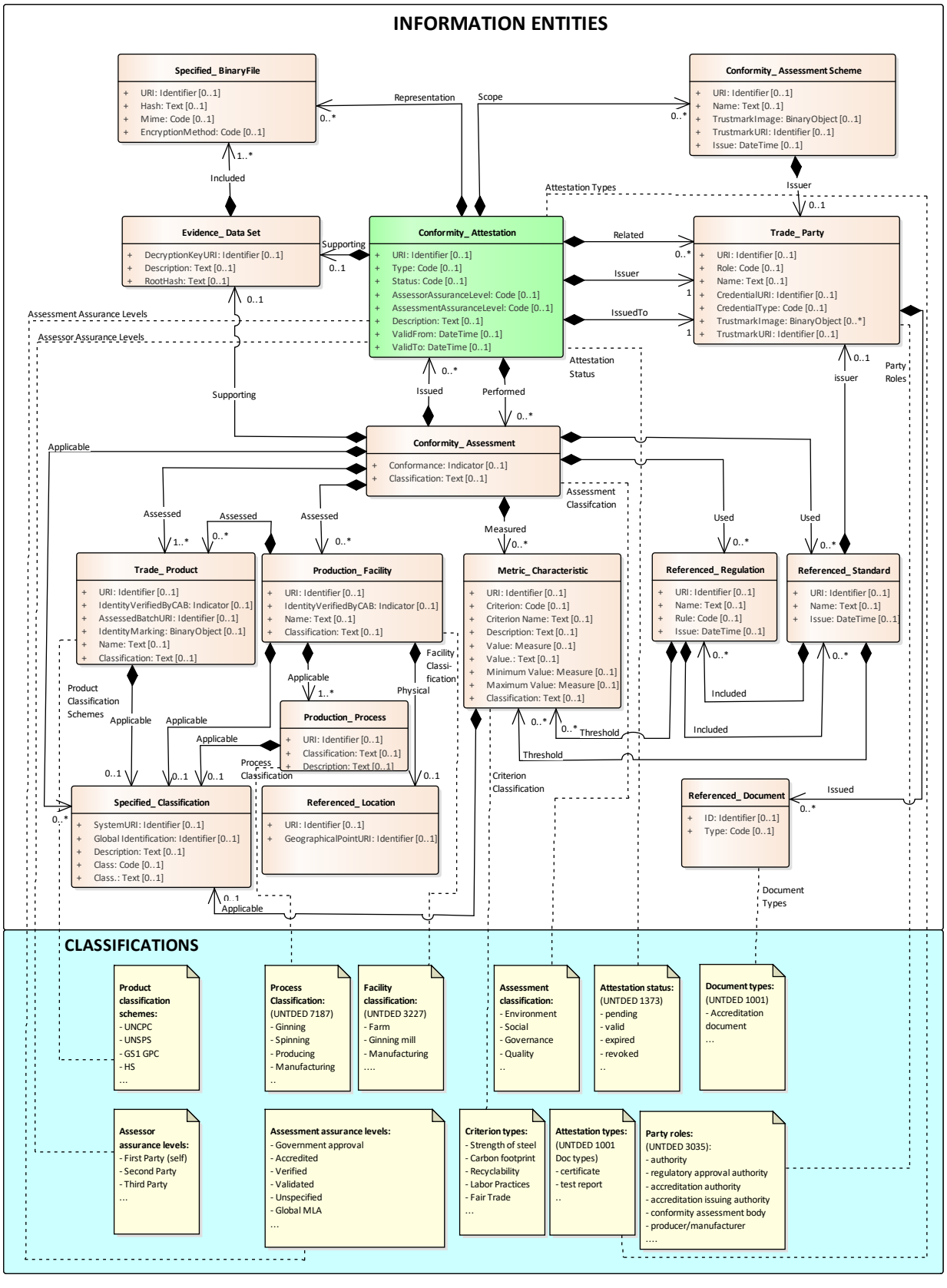


Figure 12 Overlay of UMM representation with the language used in conceptual model

On the following page is the UMM. Almost all elements shown in this model are optional.

Overpage: Figure 13 UMM representation of the conceptual model


INFORMATION ENTITIES
Specified_ BinaryFile
+ URI: Identifier [0..1]
+ Hash: Text [0..1]
+ Mime: Code [0..1]
+ EncryptionMethod: Code [0..1]
Representation
Scope
Conformity_ Assessment Scheme
+ URI: Identifier [0..1]
+ Name: Text [0..1]
+ TrustmarkImage: BinaryObject [0..1]
+ TrustmarkURI: Identifier [0..1]
+ Issue: DateTime [0..1]
Included
Attestation Types
Issuer
Evidence_ Data Set
+ DecryptionKeyURI: Identifier [0..1]
+ Description: Text [0..1]
+ RootHash: Text [0..1]
Supporting
Conformity_ Attestation
+ URI: Identifier [0..1]
+ Type: Code [0..1]
+ Status: Code [0..1]
+ AssessorAssuranceLevel: Code [0..1]
+ AssessmentAssuranceLevel: Code [0..1]
+ Description: Text [0..1]
+ ValidFrom: DateTime [0..1]
+ ValidTo: DateTime [0..1]
Related
Issuer
IssuedTo
Trade_ Party
+ URI: Identifier [0..1]
+ Role: Code [0..1]
+ Name: Text [0..1]
+ CredentialURI: Identifier [0..1]
+ CredentialType: Code [0..1]
+ TrustmarkImage: BinaryObject [0..*]
+ TrustmarkURI: Identifier [0..1]
Assessment Assurance Levels
Assessor Assurance Levels
Attestation Status
issuer
Party Roles
Issued
Performed
Supporting
Conformity_ Assessment
+ Conformance: Indicator [0..1]
+ Classification: Text [0..1]
Applicable
Assessment Classifcation
Assessed
Measured
Used
Trade_ Product
+ URI: Identifier [0..1]
+ IdentityVerifiedByCAB: Indicator [0..1]
+ AssessedBatchURI: Identifier [0..1]
+ IdentityMarking: BinaryObject [0..1]
+ Name: Text [0..1]
+ Classification: Text [0..1]
Production_ Facility
+ URI: Identifier [0..1]
+ IdentityVerifiedByCAB: Indicator [0..1]
+ Name: Text [0..1]
+ Classification: Text [0..1]
Metric_ Characteristic
+ URI: Identifier [0..1]
+ Criterion: Code [0..1]
+ Criterion Name: Text [0..1]
+ Description: Text [0..1]
+ Value: Measure [0..1]
+ Value.: Text [0..1]
+ Minimum Value: Measure [0..1]
+ Maximum Value: Measure [0..1]
+ Classification: Text [0..1]
Referenced_ Regulation
+ URI: Identifier [0..1]
+ Name: Text [0..1]
+ Rule: Code [0..1]
+ Issue: DateTime [0..1]
Referenced_ Standard
+ URI: Identifier [0..1]
+ Name: Text [0..1]
+ Issue: DateTime [0..1]
Facility Classi-fication
Physical
Product Classification Schemes
Production_ Process
+ URI: Identifier [0..1]
+ Classification: Text [0..1]
+ Description: Text [0..1]
Process Classification
Included
Threshold
Criterion Classification
Specified_ Classification
+ SystemURI: Identifier [0..1]
+ Global Identification: Identifier [0..1]
+ Description: Text [0..1]
+ Class: Code [0..1]
+ Class.: Text [0..1]
Referenced_ Location
+ URI: Identifier [0..1]
+ GeographicalPointURI: Identifier [0..1]
Referenced_ Document
+ ID: Identifier [0..1]
+ Type: Code [0..1]
Document Types
CLASSIFICATIONS
Product classification schemes:
- UNCPC
- UNSPS
- GS1 GPC
- HS
…
Process Classification: (UNTDED 7187)
- Ginning
- Spinning
- Producing
- Manufacturing
..
Facility classification: (UNTDED 3227)
- Farm
- Ginning mill
- Manufacturing
….
Assessment classification:
- Environment
- Social
- Governance
- Quality
..
Attestation status: (UNTDED 1373)
- pending
- valid
- expired
- revoked
..
Document types: (UNTDED 1001)
- Accreditation document
…
Assessor assurance levels:
- First Party (self)
- Second Party
- Third Party
…
Assessment assurance levels:
- Government approval
- Accredited
- Verified
- Validated
- Unspecified
- Global MLA
…
Criterion types:
- Strength of steel
- Carbon footprint
- Recyclability
- Labor Practices
- Fair Trade
…
Attestation types: (UNTDED 1001 Doc types)
- certificate
- test report
..
Party roles: (UNTDED 3035):
- authority
- regulatory approval authority
- accreditation authority
- accreditation issuing authority
- conformity assessment body
- producer/manufacturer
….

Annex 7 - Full listing of data requirements for UMM

The following table comprises the Business entities used in the UMM, shown in light blue (with their current or proposed UNCCL definitions listed) and a list of the data elements (attrib) and associated entities (assoc) available for each business entity. For each attribute and associated business entity its cardinality is specified.

Type	Information Entity	Definition	Cardinality
	Conformity Assessment	A systematic process used to determine whether a product, system, service, or process conforms to established standards, regulations, specifications, or other relevant requirements.	
Attrib.	Classification *Text*	The classification, expressed as text, (e.g. environment, social, governance, quality etc) for this conformity assessment.	0..1
Attrib.	Conformance *Indicator*	The indication of whether or not conformance is applicable for this conformity assessment.	0..1
Assoc	Used *Referenced Standard*	The referenced standard used for this conformity assessment.	0..1
Assoc	Used *Referenced Regulation*	The referenced regulation used for this conformity assessment.	0..1
Assoc	Measured *Metric Characteristic*	The measured metric characteristic for this conformity assessment.	0..1
Assoc	Assessed *Product*	The assessed product of this conformity assessment.	0..1
Assoc	Assessed *Production Facility*	The assessed production facility of this conformity assessment.	0..1
Assoc	Supporting *Conformity Evidence*	The conformity evidence supporting this conformity assessment.	0..1
Assoc	Issued *Conformity attestation*	The conformity attestation issued because of this conformity assessment.	0..1
Assoc	Applicable *Specified Classification*	The classification applicable for this conformity assessment.	0..1
Entity	Conformity Assessment Scheme	A set of rules and procedures that describe the object of conformity assessment, identifies specified requirements and provides the methodology for performing conformity assessment.	
Attrib.	URI *identifier*	The Uniform Resource Identifier (URI) of this conformity assessment scheme.	0..1
Attrib.	Name *Text*	The name, expressed as text, of this conformity assessment scheme.	0..1
Attrib.	Trustmark Image *BinaryObject*	The binary object of the trustmark image for this conformity assessment scheme.	0..1
Attrib.	Trustmark URI *Identifier*	The Uniform Resource Identifier (URI) of the trustmark for this this conformity assessment scheme.	0..1
Attrib.	Issue *Date Time*	The date of issuance of this conformity assessment scheme.	0..1

Assoc	Issuer *Party*	The issuing party of this conformity scheme.	0..1
Entity	Conformity Attestation	A formal document or declaration issued by a manufacturer, supplier, or responsible party stating that a product, system, or process complies with specific standards, regulations, or requirements.	
Attrib.	URI *identifier*	The Uniform Resource Identifier (URI) of this conformity attestation.	0..1
Attrib.	Type *Code*	The code specifying the type of document of this conformity attestation.	0..1
Attrib.	Status *Code*	The code specifying the status (e.g. UN Status codes) of this conformity attestation.	0..1
Attrib.	Assessor Assurance Level *Code*	The code specifying the level of assurance related to the assessor, such as first party (self), second party, third party for this conformity attestation.	0..1
Attrib.	Assessment Assurance Level *Code*	The code specifying the level of assurance for the assessment such as accredited, verified, validated of this conformity attestation.	0..1
Attrib.	Description *Text*	The textual description of this conformity attestation.	0..1
Attrib.	Valid From *Date Time*	The valid from date of this conformity attestation.	0..1
Attrib.	Valid to *Date Time*	The expiry date value of this conformity attestation.	0..1
Assoc	Issuer *Party*	The issuer party of this conformity attestation.	1..1
Assoc	Issued To *Party*	The party to whom this conformity attestation has been issued.	1..1
Assoc	Scope *Conformity Assessment Scheme*	The conformity assessment scheme scope of this conformity attestation.	0..*
Assoc	Performed *Conformity Assessment*	The conformity assessment performed for this conformity attestation.	0..*
Assoc	Supporting *Evidence Data Set*	The evidence data set supporting this conformity attestation.	0..1
Assoc	Related *Party*	A party related to this conformity attestation.	0..*
Assoc	Representation *Binary File*	The binary file representing this conformity attestation.	0..1
Entity	Evidence_ Data Set	The documentation, test results, records, or any other relevant information that serves as the foundation for reasoned judgments, decisions, and conclusions.	
Attrib.	Decryption Key URI *Identifie*r	The Uniform Resource Identifier (URI) of the decryption key of this conformity evidence.	0..1
Attrib.	Root Hash *Text*	An alphanumeric string generated by a hash function for the root of this conformity evidence.	0..1
Attrib.	Description *Text*	A textual description of this conformity evidence.	0..1
Assoc	Attached *BinaryFile*	The binary file attached for this conformity evidence.	1.*
Entity	Metric Characteristic	A prominent attribute or aspect of a metric (a standard of measurement).	
Attrib.	URI *Identifier*	The Uniform Resource Identifier (URI) of this metric characteristic.	0..1

Attrib.	Criterion *Code*	The code specifying the criterion, related to the value of this metric characteristic.	0..1
Attrib.	Criterion *Name*	The name, expressed as text, for the criterion of this metric characteristic.	0..1
Attrib.	Description *Text*	A textual description of this metric characteristic.	0..1
Attrib.	Value *Measure*	A measure of a value of this metric characteristic.	0..1
Attrib.	Value *Text*	The value, expressed as text, of this metric characteristic.	0..1
Attrib.	Minimum Value *Measure*	A measure of a minimum value for this metric characteristic.	0..1
Attrib.	Maximum Value *Measure*	A measure of a maximum value of this metric characteristic.	0..1
Attrib.	Classification *Text*	The classification, expressed as text, for this metric characteristic.	0..1
Assoc	Applicable *Specified Classification*	The classification applicable for this metric characteristic	0..1
Entity	Production Facility	A man-made physical structure, such as a building, in which something is produced.	
Attrib.	URI *Identifier*	The Uniform Resource Identifier (URI) of this production facility.	0..1
Attrib.	Identity VerifiedByCAB *Indicator*	The indication of whether or not the identity of this production facility is verified by a conformity assessment body.	0..1
Attrib.	Name *Text*	The name, expressed as text, for this production facility.	0..1
Attrib.	Classification *Text*	The classification (e.g. UN location function codes), expressed as text, for this production facility.	0..1
Assoc	Physical *Referenced Location*	The physical location referenced for this production facility.	0..1
Assoc	Applicable *Production Process*	The process applicable for this production facility.	1..*
Assoc	Applicable *Specified Classification*	The classification applicable for this production facility.	0..1
Assoc	Assessed *Trade Product*	The product of this production facility that has been assessed.	0..*
Entity	Production_ Process	A naturally occurring or designed sequence of operations or events in order to produce something.	
Attrib.	URI *Identifier*	The Uniform Resource Identifier (URI) for this production process.	0..1
Attrib.	Classification *Text*	The classification (e.g. UN process codes) expressed as text for this production process.	0..1
Attrib.	Description *Text*	A textual description for this classification.	0..1
Attrib.	Applicable *Specified Classification*	The classification applicable for this production process.	0..1
Entity	Referenced Document	Written, printed or electronic matter that is referenced.	

Attrib.	ID *Identifier*	The identifier of this referenced document.	0..1
Attrib.	Type *Code*	The code specifying the type of referenced document.	0..1
Entity	Referenced Location	A reference to a physical location or place.	
Attrib.	URI *Identifier*	The Uniform Resource Identifier (URI) of this referenced location.	0..1
Attrib.	Geographical Point URI *Identifier*	The Uniform Resource Identifier (URI) of the geographical point of this referenced location.	0..1
Entity	Referenced Regulation	A principle, rule, or law that is referenced.	
Attrib.	URI *Identifier*	The Uniform Resource Identifier (URI) of this referenced regulation.	0..1
Attrib.	Name *Text*	The name, expressed as text, of this referenced regulation.	0..1
Attrib.	Rule *Code*	The code specifying rule, provision or requirement, of this referenced regulation.	0..1
Attrib.	Issue *Date Time*	The date of issuance of this referenced regulation.	0..1
Assoc	Threshold *Metric Characteristic*	The threshold metric characteristic of this referenced regulation.	0..*
Assoc	Included Referenced Standard	The referenced standard included in this referenced regulation.	0..*
Entity	Referenced Standard	A referenced norm or requirement that establishes uniform criteria, methods, processes and practices, such as in engineering or technical areas.	
Attrib.	URI *Identifier*	The Uniform Resource Identifier (URI) of this referenced standard.	0..1
Attrib.	Name *Text*	The name, expressed as text, of this referenced standard.	0..1
Attrib.	Issue *Date Time*	The date of issuance of this referenced standard.	0..1
Assoc	Threshold *Metric Characteristic*	The threshold metric characteristic of this referenced standard.	0..*
Assoc	Included *Referenced Regulation*	The referenced regulation included in this referenced standard.	0..*
Assoc	Issuer *Party*	The issuing party of this referenced standard.	0..1
Entity	Specified BinaryFile	A specified computer file or program stored in a binary format.	
Attrib.	URI *identifier*	The unique Uniform Resource Identifier (URI) for this specified binary file.	0..1
Attrib.	Hash *Text*	An alphanumeric string generated by a hash function based on the content of a file.	0..1
Attrib.	Mime *Code*	The code specifying the Multipurpose Internet Mail Extensions (MIME) type for this specified binary file.	0..1
Attrib.	Encryption Method *Code*	The code specifying the details of the algorithm and the cryptographic techniques used.	0..1
Entity	Specified Classification	A specified systematic arrangement in classes or categories according to established criteria.	

Attrib.	SystemURI *Identifier*	The system URI (Uniform Resource Identifier) of this classification.	0..1
Attrib.	Global Identification *Identifier*	A unique global identifier for this classification.	0..1
Attrib.	Description *Text*	A textual description for this classification.	0..1
Attrib.	Class *Code*	The code specifying the class for this classification.	0..1
Attrib.	Class *Text*	The class, expressed as text, for this classification	0..1
Entity	Trade Party	An individual, a group, or a body having a role in a trade business function.	
Attrib.	URI *Identifier*	The URI (Uniform Resource Identifier) of this party.	0..1
Attrib.	Role *Code*	The code specifying the role of this party.	0..1
Attrib.	Name *Text*	A name, expressed as text, of this party.	0..1
Attrib.	Credential URI *Identifier*	The Uniform Resource Identifier (URI) of the credential for this party.	0..1
Attrib.	Credential Type *Code*	The code specifying the type of evidence for the credential, such as VC, web page, DAKKS), of this party.	0..1
Attrib.	Trustmark Image *BinaryObject*	The binary object of the trustmark image for this party.	0..*
Attrib.	Trustmark URI *Identifier*	The Uniform Resource Identifier (URI) of the trustmark for this party.	0..1
Assoc	Issued *Referenced Document*	The referenced document issued by this party.	0..*
Entity	Trade Product	Any tangible output or service produced by human or mechanical effort or by a natural process for trade purposes.	
Attrib.	URI *Identifier*	The Uniform Resource Identifier (URI) of this product.	0..1
Attrib.	Identity VerifiedByCAB *Indicator*	The indication of whether or not the identitity of this product is verified by a Conformity Assessment Body (CAB).	0..1
Attrib.	Assessed Batch URI *Identifier*	The Uniform Resource Identifier (URI) for the assessed batch of this product.	0..1
Attrib.	Identity Marking *Binary Object*	The binary object of the identity marking for this product.	0..1
Attrib.	Name *Text*	A name, expressed as text, of this product.	0..1
Attrib.	Classification *Text*	The classification (e.g. UNCPC, GS1 GPC codes), expressed as text, for this product.	0..1
Assoc	Applicable *Specified Classification*	The classification applicable for this product.	0..1

Table 7 Data requirements for UMM

Annex 8 - Building products supply chain example

Steel product - from mill to as-built

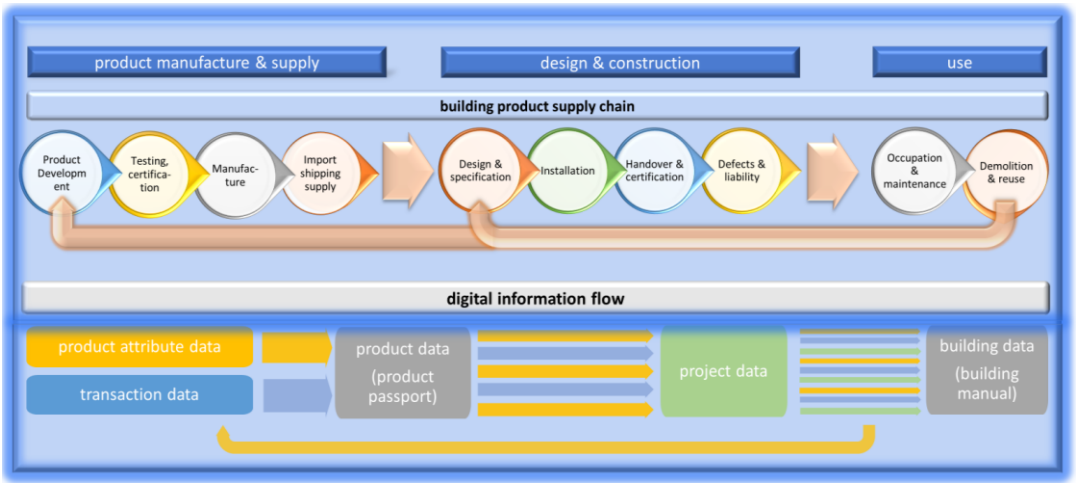
1. Building products problem statement:

> While noting that regulatory practices for building products differ around the world, in some circumstances[24] the product specifier (procurer) and the authority having jurisdiction cannot effectively establish the validity and scope of the information submitted to support conformance with national building codes and referenced standards. This is often due to the lack of robust linkages between product supply, conformity attestations and a potential lack of clarity regarding the authority under which conformity attestation was issued. These same circumstances will also impact the effectiveness of emerging sustainability reporting requirements.

2. Context for the problem statement

The building products supply chain is characterised by the manufacture and supply of products or systems that in many cases, are assembled away from the point of production, by building practitioners who are not necessarily familiar with their physical properties and performance. As this occurs, they are often co-joined with other products in the assembly of a building or structure, which when complete is likely to comprise many thousands of different parts that have moved through a long supply chain and assembled by many different trades people.

There are distinct parts to this chain of supply, represented in the diagram below. The first involves the manufacture and supply of a product, which is typically the focus of testing, inspection and certification activity. In theory, this should result in building products that have a form of documentation that attests to its attributes and limitations as a form of 'evidence of suitability.'



[24] Chapter 8, Building a Safer Future - Independent Review of Building Regulations and Fire Safety: Final Report, May 2018, Dame Judith Hackitt

Previous page: Figure 14 Representation of building product data flow

Removed from this process, but heavily reliant upon it, are a chain of practitioners involved in the design and construction of buildings and structures. The first of these are responsible for specifying the products to be used for the purpose of whatever is to be constructed, followed by those who will procure the products, those who are responsible for their approval and those who install. Each of these requires visibility of product conformity evidence, that should both proceed and accompany products to site. This should ensure that it can be established that a product is fit for its intended purpose, as well as ensuring that the product being delivered to site is the same as the one that was specified.

There is also the need for data to flow through to the operation of a building in order for those who use it to be familiar with on-going performance and need for maintenance, as well as the potential to repurpose or recycle a product at the end of a building or structures useful life.

Another important factor for traceability in building supply chains is the increasing use of data dictionaries and data templates for digitalising the exchange of supply chain data. This is explored in more detail in Annex 13. Without suggesting that any classification system is better than another, the data model in this BRS can incorporate any referenced classification systems for products, facilities and measurements.

3. Relevance of the BRS

The principles this BRS outlines seeks to ensure that product conformity data for steel product (whether mandated by regulation or operating under voluntary conditions):

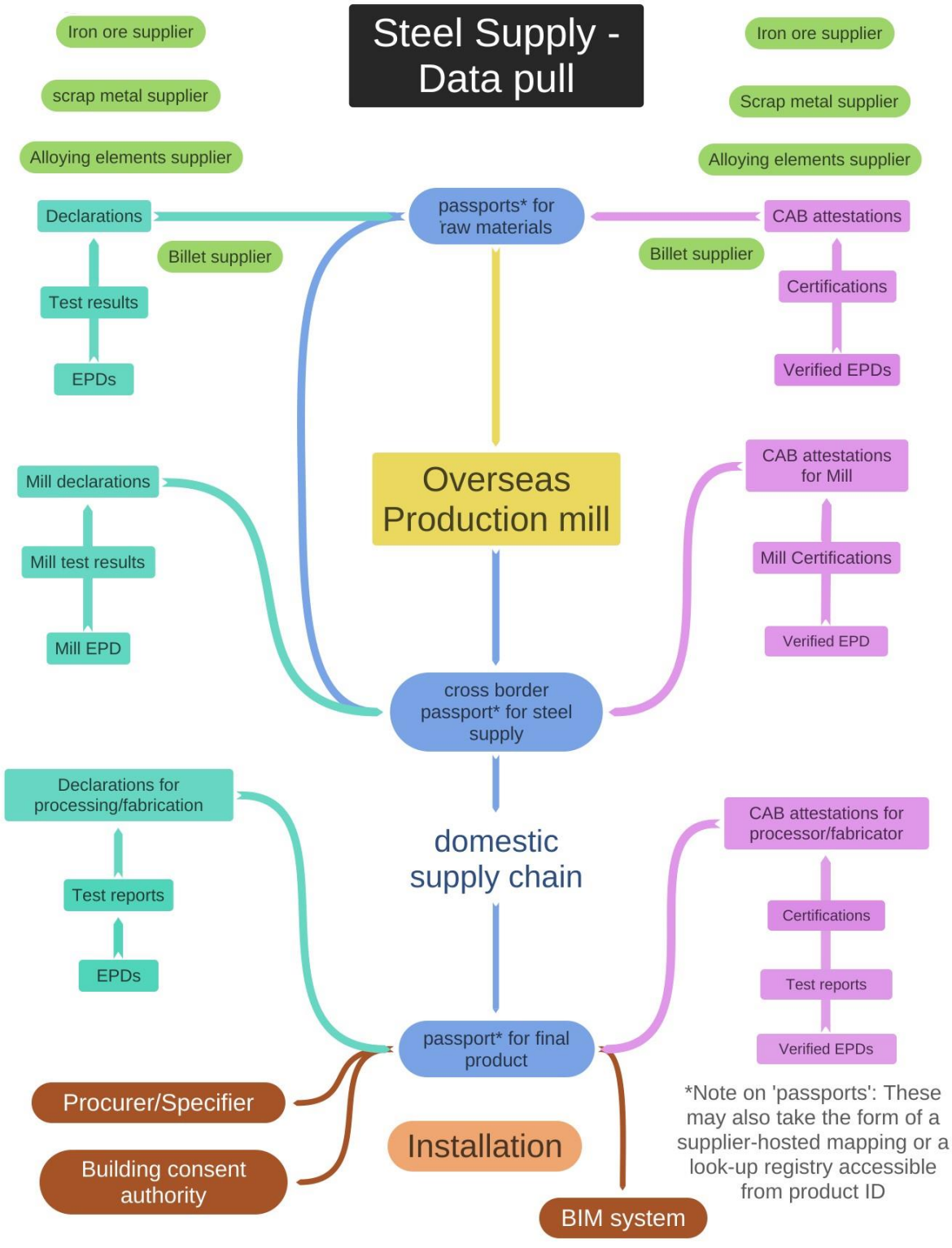
- is issued by parties whose authority can be ascertained,
- demonstrates conformance with recognised standards and laws;
- is available digitally in accompaniment with the product;
- is accessible by all actors in the supply chain
- is capable of being traced at any point.

The data model within the BRS, if followed, makes this possible. Some fictitious examples of certificates and reports encoded within the generalised data model, at a level commensurate with the detail typically available in current supply chains, is provided in Annex 10.

> **Note:** There are cases in some regulatory systems where the authenticity or performance of a building product can be established under a regulatory system without any recognised standards upon which to base formal conformity assessment processes. This can apply to, for example, innovative products reflecting the outcome of an engineered solution for a specific building application. In these circumstances, an attestation (such as an independent engineering evaluation or specification) may still arise in order to demonstrate conformance with the regulated requirements.

Figure 15 below shows an example of a potential steel supply data pull model, depicting how upstream conformity data (including cross-border) might be accessed using linked data from

registries and leveraging principles described within this BRS (note that EPD = Environmental Product Declaration).



Previous page: Figure 15 Depiction of data pull in a steel supply model

> **Note**: For a user to be in a position to verify whether an attestation for an input material (subject to a manufacturing transformation) retains a direct relationship to the output product that they have purchased (or are considering purchasing), additional mechanisms are required. While beyond the scope of this BRS, this forms part of the subject matter for the UNTP[25] initiative.

The product passport concept represents a very useful tool for organising complex and diverse sets of conformity data. However, even without product passports, the data structure described within this BRS means that an individual attestation may still be immediately verified back to its source, including links to the supplied product for which the attestation relates.

4. Satisfying the building products problem statement

This BRS can be seen to address the potential lack of clarity regarding the authority under which conformity information had been issued. This BRS can also provide an important part of the solution to the lack of robust linkages between conformity information and the product that is delivered. One challenge that currently exists is that unique product identification within the building sector is largely voluntary. However, there are a range of current and emerging regulatory initiatives around the world that are driving improved building product identification and traceability. These include mandatory reporting of environmental criteria for construction products under the European Eco-design for Sustainable Products Directive[26] (ESPR).

Emerging regulation is likely to mean that product purchasers will increasingly require evidence to demonstrate their due diligence in purchasing decisions, leading to pressure on upstream actors to provide this evidence. By providing a standardised mechanism for connecting the source of the conformity information with products supplied, implementation of this BRS may promote more reliable reporting of product conformity (including aspects of sustainability reporting).

[25] https://uncefact.github.io/spec-untp/docs/about

[26] https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_en

Annex 9 - Textile products supply chain example

Cotton garments - from harvesting to recycling

1. Textile products problem statement:

> There is a need to facilitate the availability and authenticity of conformity data, in an interoperable manner, to assist in reducing the complexity in tracking performance and sustainability data for the purposes of demonstrating that product claims are valid. This is necessary for the support of legislative initiatives aimed at driving improved sustainability product circularity within the sector.

2. Context for the problem statement

Garment supply chains are under significant pressure to improve sustainability practices. The adverse environmental and human health impact of the fashion industry is well documented.[27] [28] The UNECE has produced[29] a significant collection of traceability initiatives and tools to support transition to a more sustainable footing, including the launch of the Sustainability Pledge[30] for governments, garment and footwear manufacturers and industry stakeholders.

The 2022 EU Strategy for Sustainable and Circular Textiles[31] details a strategy for shifting from 'fast fashion' to circular fashion, reflecting commitments made under the 2019 European Green Deal[32] and the 2020 Circular Economy Action Plan[33] (CEAP). Digital Product Passport platforms are envisaged as key to facilitating circularity. To support the concept, reliable and sophisticated data is needed to provide transparency, traceability over production and transportation processes, which also take into account regional conditions such as water and infrastructure availability.

The conformity and performance information that flows along supply chains is varied. CABs may perform testing or inspection to assess properties such as fibre length, strength, and quality for market grading and value assessment. They may also provide certification for sustainability, environmental and social impacts, resource efficiency and development of circular systems. There are other organisations and platforms that provide chain of custody and input information to brand owners, retailers, consumers and recyclers.

[27] https://www.worldbank.org/en/news/feature/2019/09/23/costo-moda-medio-ambiente

[28] https://www.europarl.europa.eu/topics/en/article/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographics

[29] https://unece.org/trade/traceability-sustainable-garment-and-footwear

[30] https://thesustainabilitypledge.org/

[31] https://environment.ec.europa.eu/strategy/textiles-strategy_en

[32] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

[33] https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

3. Relevance of the BRS

The principle this BRS outlines is ensuring that product conformity data for textile products (whether mandated by regulation or operating under voluntary conditions):

- is issued by parties whose authority can be ascertained,
- demonstrates conformance with recognised standards and laws;
- is available digitally in accompaniment with the product;
- is accessible by all actors in the supply chain
- is capable of being traced at any point.

The data model within this BRS, if followed, makes this possible.

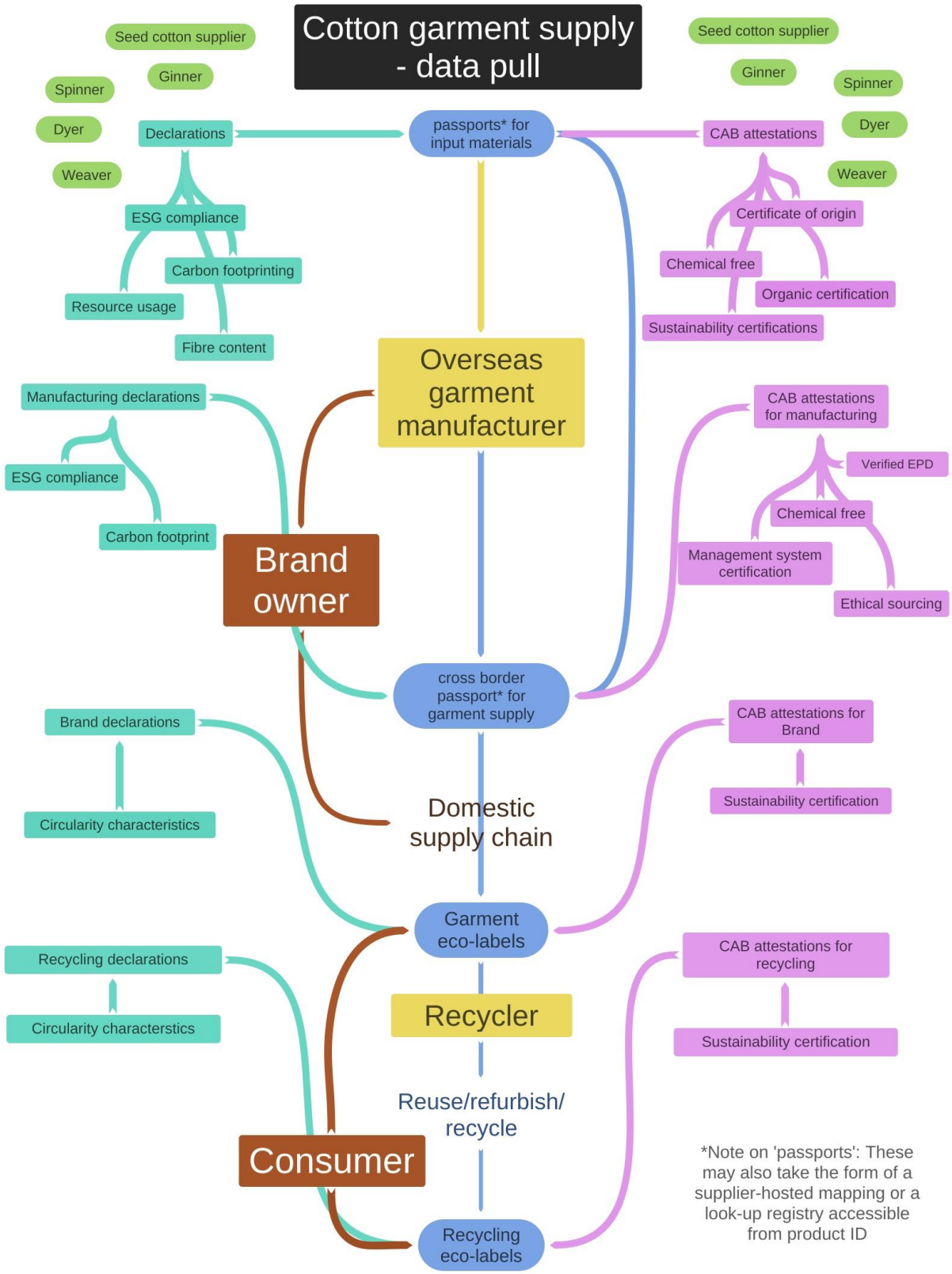
Some fictitious examples of certificates and reports encoded within the generalised data model, at a level commensurate with the detail typically available within current supply chains, is provided in Annex 10.

Figure 16 below shows an example of a potential data pull model for Cotton garments, depicting how access to upstream conformity data (including cross-border) might be accessed using linked data from registries and leveraging principles described within this BRS (note that EPD = Environmental Product Declaration).

> **Note**: For a user to be in a position to verify that an attestation for an input material (subject to a manufacturing transformation) retains a direct relationship to the output product that has been purchased, additional mechanisms are required. While beyond the scope of this BRS, this forms part of the subject matter for the UNTP[34] initiative.

Overpage: Figure 16 Depiction of data pull in a textile supply model

[34] https://uncefact.github.io/spec-untp/docs/about


Cotton garment supply - data pull
Seed cotton supplier
Ginner
Spinner
Dyer
Weaver
Declarations
ESG compliance
Carbon footprinting
Resource usage
Fibre content
passports* for input materials
Seed cotton supplier
Ginner
Spinner
Dyer
Weaver
CAB attestations
Certificate of origin
Chemical free
Organic certification
Sustainability certifications
Overseas garment manufacturer
Manufacturing declarations
ESG compliance
Carbon footprint
Brand owner
CAB attestations for manufacturing
Verified EPD
Chemical free
Management system certification
Ethical sourcing
cross border passport* for garment supply
Brand declarations
Circularity characteristics
Domestic supply chain
CAB attestations for Brand
Sustainability certification
Garment eco-labels
Recycling declarations
Circularity characterstics
Recycler
CAB attestations for recycling
Sustainability certification
Reuse/refurbish/ recycle
Consumer
Recycling eco-labels
*Note on 'passports': These may also take the form of a supplier-hosted mapping or a look-up registry accessible from product ID

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The product passport concept represents a very useful tool for organising complex and diverse sets of conformity data. However, even without product passports, the data structure described within this BRS means that an individual attestation may still be immediately verified back to its source, including links to the supplied product for which the attestation relates.

4. Satisfying the textile products problem statement

This BRS addresses a key element of the problem statement, namely, the availability and authenticity of conformity data for tracking textile sustainability data for the purposes of demonstrating product sustainability outcomes, including circularity outcomes.

This approach also aligns with the outputs of ongoing UN/CEFACT standards development in relation to product circularity[35] for the textile and leather sector.

One challenge that still exists is a high degree of reliance within the global textile industry on self-reported information, commonly not independently verified or validated. This may reflect production of items that are often low margin and low value.

Regulation emerging within the textile sector in relation to sustainability performance and circularity is likely to drive higher assurance levels over conformity information. This is because, to demonstrate due diligence in their purchasing decisions, corporate purchasers will demand evidence necessary to meet their regulatory obligations - leading to pressure on upstream actors to provide this evidence. In a 2021 report[36], the UNECE noted that "[the garment and footwear sector] relies heavily on outsourcing and is typified by a lack of transparency" but went on to say that this is "slowly improving with the emergence of technology solutions and pressure from consumer groups, regulators and other stakeholders".

By enabling the source and nature of conformity information to be digitally verifiable, implementation of this BRS can provide a part of the machinery needed for capitalising on this situation, to drive enhanced levels of sustainability assurance.

[35] https://uncefact.unece.org/download/attachments/182976575/ProductCircularityDataUseCase-v3A-Extension-TL_TT_BRS_Part%20II-UC_CCBDA.pdf?api=v2

[36] https://unece.org/sites/default/files/2021-05/Ecosystem_report-April2021.pdf

Annex 10 - Steel and Cotton attestation data structure examples in UMM

A range of sample certificates and reports are provided below, encoded at a level commensurate with details that are typically available within current supply chains. The colour-coding represents prime, expanded and advanced data to reflect the Conceptual model in section 6.5.9.

> **Note**: Not all data elements available within the UMM representation appear in the examples shown within this Annex. The intention in this annex is merely to provide some easily recognisable examples of rendered attestations.

Below is a fictitious instance of the data model for a third-party product certification relating to steel products that is publicly accessible. This example illustrates the linking of an assurance credential (in this case for an accreditation) and use of classification systems for identifying products and facilities.

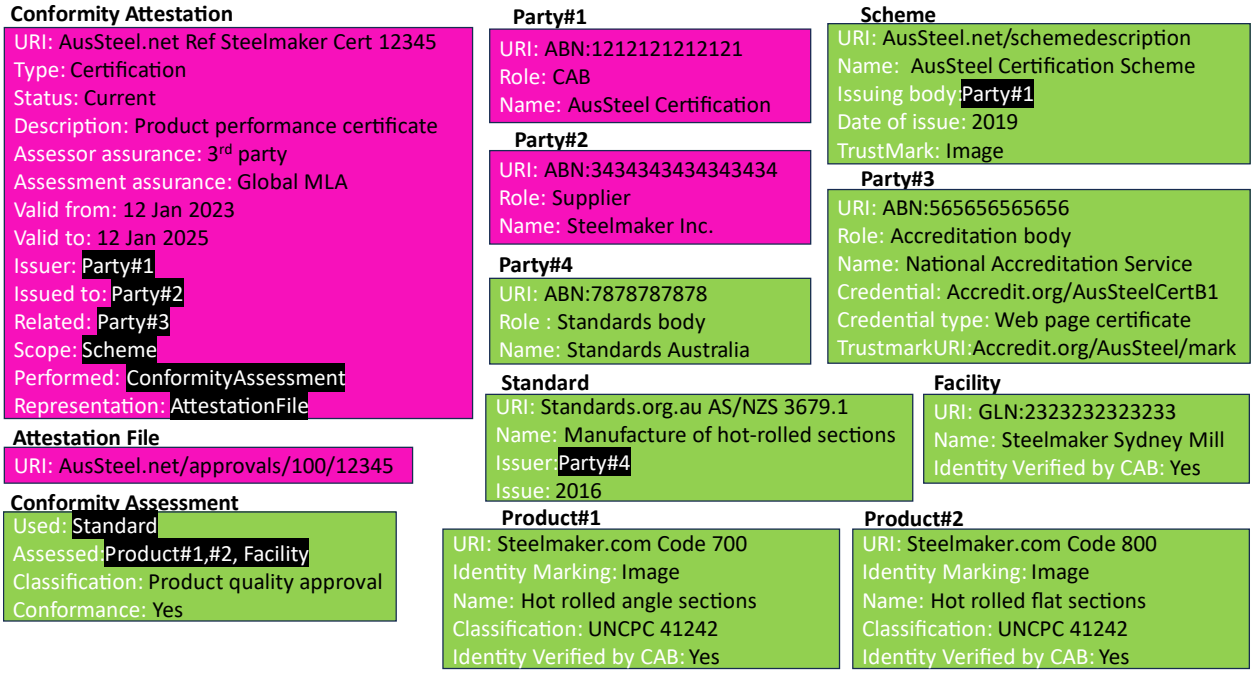

Figure 17 UMM representation of a product performance certificate for steel

Below is a fictitious instance of the data model for a Mill Test Report that is publicly accessible. This example illustrates the use of proprietary standards as well as Metric-related elements (the analysis for micro-alloying elements is not shown).

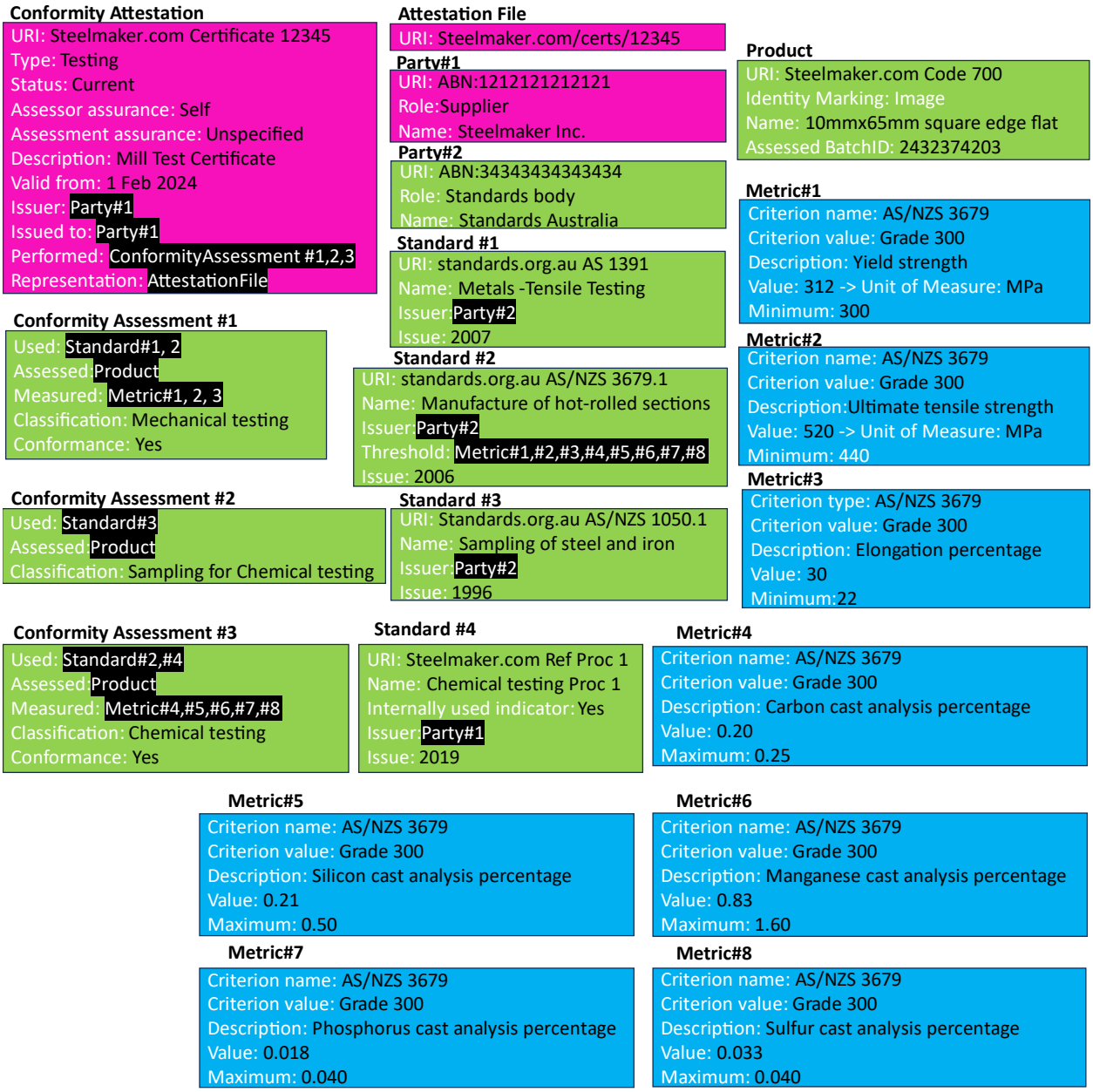

Figure 18 UMM representation of a Mill Test Report for steel

Note: Additional products that might also be tested as part of the same report as shown above would appear as additional conformity assessment items. Also, if a separate conformance indicator is needed for each tested parameter (e.g. at individual element level) then additional conformity assessment items can be added to accommodate this.

Below is a fictitious instance of the data model for an externally-verified declaration for a cotton product that is publicly accessible. This example illustrates how a self-declaration that has been externally verified may be rendered in the data model. Note that only two environmental impact metrics are listed for brevity (the real number might be much larger).

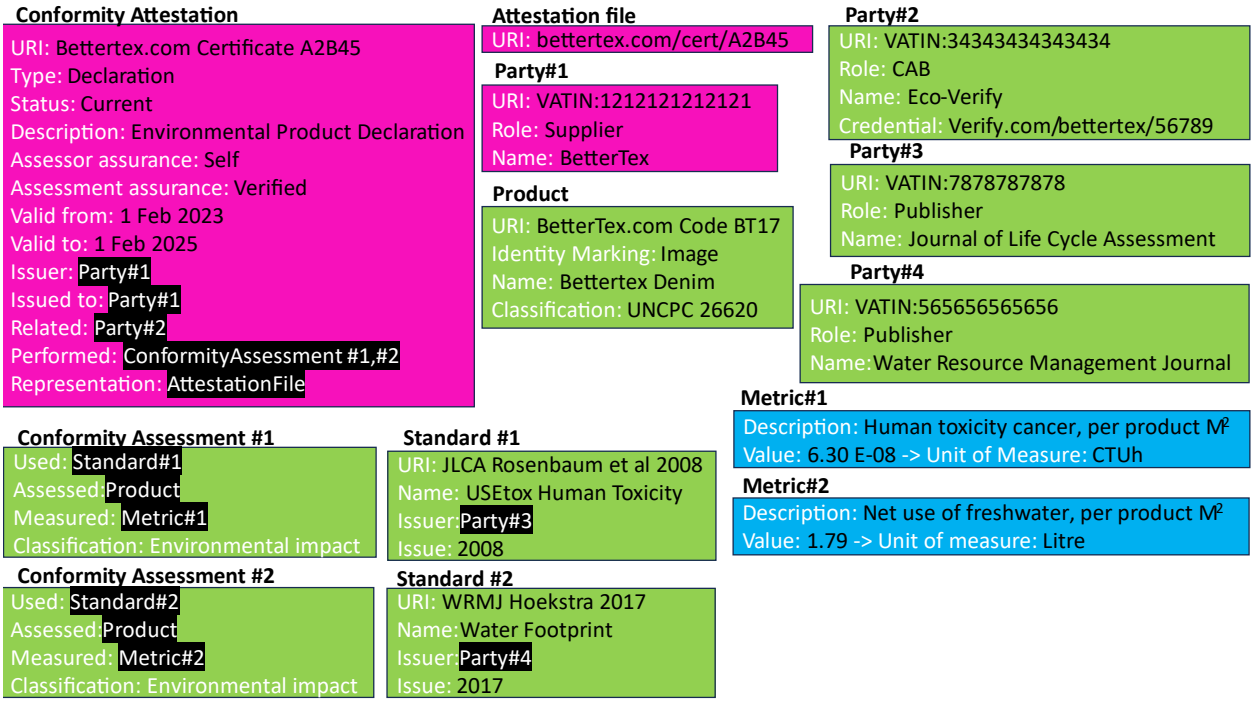

Figure 19 UMM representation of an Environmental Product Declaration for a cotton fabric

Below is a fictitious instance of the data model for an unaccredited 3rd party organic certification that is publicly accessible. This example illustrates usage of a formal classification system.

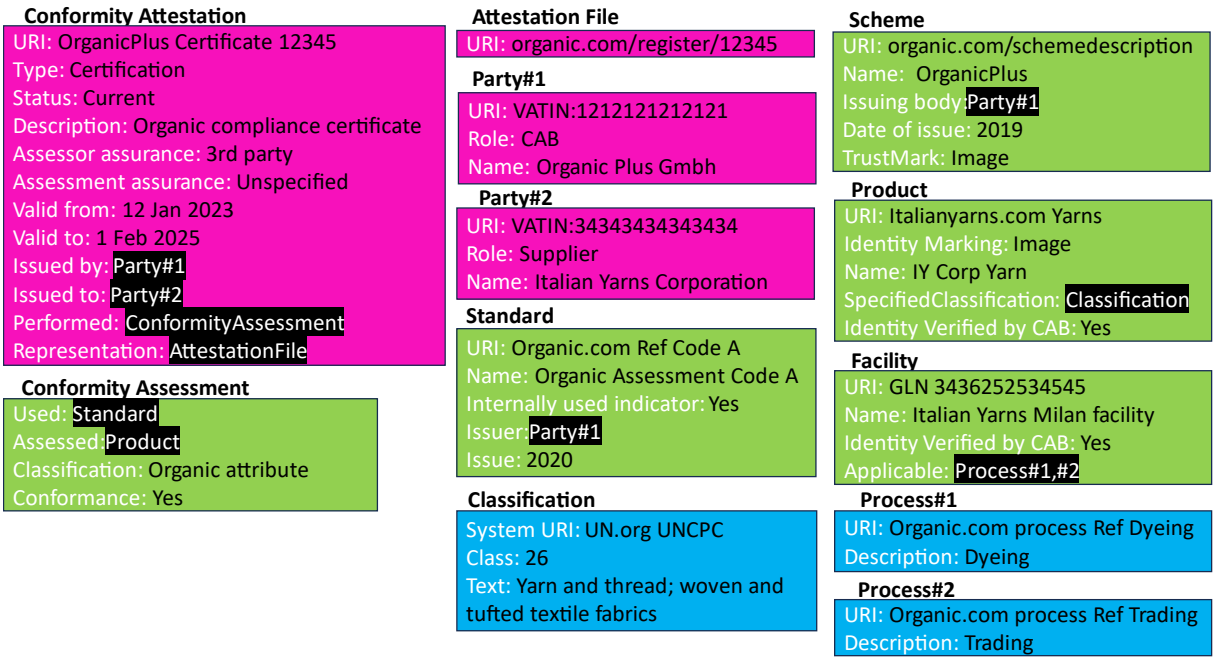

Figure 208 UMM representation for an organic certificate for yarn

Annex 11 - Conformity assessment process considerations

Some conformity assessment types, such as product testing, product inspection and some elements of product certification, involve directly assessing product attributes. Other conformity assessment types may involve indirect product assessment, such as verification of a product claim, validation of a product claim and the certification of an attribute or process for a facility, producer or supplier.

Regardless of assessment type, objectively reliable conformity assessment processes should be based on the application of transparent and accessible scheme rules (where a scheme applies) and the use of standards that have been established through a recognised process to be reliable and fit for purpose. Failure by a CAB to identify how a conformity assessment has been undertaken critically weakens the value of the outputs. Hence, the inclusion within both the conceptual model and associated UMM of identifiers for these particular elements.

Additional considerations below are reflective of the challenges and complexity of conformity assessment in supply chains:

1. Some attributes, such as ethical sourcing, may require analysis across multiple stages of a supply chain. The reliability of processes for data collection (possibly involving traceability data platforms that assimilate inputs from different stages of the supply chain) may impact the effectiveness of the assessment process. The procedures applied by the CAB in addressing these aspects will be important in lending rigour to the assessment process.
2. For testing and/or inspection of materials/components that are subsequently transformed by a manufacturing process, the continued relevance of the earlier testing/inspection results would depend on whether the specific attributes of interest are likely to be altered during the transformation.
3. Testing and inspection of a product may also depend on a product sampling process, undertaken at a specific point in time and often relating to a specific batch or lot of product. If a test or inspection result does not reflect the specific batch/lot of interest, then there should be some other basis for establishing the relevance of a test or inspection report to the supplied product (for example, ongoing testing for limited product attributes, production monitoring or other forms of conformity assessment).

Annex 12 - Controlling access to data

Access to product and facility conformity information

1. This BRS describes an arrangement where the party that issues data retains responsibility for that data. With the exception of data that may be issued as 'portable' data packets (such as verifiable credentials), all other data remains hosted by the issuing party (or a party authorised by the issuer to act on their behalf).

2. CABs may be regarded as the custodians of the data which they issue on behalf of their customers, since the CAB is the only party with the authority to amend or withdraw an issued attestation. CABs provide their customers (in most cases the product manufacturer or producer) with access to their own conformity data which may, or may not, be publicly accessible. Where data is not publicly accessible, it is generally left up to the customer of the CAB whether to share this data with other parties. The customer of the CAB could choose to share non-publicly accessible information in a variety of ways, including processes that involve defined access permissions, possibly involving sharing of a decryption key. A shared key may be provided directly by the customer of the CAB or through a third party platform based on accepted rules. The UMM data model explicitly provides for file-hash access to a referenced attestation file.

3. It is also possible that the 'Evidence file' described in the data model could be used to carry any sensitive analogue payload that would otherwise be contained within an attestation. This might be done at the request of a supplier, for example. In this way, unrestricted access might be provided to the attestation itself, with sensitive information moved into a separate file which is referenced from the same supporting data structure but only available to parties that possess a decryption key. The UMM data model provides for this possibility.

4. Where W3C verifiable credentials are used, there is capacity for selective redaction of data elements. It is important to note that selective redaction within a W3C verifiable credential does not apply to data contained within any referenced files (such as the attestation itself), only to the digital elements of the data structure. Even so, one of the most common 'sensitive' elements of an attestation is the identity of the original party to whom the attestation was issued, since parties further downstream in the supply chain may wish to hide that producer's identity, to obfuscate upstream procurement sources. The potential for selective redaction of this particular data element could prove useful in real world supply chains.

Annex 13 - Identity and classification systems

1. General

Unique identifiers for businesses (e.g. tax registration numbers and legal entity identifiers), of locations (e.g. google pins or cadastral/lot numbers) and of products (e.g. Global Trade Item Numbers[37]) are ubiquitous throughout supply chains. Similarly, classification systems that pertain to a category of objects, rather than being unique to a specific object, play a critical role in trade (such as the allocation of customs authority procedures to product classes). A forthcoming UN/CEFACT White Paper[38] provides a more detailed treatment of this subject.

Since this BRS deals with not just physical objects (e.g. products, facilities) but also conceptual objects (e.g. measurements, process types), the types of identity and classification of interest are wide-ranging. More generally still, there is the overlapping concept of data dictionaries, which provide comprehensive pre-defined descriptions for data definitions and schema. Just like a dictionary for the human language, data dictionaries provide the common understanding for all participants who are establishing data resources, ensuring the data can be exchanged and translated correctly.

There is a vast range of formal systems (including data dictionaries) for defining identity and classification systems and these systems can operate at a local industry level, country level or international level and may take various forms, including inter-governmental agreements, lists published by standards bodies and private sector code lists or allocation systems.

The purpose of the Classification entity within the conceptual model and associated UMM representation is to specify the classification system of interest and to stipulate the relevant values from that nominated system, so that ambiguity can be avoided.

In terms of identifiers that are unique to a specific object, it is desirable that these are discoverable (for example, by scanning a barcode), globally unique (e.g. by adding a domain prefix in accordance with ISO/IEC 15459[39]), resolvable (i.e. given an identifier, there is a standard way to find more data about the identified thing), and verifiable (i.e. ownership of the identifier can be verified so that actors cannot make claims about identifiers they don't own). Identifiers meeting all of these attributes are not always available, particularly for raw materials or industrial components. Nonetheless, the data model presented in this BRS provides a framework for capturing such identifiers, noting that these may become more widely available in response to increasing regulatory demands for improved supply chain traceability.

[37] https://www.gs1.org/standards/id-keys/gtin

[38] UN/CEFACT White Paper Globally Unique Identifiers in Supply Chains – Discoverable, Resolvable, Verifiable (pending publication)

[39] ISO/IEC 15459-1:2014 Information technology - Automatic identification and data capture techniques - Unique identification

2. Building and construction

The building and construction sector is one the specific areas explored within this BRS and this sector has made considerable progress towards codifying identity and classification systems. ISO 23386[40] provides a methodology for authoring and maintaining properties within interconnected data dictionaries used in the construction sector. This is useful since products can be described differently in various jurisdictions reflecting, for example, the use of different source standards (e.g., ASTM standards in the United States). Data Dictionaries based on ISO 12006-3[41] can provide translations and a Globally Unique Identifier (GUID) that machines use for any concept related to the building and construction. In respect of environmental aspects, Environmental Product Declaration characteristics are also developed in a data dictionary according to ISO 22057:2022[42].

A somewhat related concept, also having relevance to this BRS, is the use of data templates, such as described in ISO 23387[43], for construction objects that are used in the life cycle of built assets and which can serve as a data schema for product information.

[40] ISO 23386:2020 Building information modelling and other digital processes used in construction - Methodology to describe, author and maintain properties in interconnected data dictionaries

[41] ISO 12006-3:2022 Building construction - Organization of information about construction works Part 3: Framework for object-oriented information

[42] ISO 22057:2022 Sustainability in buildings and civil engineering works - Data templates for the use of environmental product declarations (EPDs) for construction products in building information modelling (BIM)

[43] ISO 23387:2020 Building information modelling (BIM) - Data templates for construction objects used in the life cycle of built assets - Concepts and principles

Annex 14 - The transition to conformity data digitalisation

A transition pathway is necessary on the journey towards full digitalisation of conformity data, given the formidable complexity arising in trying to encode fine details of conformity data that are typically presented as unstructured data. While such information can certainly be represented digitally, the real challenge is whether machines can understand each other when the information is exchanged.

This BRS focusses on a small set of key data elements considered to be of most value for the support of digital trade and sustainability initiatives. The data model described within this BRS is by no means the full data set available from original certificates and so manual verification will still be warranted in certain circumstances, even with full implementation of the BRS data model.

With due consideration for the manageability of any digitalisation transition for CABs, an initial target for digital discovery of product conformity data might simply be the digital capture of the 'prime data' (i.e., meta-data about the attestation itself, refer Section 6.5.9) as well as identifiers (in some form) for the following:

- applicable conformity scheme (or program), if applicable
- referenced standard(s) and/or regulation(s)
- object(s) of conformity assessment

The BRS data model, which extends well beyond the elements listed immediately above, might also provide a useful template for parties looking to begin digitally structuring certain elements within attestations on a journey towards full digital representations. This could be done while recognising the possibility for artificial intelligence to develop to the point of being able to reliably interpret even partially structured conformity data on a shorter timeframe than the development of universal coding systems capable of rendering all conformity assessment data.