

United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT)

28th Plenary meeting

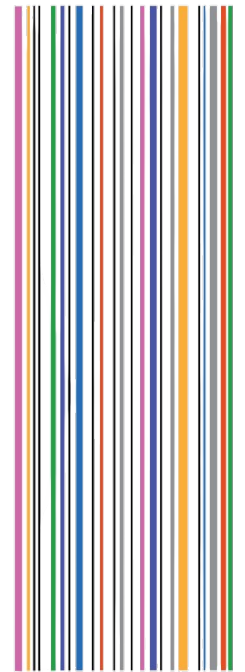
10-11 October 2022

Hybrid (virtual and Geneva in-person) meeting



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Solving International Trade Challenges with Emerging Web Technologies



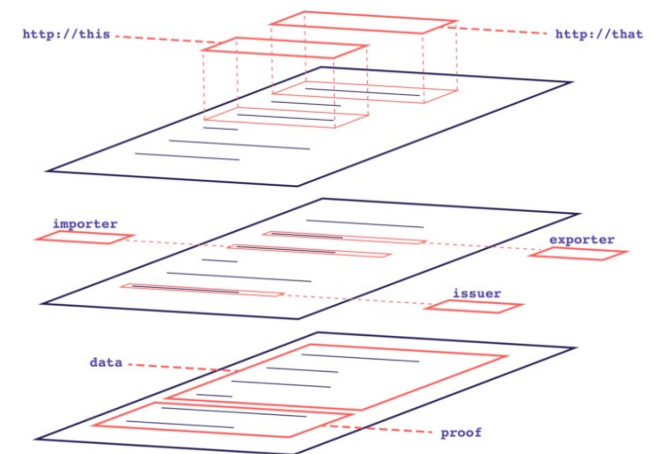
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Three major challenges have obstructed global trade and supply chain digitization:

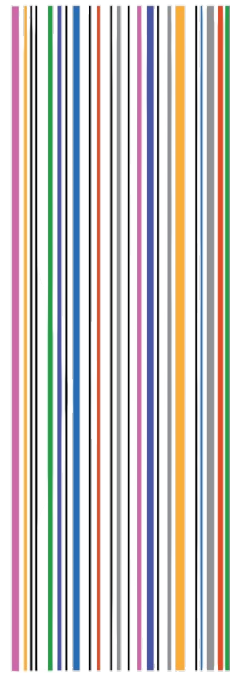
1. Global identification of trade parties
2. Establishing and maintaining trust at the distance
3. Mutual understanding and common semantics

An emerging technology stack is proving to solve these challenges by applying cryptography and international and W3C web standardization:

1. JSON Linked Data
2. Decentralized Identifiers
3. Verifiable Credentials



Challenge 1: Interpreting Data



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The heterogeneous environment of international trade makes it particularly difficult to ensure that the meaning of data is understood. When I say "x", might it be understood as "歪", or perhaps "ζ"?

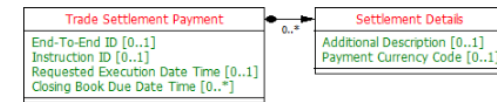
This is at the core of UN/CEFACT! The Buy-SHIP-PAY model is the global dictionary for terms in trade.

However, until recently using UN/CEFACT terminology still relied on:

- Out-of-bounds vocabulary agreement,
- Human interpretation, mapping source data into UN/CEFACT terms,
- Another human's interpretation, mapping UN/CEFACT terms to a target model,
- Breaking legacy API agreements.

Trade Settlement Payment

ASBIE BSP Master: Trade Settlement_Payment



Documentation

Common term	Trade Settlement Payment
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CCTS

Type	ASBIE
Dict EntryName	BSP Master: Trade Settlement_Payment
Definition	A trade settlement payment for a use of this master message assembly.
Obj.Class Term	BSP Master
Assoc.Obj.ClassQual.	Trade Settlement
Assoc.Obj.Class	Payment
Occurrence	0..1

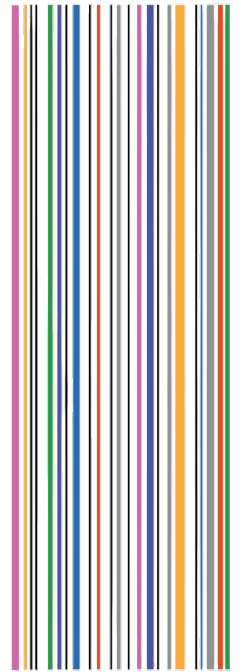
Publication

UN Identifier	UN01008866
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Attributes

Attribute name	Status	Description/Data Type
Trade Settlement_Payment. End-To-End_ Identification. Identifier	0	Identifier_Type The unique identifier for the end-to-end processing of this trade settlement payment, such as an identifier assigned by an initiating party to unambiguously identify the transaction.
Trade Settlement_Payment. Instruction. Identifier	0	Identifier_Type The unique identifier of the instruction for this trade settlement payment.
Trade Settlement_Payment. Requested Execution. Date Time	0	Date_Time_Type The date, time, date time or other date time value of the requested execution of this trade settlement payment.
Trade Settlement_Payment. Closing Book_Due. Date Time	0	Date_Time_Type A date, time, date time or other date time value of a closing book due date for this trade settlement payment.

Challenge 2: Global Trade Identification



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The prevalent "2nd generation" digital identification is based on federation. There are large Identity Providers, especially for personal identification.

- Commercial organization identifier registries do exist, but are not commonly used for federated authentication.
- State-governed Identity Providers do exist, but are almost entirely recognized within that country.
- A federated approach does not scale: everyone recognizing everyone else's Identity Providers is an exponentially complex problem.


Even if it was possible, the Identity Provider model is unattractive because:


- The 3rd party Identity Provider gains trade secret insights
- Granting an identifier monopoly tends to not benefit users
- Centralization entails a single point of failure

The problem extends beyond Parties: products, shipments, orders, consignments, devices, equipment, etc. GS1 and BIC are noteworthy successful identifier registries in some of these domains, but for identifiers not authentication.

 Sign in with Google

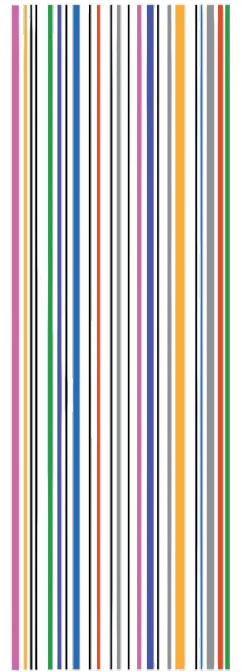
 Sign in with Facebook

 Sign in with Apple

 Sign in with Twitter

 Sign in with email

Challenge 3: Establishing Trust



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Spanning cultures, political environments and jurisdictions, makes it hard to establish and maintain trusted business relationships in international trade. Trust today in large part rides on personal relationships, which are costly and fragile.

Even assuming a trusted relationship, how can you be sure that a set of claims are in fact representing the business partners intention? We are used to signed paper documents, backed by international law. PDFs is the intuitive way to "digitize", but is a mirage:

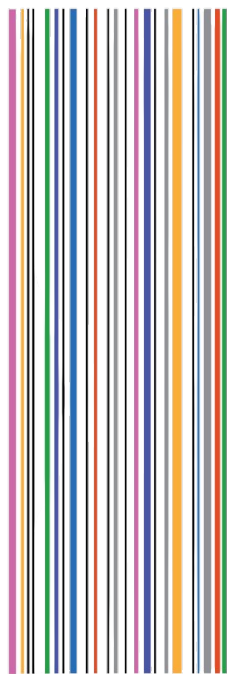
- Does not enable automation
- Data security based on human judgement

Commercial platforms approach this challenge by signing into a walled-off contractual environment which:

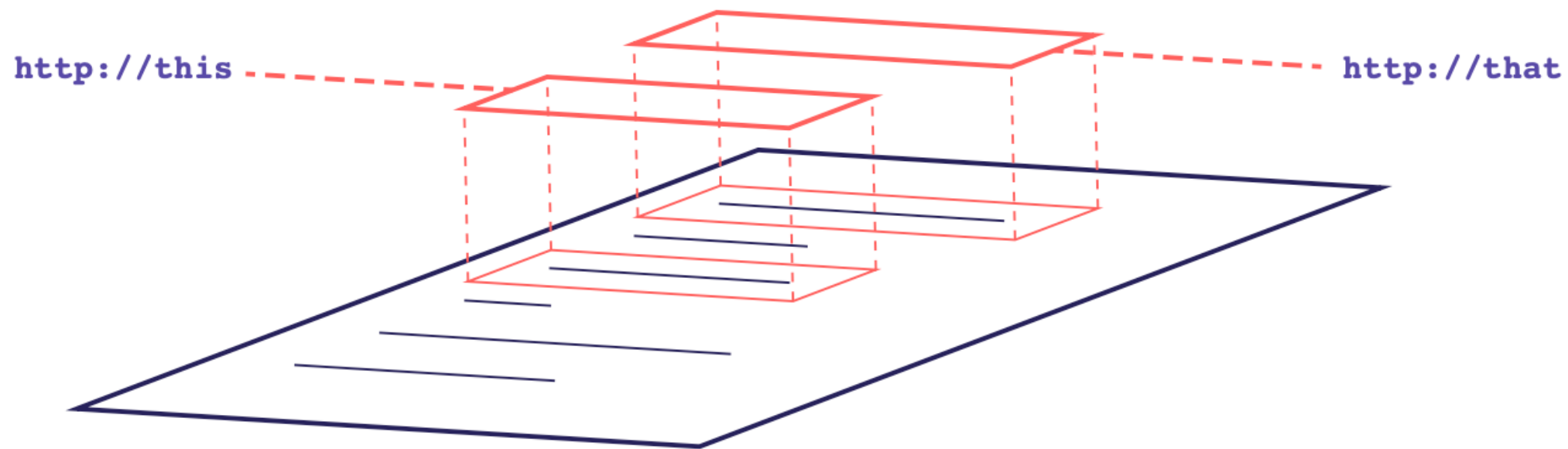
- Is limited to a particular part of the business process
- Is not globally scalable
- Trust is lost when data leaves the platform



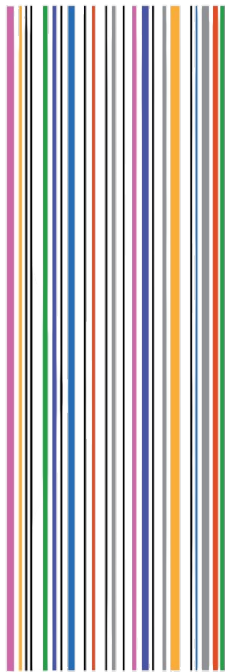
JSON Linked Data



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JSON Linked Data



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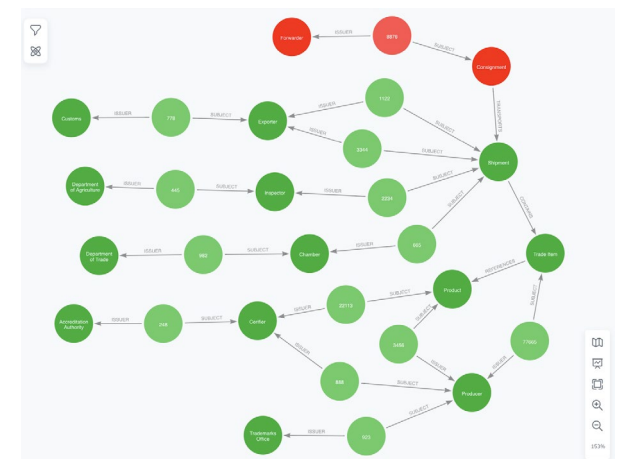
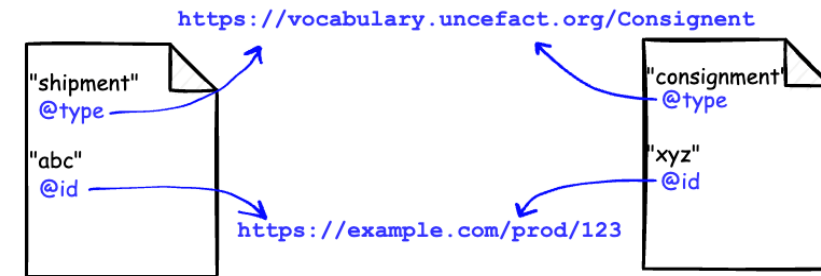
[JSON Linked Data](#) is a standard for overlaying normal API JSON with RDF in a non-breaking manner. This is done by literally adding a context to the raw data. This defines the types and identifiers of the data by use of web URIs.

For example, a "consignment" attribute would be defined as <https://vocabulary.uncefact.org/Consignment>.

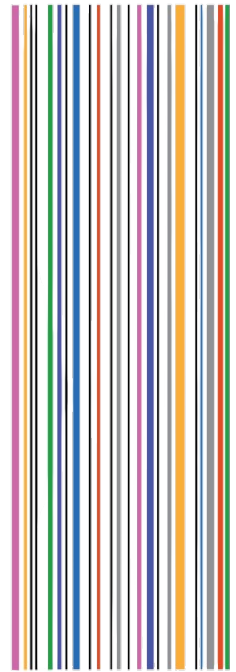
JSON-LD enables:

- When the data sender is explicit about the meaning of data, no further interpretation is needed downstream. Interpret once, understand everywhere.
- Explicit semantics and standard syntax makes the data directly machine readable. For example, RDF fits directly into data graph which enables advanced data analysis.

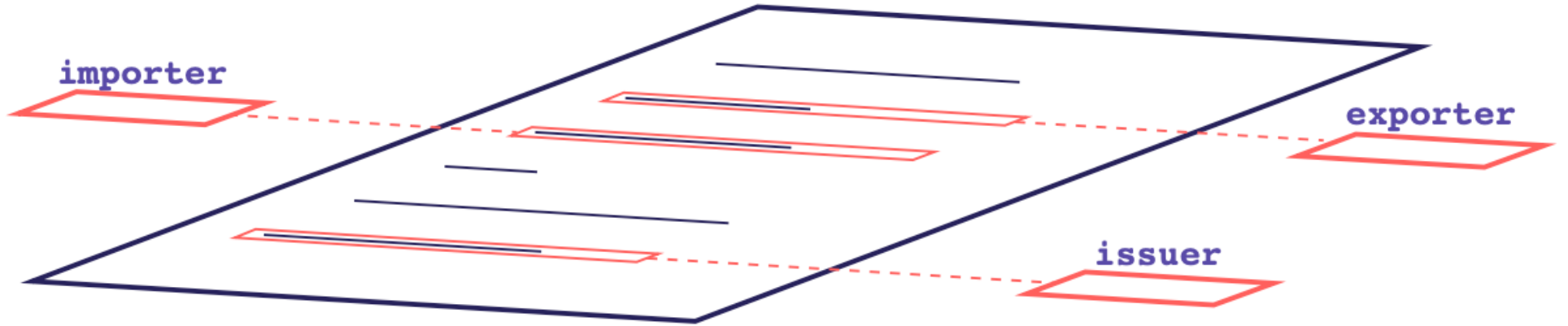
You can try expanding a JSON-LD file [here](#).



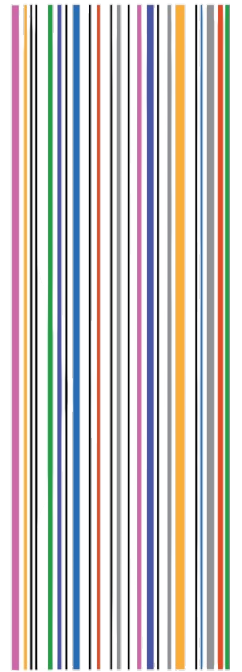
Decentralized Identifiers



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Decentralized Identifiers



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Decentralized Identifiers are based on the model that the controller of an identity keeps a private key which is used for authentication, assertions and other use cases.

All DIDs resolve to a DID Document, which include the corresponding public key. This way, anyone can verify that an entity claiming to control a given identifier indeed holds its private key.

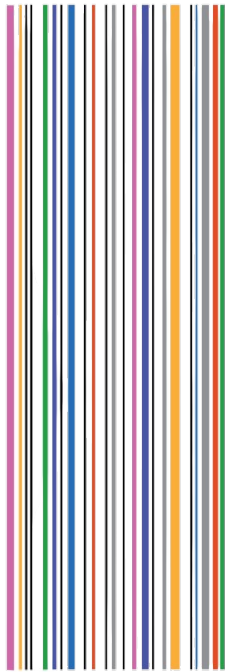
This removes the need to map between multiple identity provider representations; the DID is essentially its own Identity Provider.

Sample DID Document for
did:web:transmute.industries

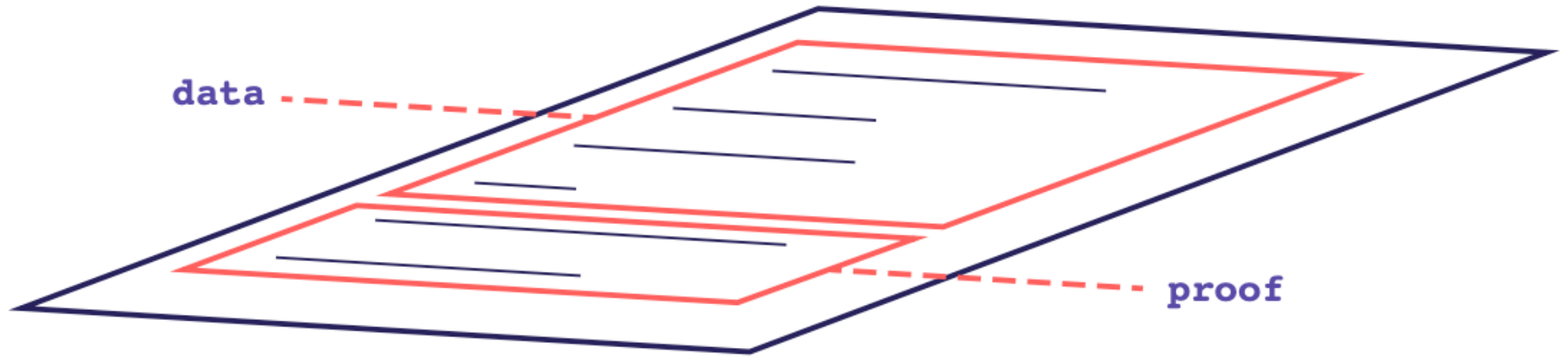
You can try resolving it yourself [here](#).

```
{
  "@context": [
    "https://www.w3.org/ns/did/v1",
    "https://w3id.org/security/suites/jws-2020/v1"
  ],
  "id": "did:web:transmute.industries",
  "verificationMethod": [
    {
      "id": "did:web:transmute.industries#z6MksCkfm4E7CDZsb81AftJidLk24J4XLqanNGsqiXSoQHvf",
      "type": "JsonWebKey2020",
      "controller": "did:web:transmute.industries",
      "publicKeyJwk": {
        "kty": "OKP",
        "crv": "Ed25519",
        "x": "vXCVLS-AwbLXS4J_OkD1kvvPto8rBEC4irg8yINUz4A"
      }
    }
  ],
  "assertionMethod": [
    "did:web:transmute.industries#z6MksCkfm4E7CDZsb81AftJidLk24J4XLqanNGsqiXSoQHvf"
  ],
  "authentication": [
    "did:web:transmute.industries#z6MksCkfm4E7CDZsb81AftJidLk24J4XLqanNGsqiXSoQHvf"
  ]
}
```

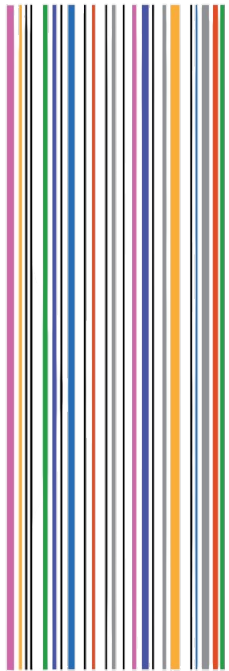
Verifiable Credentials



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Conclusion



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The DID+VC model is increasingly gaining traction. Many nation states are nearing production support as a means to digitization.

The UN/CEFACT vocabulary is essential for bringing the rich BSP semantic model for trade to modern web environment. Proper terms are the essential to verifiable data expressed with well-defined semantics.

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The screenshot shows a web browser at <https://vocabulary.uncefact.org/Consignment>. The page header includes the United Nations logo and navigation tabs for 'Classes', 'Properties', and 'Code Lists'. The main content area is titled 'Consignment' and includes a descriptive paragraph: 'A separately identifiable collection of goods items to be transported or available to be transported from one consignor to one consignee via one or more modes of transport where each consignment is the subject of one single transport contract.' Below this is a section for 'Object Properties' containing a table with columns for URI, Type, and Comment.

URI	Type	Comment
unece:applicableAllowanceCharge	unece:AllowanceCharge	An allowance or charge applicable to this supply chain consignment.
unece:applicableCargoInsurance	unece:CargoInsurance	The cargo insurance applicable to this supply chain consignment.
unece:applicableCurrencyExchange	unece:CurrencyExchange	A currency exchange applicable to this supply chain consignment.
unece:applicableCustomsValuation	unece:CustomsValuation	A cross-border customs valuation applicable to this supply chain consignment.
unece:applicableDangerousGoods	unece:DangerousGoods	Dangerous goods applicable to the transport of this supply chain consignment.
unece:applicableRegulatoryProcedure	unece:RegulatoryProcedure	A cross-border regulatory procedure applicable to this referenced supply chain consignment.
unece:applicableServiceCharge	unece:ServiceCharge	A logistics service charge applicable to this supply chain consignment, such as freight or insurance charges.
unece:associatedDocument	unece:Document	A referenced document associated with this supply chain consignment, such as the certificate of origin or dangerous goods note.
unece:associatedParty	unece:TradeParty	A trade party associated with this supply chain consignment.
unece:atArrivalTransportMovement	unece:TransportMovement	The logistics transport movement for this supply chain consignment at the point when the means of transport