

ONE Record

Implementation Playbook



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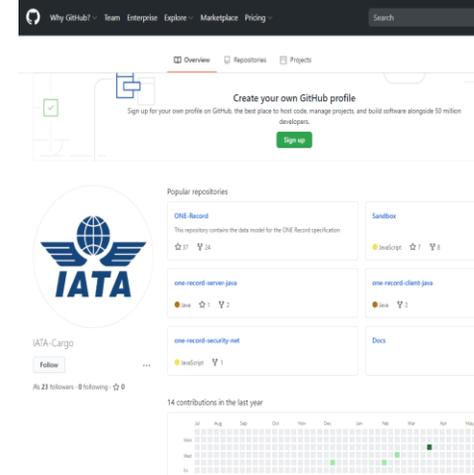
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Objective of the document

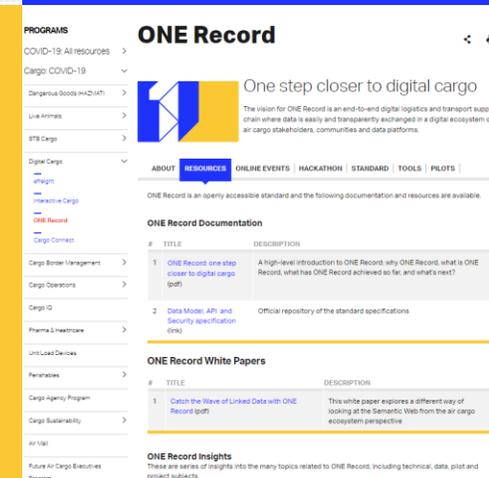
The purpose of the ONE Record Implementation Playbook is to provide a step by step guidance to implement the ONE Record standard within your organization.

The document has been designed as a pointer to the various resources made available by IATA, either the standard components or additional pieces of information/guidance materials.

This implementation playbook aims to be a catalyzer in your implementation plan.



GITHUB



If you missed our online events don't worry. Catch up with our presentations and video recordings.

ONE Record Insights – Series of six webinars
The ONE Record Insights webinar is a series of six episodes, diving into the components of the make ONE Record work. Each episode is a standalone topic.

#	EPISODE	MATERIALS	LIVE/REPLAY
1	ONE Record introduction One step closer to digital cargo	Youtube Recording Youku Recording Presentation (pdf)	23.06.20 / 11:00 – 12:00 Click here
2	The data model A digital twin of the air cargo industry	Youtube Recording Youku Recording Presentation (pdf)	30.06.20 / 11:00 – 12:00 Click here
3	Crafting ontologies From physical freight to machine-readable data	Youtube Recording Youku Recording Presentation (pdf)	07.07.20 / 11:00 – 12:00 Click here
4	The API An overview of the key features	Youtube Recording Youku Recording Presentation (pdf)	14.07.20 / 11:00 – 12:00 Click here

ONLINE
EVENTS

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ONE Record

One step closer to digital cargo





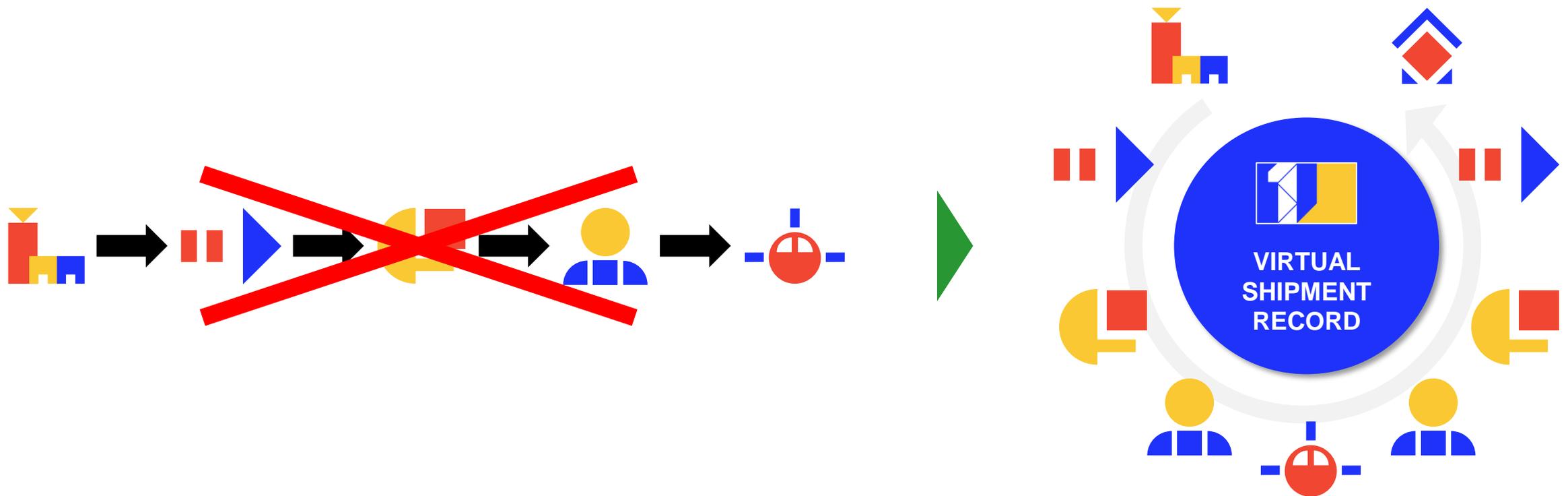
The Vision

An end-to-end digital logistics and transport supply chain where data is easily and transparently exchanged in a digital ecosystem of air cargo stakeholders, communities and data platforms



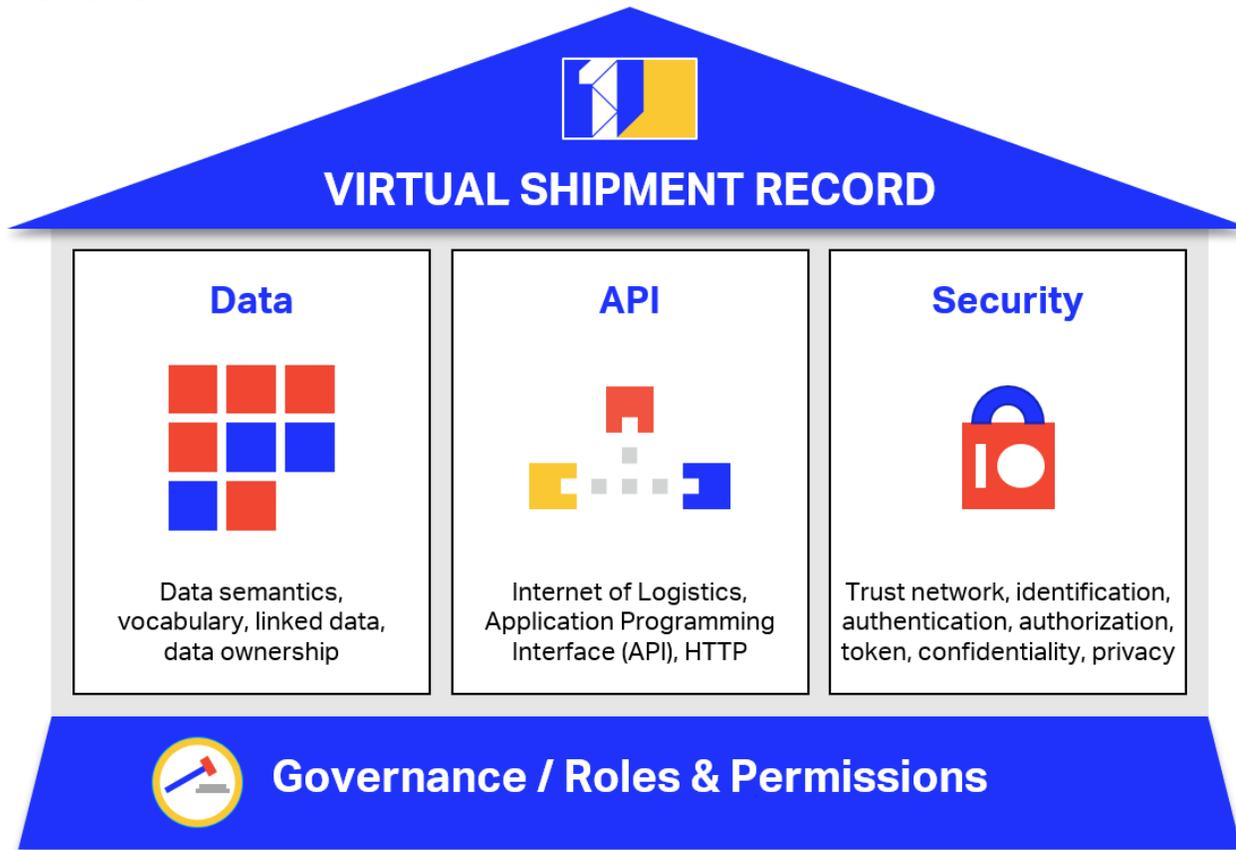
ONE Record concept

The essence of the ONE Record is to move from a peer-to-peer messaging model to a data sharing model relying on a Virtual Shipment Record.



The 3 pillars

ONE Record is a standard for data sharing and creates a “Virtual Shipment Record”, i.e. a single record view of the shipment. The concept is based on 3 pillars enabling to define WHAT, HOW, with WHOM data can be shared.



The standard specifies

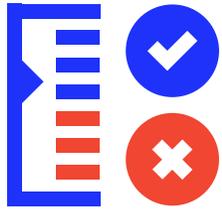
Data model specification: provides the air cargo industry with a standard data structure for data exchange using JSON-LD that facilitates data integration with existing and new data services;

API specification: specifies the interface and interaction of the web API or Application Programming Interface that allows airlines and their partners to connect their system directly using best in class web technologies;

Security specification: uses an industrywide and federated trust network to manage identification and authentication of data sharing systems and ensures data privacy and confidentiality for all parties.

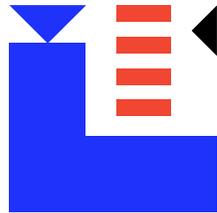
The Industry benefits

The objective of ONE Record is to address the main challenges of e-freight and unlock the possibilities of a full digital air cargo industry and create opportunities for new value-added services and business models.



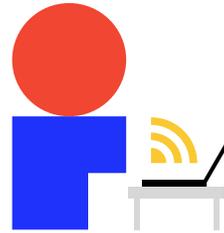
Data quality and control

- Data shared by data owner
- Full control of data
- Data stays at the source
- Owner determines data access



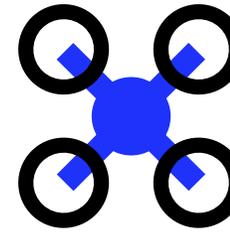
Visibility and transparency

- End-to-end transportation chain
- Share data of the shipment with relevant parties
- Enhanced visibility and transparency



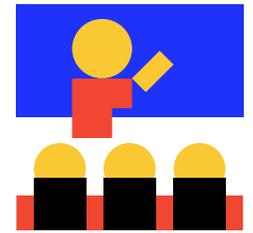
Plug & Play Connectivity

- Facilitate the direct connectivity between all the stakeholders
- Use of web API
- New cooperative IT solutions and innovation



Future of digital cargo

- Foundation for true digital air cargo
- Develop collaborative and automated digital services



Welcome a new generation

- Technology platform that is ready for a new generation of digital natives

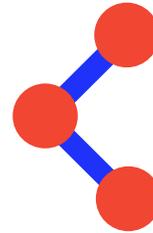
Key Points

As the industry needs to embrace change to face the current and future business and regulatory challenges, these are our conviction about what will happen:



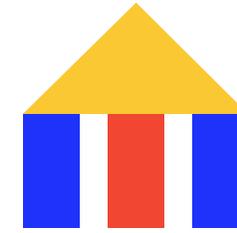
DIGITALIZATION

- Complete digitalization of the global supply chain will happen
- The Internet of Logistics is a likely scenario



AGILE SUPPLY CHAIN

- This will lead to new and dynamic supply chain configurations
- Speed and agility is key



REGULATORS & AUTHORITIES

- Regulators and authorities will get high visibility and transparency
- The focus will shift to intelligence & collaboration

ONE Record

Implementation steps



ONE Record implementation steps

The following **5 steps** are key to ensure the success of the ONE Record standard implementation



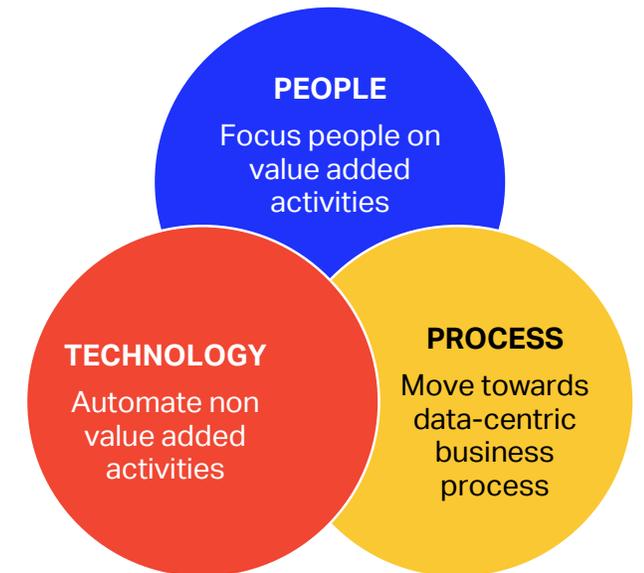
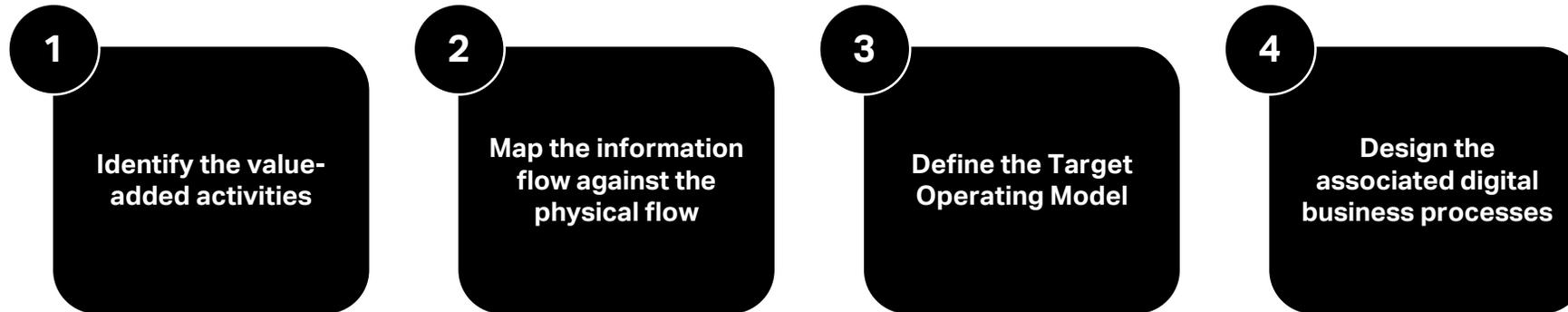
Step 1

Define the Digital Business Process



Define a Digital Business Process

While the e-freight initiative aims to digitalize a paper-based process, ONE Record enables a full data centric approach. Therefore a full digital business process can be designed, unlocking opportunities for true operations efficiency and lean organization.



Step 2

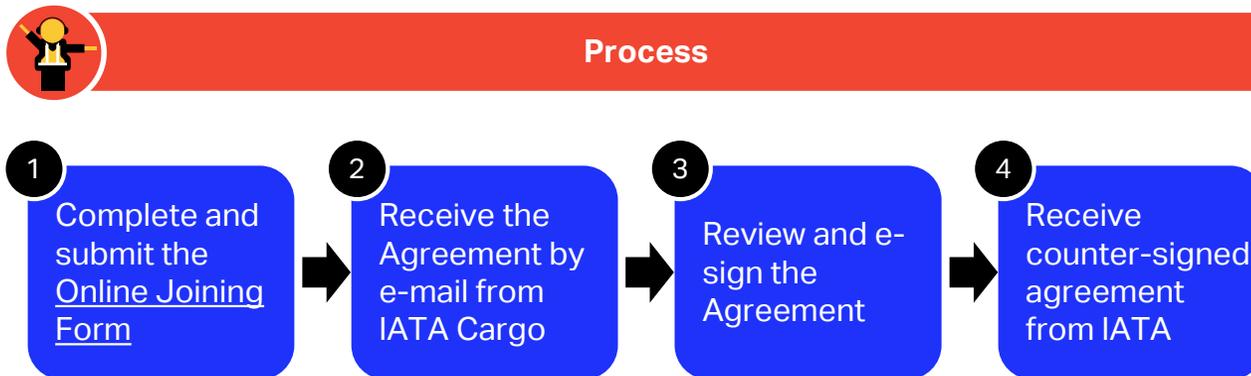
Sign the Multilateral Data Agreement



Sign the Multilateral Data Agreement

The IATA Multilateral Data Agreement (MDA) provides a single non-disclosure agreement standard whereby stakeholders sign once with IATA and start exchanging through ONE Record with all other signatory parties to the Agreement. By signing the Agreement with IATA, stakeholders effectively enter into Data Agreements with each other, i.e. enabling them to share data through the ONE Record API.

Before starting ONE Record, stakeholders are required to sign the Multilateral Data Agreement (MDA) following the below steps:



-  Free of charge
-  Provides the necessary legal framework for establishing ONE Record Data exchange
-  Avoids the need to negotiate numerous bilateral Data agreements with stakeholders
-  Enables to share data with all stakeholders
-  Participating companies are listed on the ONE Record website

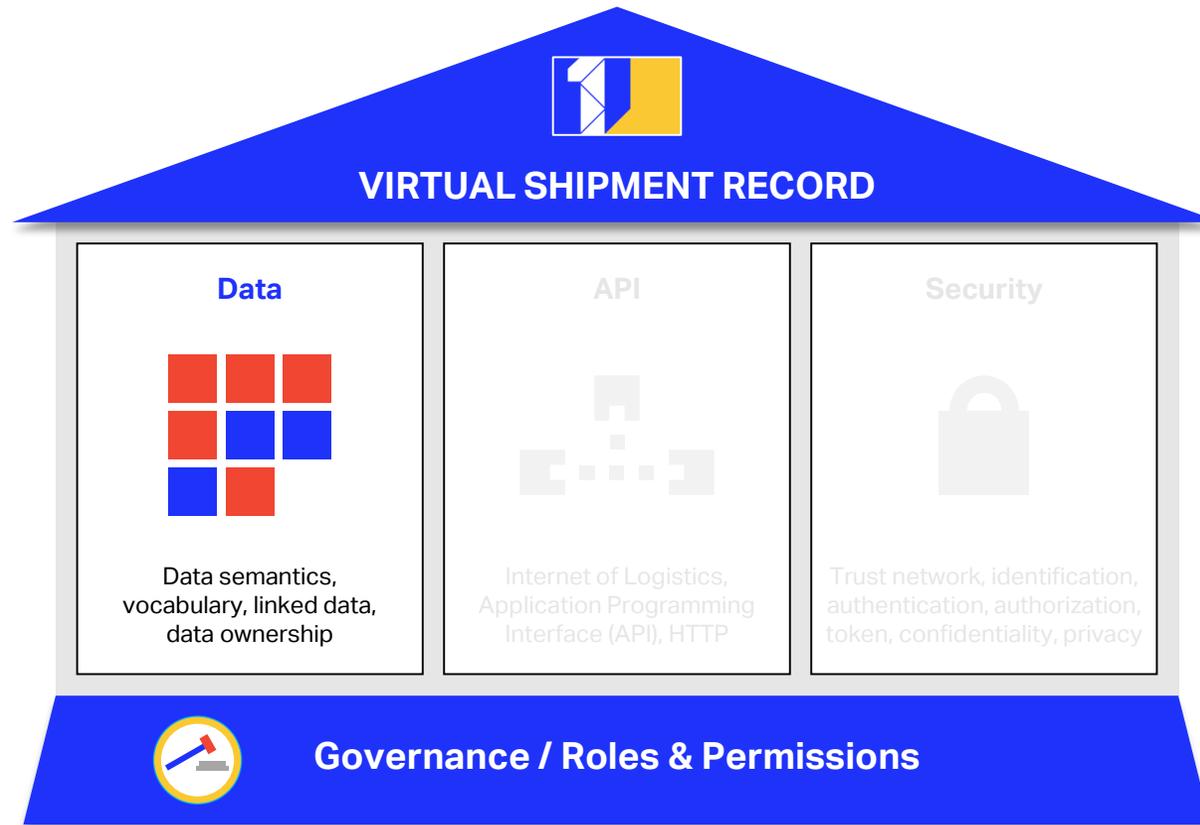
Step 3

Adopt the ONE Record Data Model



ONE Record concept

The ONE Record data model, which is one of the key pillars of ONE Record, defines what can be shared with partners.

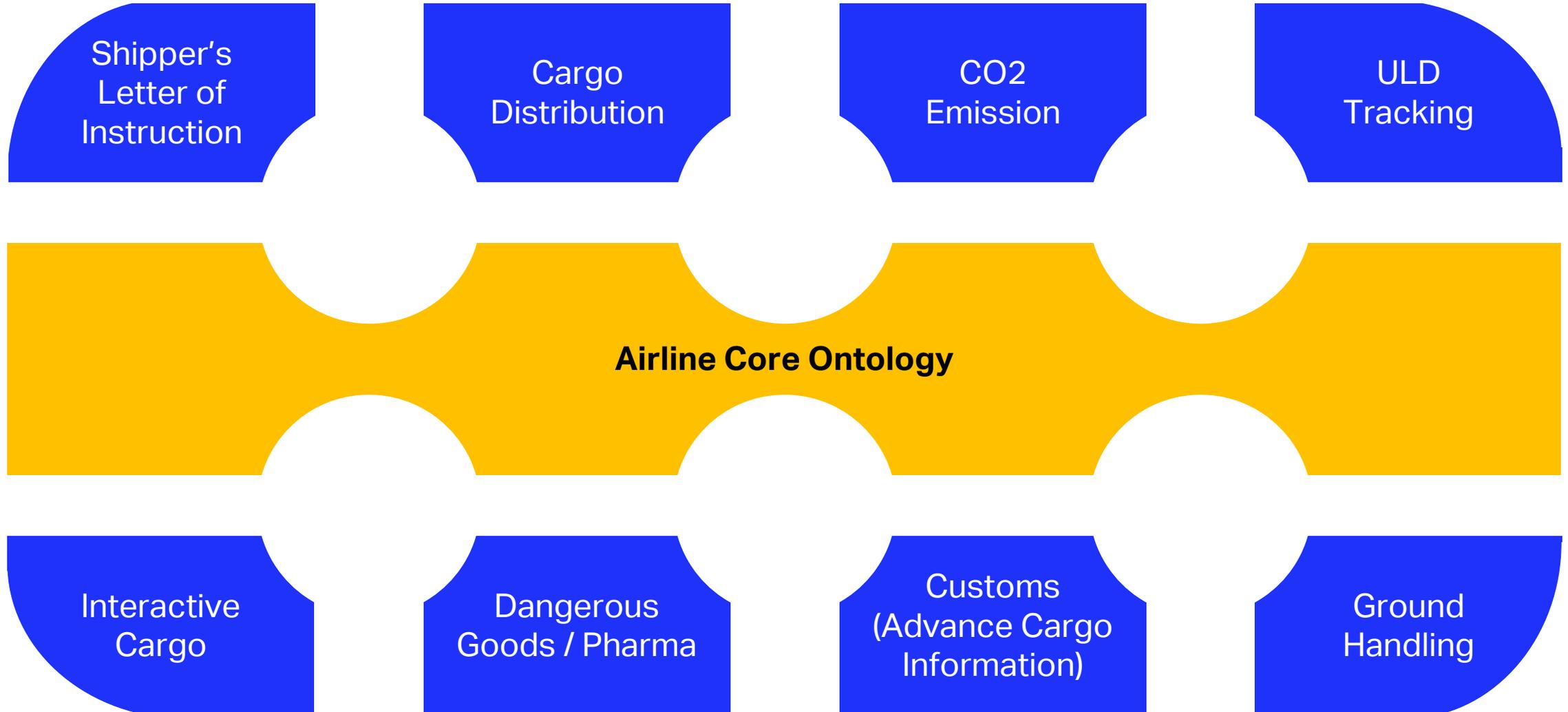


What is the scope?

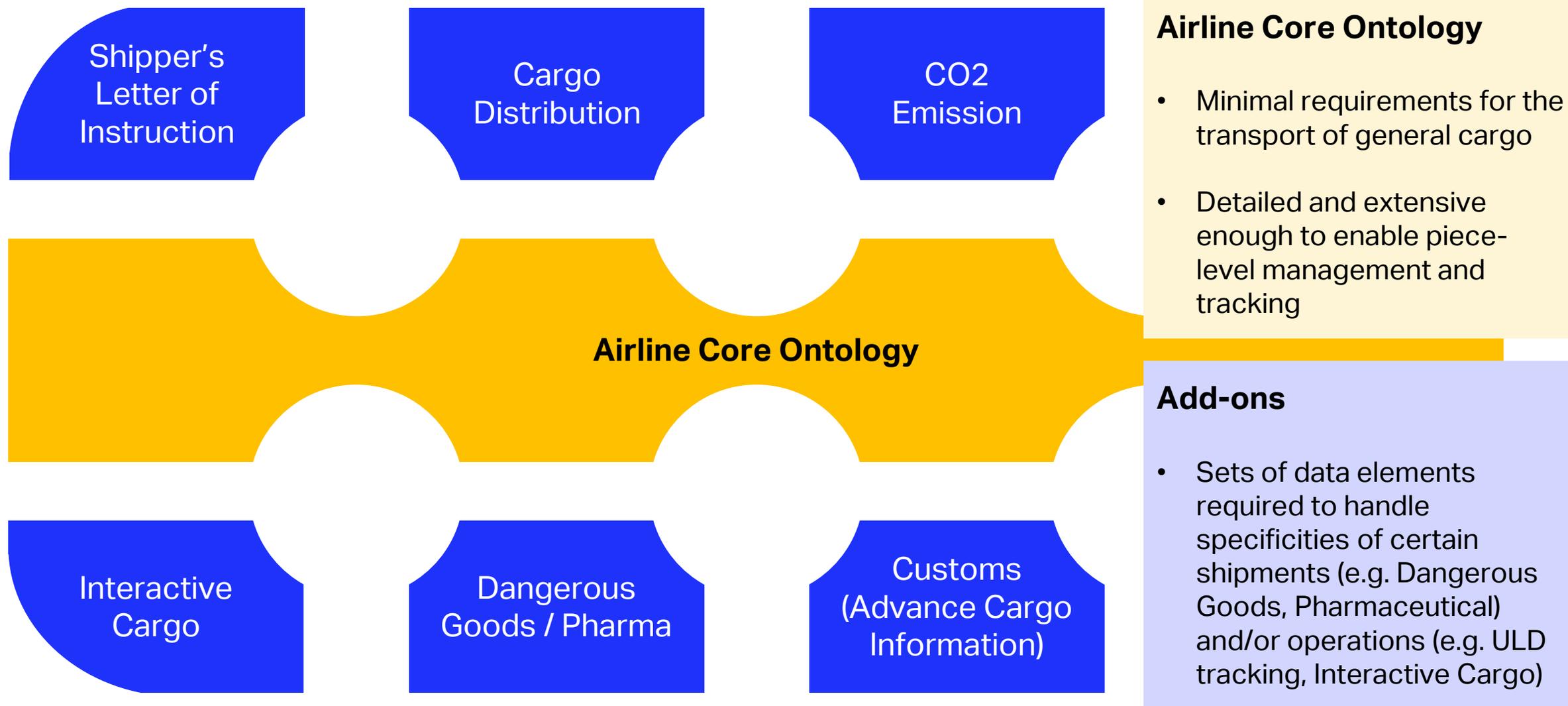


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ONE Record Data Model: the ambition



ONE Record Data Model: the ambition

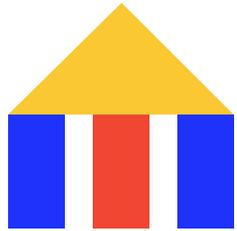


What is behind the data model standards?

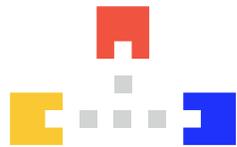


Data Model: Standard components

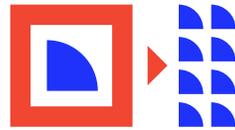
To support the deployment and the adoption of the ONE Record Data Model, IATA published a set of specification, guidance materials and tools



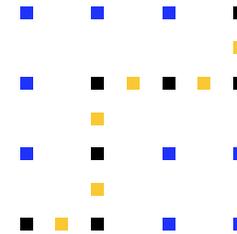
[Design Principles](#)



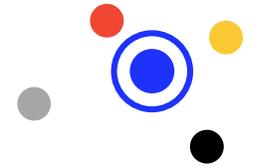
[Conceptual Data Model](#)



[Logical Data Model](#)



[Use Cases](#)



[Ontology](#)

Design Principles



The design principles document aims to describe the design principles for the data model and provide the definition of the Logistic Objects as central entities of the data model.



Definition of the four **design principles**

Definition of the **logistic objects**

Application of the data model to the **Master AWB** and the **House AWB**

What is a logistic object?

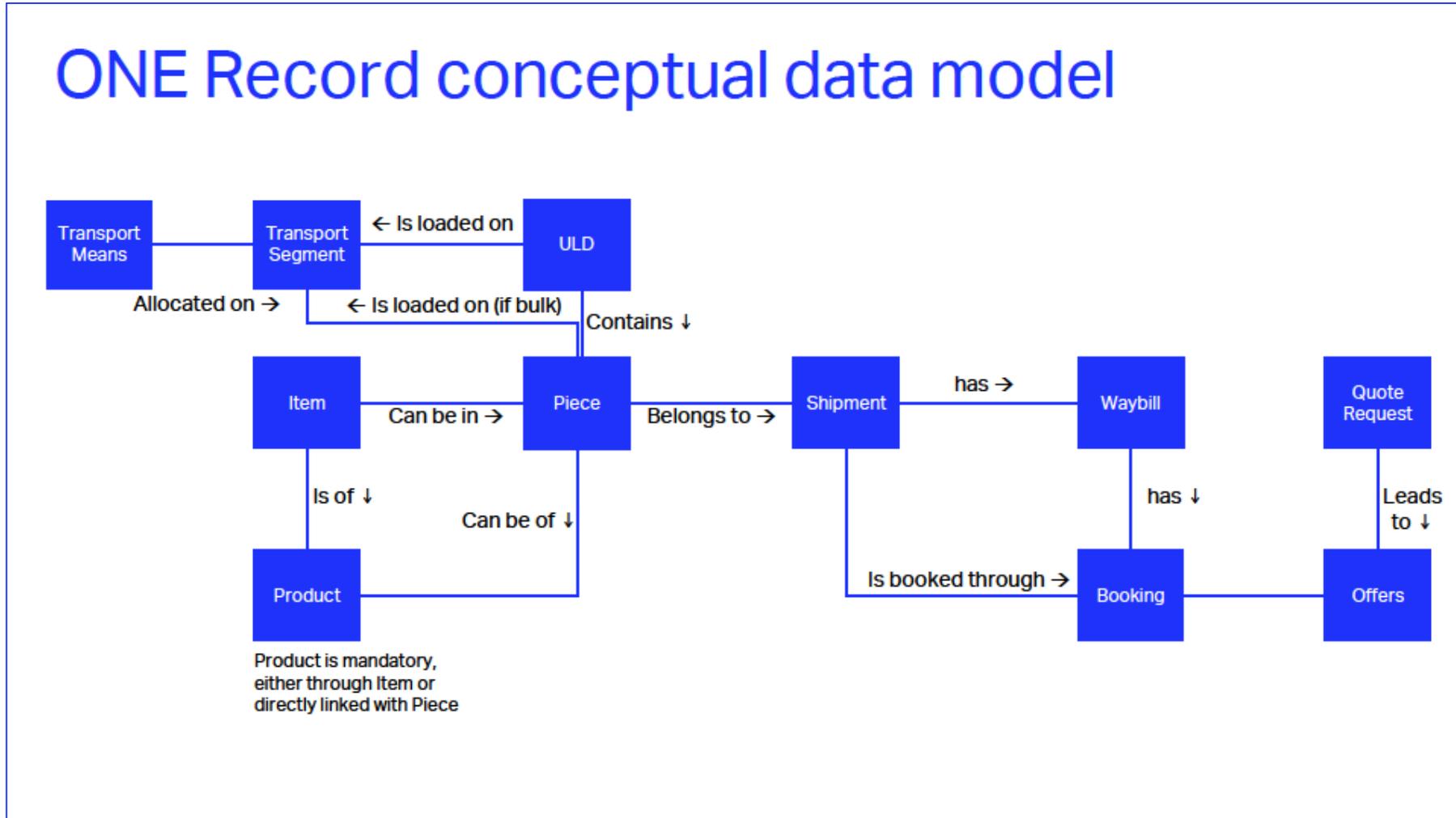
“ An essential element of the cargo supply chain e.g. digital twins, transport movements, etc. ”



Conceptual Data Model



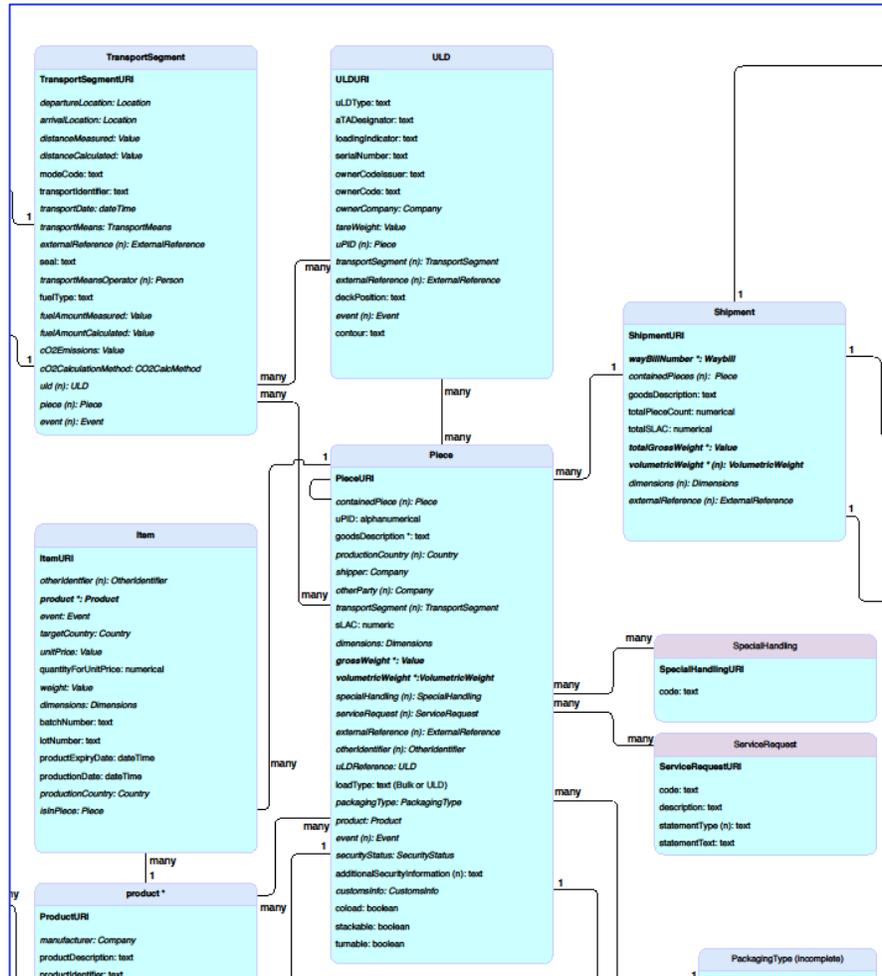
The conceptual data model describes the relationships between the Logistic Objects.



Logical Data Model



The logical data model is a detailed representation of the logistic objects and common objects. It also lists the attributes for each object, their definition and their properties (e.g. cardinality)



Object_Type	Object	Attribute	Linked_Object	Description
Logistic Object	Offer	securityState		Indicate the security state of the shipment, screened
Logistic Object	Offer	serviceRequest	ServiceRequest	Reference to the Service requests of the quote request
Logistic Object	Offer	shipmentDetails	Shipment	Details of the shipment that is to be shipped
Logistic Object	Offer	specialHandling	SpecialHandling	Special Handling details
Logistic Object	Offer	transportMovement	TransportSegment	Transport segment linked to the offer, including the
Logistic Object	Offer	units	Value	Units used for the offer
Logistic Object	PackagingType			Packaging details
Logistic Object	PackagingType	code		Packaging type identifier as per UNECE Rec 21 A
Logistic Object	PackagingType	description		If no Code provided, packaging type description
Logistic Object	Piece			Individual piece or virtual grouping of pieces
Logistic Object	Piece	additionalSecurityInfo		Ad hoc security statement required by state regulations
Logistic Object	Piece	coload		Coload indicator for the pieces (boolean)
Logistic Object	Piece	containedPiece	Piece	Contained indicator for the pieces (boolean)
Logistic Object	Piece	customsInfo	CustomsInfo	Customs details
Logistic Object	Piece	dimensions	Dimensions	Dimensions details
Logistic Object	Piece	event	Event	Event details e.g. DEP, ARR, FOH, RCS, security
Logistic Object	Piece	externalReference	ExternalReference	Reference documents details
Logistic Object	Piece	goodsDescription	Value	General goods description
Logistic Object	Piece	grossWeight	Value	Weight details
Logistic Object	Piece	loadType		Specify how the piece will be delivered (bulk or ULD)
Logistic Object	Piece	otherIdentifier	OtherIdentifier	Other piece identification (e.g. Shipping Marks, S
Logistic Object	Piece	otherParty	Company	Other party company details - e.g. the party to be
Logistic Object	Piece	packagingType	PackagingType	Packaging details
Logistic Object	Piece	product	Product	Product of the piece, mandatory when there are n
Logistic Object	Piece	productionCountry	Country	Goods production country, mandatory when there
Logistic Object	Piece	securityStatus	SecurityStatus	Security details
Logistic Object	Piece	serviceRequest	ServiceRequest	Service Requests
Logistic Object	Piece	shipper	Company	Shipper company details - e.g. the party shipping t
Logistic Object	Piece	sLAC	Value	Shipper's Load And Count (total contained piece
Logistic Object	Piece	specialHandling	SpecialHandling	Special Handling details
Logistic Object	Piece	stackable		Stackable indicator for the pieces (boolean)
Logistic Object	Piece	transportSegment	TransportSegment	Transport segments related to the piece(s)
Logistic Object	Piece	turnable		Turnable indicator for the pieces (boolean)
Logistic Object	Piece	uLDReference	ULD	ULD on which the (virtual) piece has been loaded i
Logistic Object	Piece	uPID	Value	Unique Piece Identifier (UPID) of the piece (Refer
Logistic Object	Piece	volumetricWeight	VolumetricWeight	Volumetric weight details
Logistic Object	Price			Price associated to the offer/booking
Logistic Object	Price	grandTotal		Total price
Logistic Object	Price	ratings	Ratings	Rating used for pricing
Logistic Object	Price	validTo		Terms of validity
Logistic Object	Product			Product details
Logistic Object	Product	characteristics	Characteristics	Characteristics of the product
Logistic Object	Product	commodityCode		Unique Commodity Code e.g. 391721 - Tubes, Pip
Logistic Object	Product	commodityDescription		Commodity description
Logistic Object	Product	commodityName		If no Code provided, name of commodity
Logistic Object	Product	commodityType		Issuer of the Commodity Code - e.g. Brussels Tar

Use Cases



Design Principles



Conceptual Data Model



Logical Data Model



Use Cases



Ontology

The use cases explain how the data model should be used with normal cargo operations: objects to created and modified, stakeholders involved, specificities, etc.

ONE Record - Data Model and MOP mapping

1. Select a task from the Master Operating Plan (MOP)

Activity	1 Book & plan shipments
Task	1.1 Receive booking from shippers' request & check security status
Go to MOP document	Click here to see the complete description

2. The stakeholder presented below is the one accountable to make the data available. However other parties (not specified here) can be designated to perform this action (e.g. GHA on behalf of the airline)

Stakeholders	Shipper
--------------	---------

3. The below sections presents the Logistic/Common object to be created and a description of what need to be done during this specific tasks

Logistic Object	Common Object	Action / Comment
Characteristics CustomsInfo DangerousGoods Item PackagingType Piece Product ReasonsForSecurityStatus ReceivedFrom SecurityStatus ServiceRequest TransportSegment ULD	Company Country Dimensions Event ExternalReference Location OtherIdentifier Person Value VolumetricWeight	<p>The booking is made between the shipper and the forwarder, at this stage this booking is not in the scope of the data model.</p> <p>The shipper ensures that the following LO are created or updated for the shipment: Product, Item, Piece, Dangerous Goods, Transport Segment (Origin and Destination, reference to the pieces), ULD if relevant (creating/updating if he is the owner, linking to existing ULD object otherwise), Security Status, Customs information, Service Request</p> <p>In this list the following are optional objects that are not mandatory at this stage: Item, ULD, Security Status, Customs information</p> <p>If there is no Item, the Product is directly linked to the Piece</p>

ONE Record - Data Model and MOP mapping

Object name	Piece	Back to "MOP vs Data Model" screen
Object type	Logistic Object	

Data type: (O - Object, E - Embedded object, N - Numeric, D - DateTime, T - Text)

Attribute	Description	Optional or Mandatory	Cardinality	Data Type	Linked object
additionalSecurityInfo	Ad hoc security statement required by state regulators	0	n	T	
coload	Coload indicator for the pieces (boolean)	0	0	B	
containedPiece	Details of contained piece(s)		n	E	Piece
customsInfo	Customs details	0	n	E	CustomsInfo
dimensions	Dimensions details			E	Dimensions
event	Event details e.g. DEP, ARR, FOH, RCS, security screening, customs status, etc.	0	n	E	Event
externalReference	Reference documents details		n	E	ExternalReference
goodsDescription	General goods description	M		T	
grossWeight	Weight details	M		E	Value

Ontology



Design Principles



Conceptual Data Model



Logical Data Model



Use Cases



Ontology

The data model is transcribed into an Ontology (ttl file) that contains: all the objects (LO and common objects) including their description, the relationship between objects, the objects' attributes and the cardinality

The screenshot shows the Protégé ontology editor interface. The browser address bar displays the URL: (https://onerecord.iata.org/) : [C:\Users\blaja\Documents\Github\ONE-Record\working_draft\ontology\1R Data Model ontology - May 2020.ttl]. The main window title is "Piece — https://onerecord.iata.org/Piece". The interface includes a menu bar (File, Edit, View, Reasoner, Tools, Refactor, Window, Mastro, Help), a search bar, and a toolbar. The left sidebar shows a class hierarchy starting with "owl:Thing" and listing various classes like "Address", "Booking", "Branch", etc., with "Piece" selected. The main area displays the "Annotations: Piece" tab, showing a list of annotations such as "rdfs:label [language: en] Piece". Below this, the "Description: Piece" tab is active, showing a list of subclasses under "SubClass Of", including "piece:additionalSecurityInfo only xsd:string", "piece:coload only xsd:boolean", "piece:containedPiece only Piece", etc. The bottom status bar shows "Git: master" and "To use the reasoner click Reasoner > Start reasoner [x] Show Inferences".



Developed by the Stanford Center for Biomedical Informatics Research at the Stanford University School of Medicine, Protégé tool is one of the oldest and most widely deployed ontology modelling tools. It was originally conceived as a frame-based modelling tool for rich ontologies following the Open Knowledge Base Connectivity protocol. Later iterations of Protégé have expanded to include a plug-in that is now widely used for OWL and RDF modelling.

<https://protege.stanford.edu/>



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How is it designed?



Data Model Requirements

To fulfill its purpose, the ONE

Record model should meet few
high-level requirements



Cover the end-to-end
supply chain

Find optimal balance in
simplicity, flexibility and
robustness of the data
model



Optimize the usage of
modern technologies to
facilitate data exchange



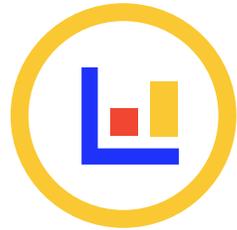
Minimize redundancy of
data in the model



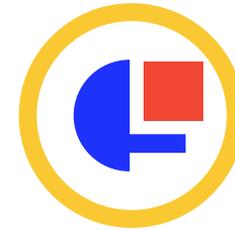
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Focus on the Design Principles

The ONE Record Data Model is based on four core design principles



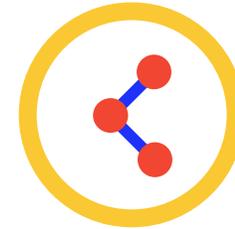
Piece-centric



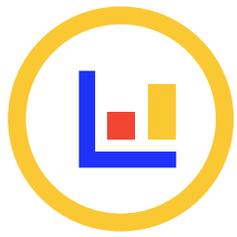
Physics-oriented: the digital twin concept



One single source of truth



Data-driven



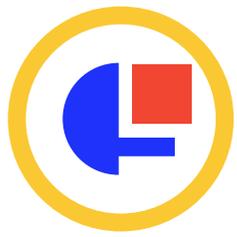
Piece-centric

- The Air Cargo industry is shifting from Shipment-level management to **Piece-level management** starting with Piece-level tracking
- The **Piece** is at the center of the model and deeply linked to the other elements of the cargo supply chain

What is a piece?

“ A uniquely identified physical single unit which may form all or a part of a shipment ”





Physics-oriented



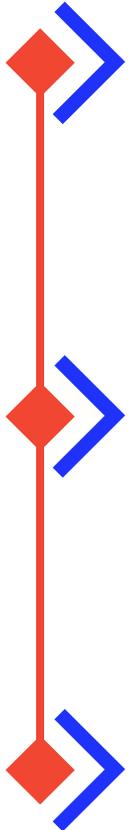
- Physical entities have **digital twins** in the Data Model (e.g. Airplane, ULDs, etc.)
- Easy understanding of the Data Model and how it interacts with actual operations
- Easy **sharing** and **transparency** of the data throughout the supply chain

Digital twins

“ digital twin is the "digital replica" of a physical entity ”



One single source of truth

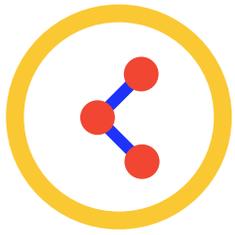


Clear ownership of data that remains at the source

Data integrity and **accuracy** is ensured

A strong trust is implied and in favor of replacing paper-based documents





Data-driven

Data, not documents!

- Data is the **core** of ONE Record
- Documents will be the results of **data aggregation**
- Proper **APIs** and **security mechanisms** allow to cover the legal requirements of documents in the current world

Combined with **Semantic Web** and **Linked Data** principles

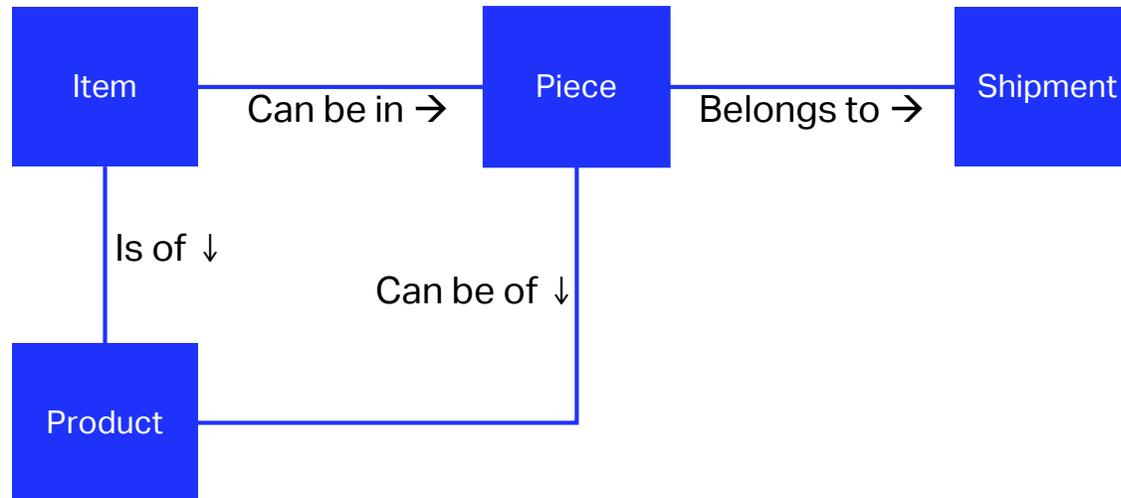
- **All objects are linked**, directly or indirectly, that is Linked data
- No **redundancy** of data required
- The Semantic is described easily in machine-readable **ontologies**

How is this data model applied to the air cargo?



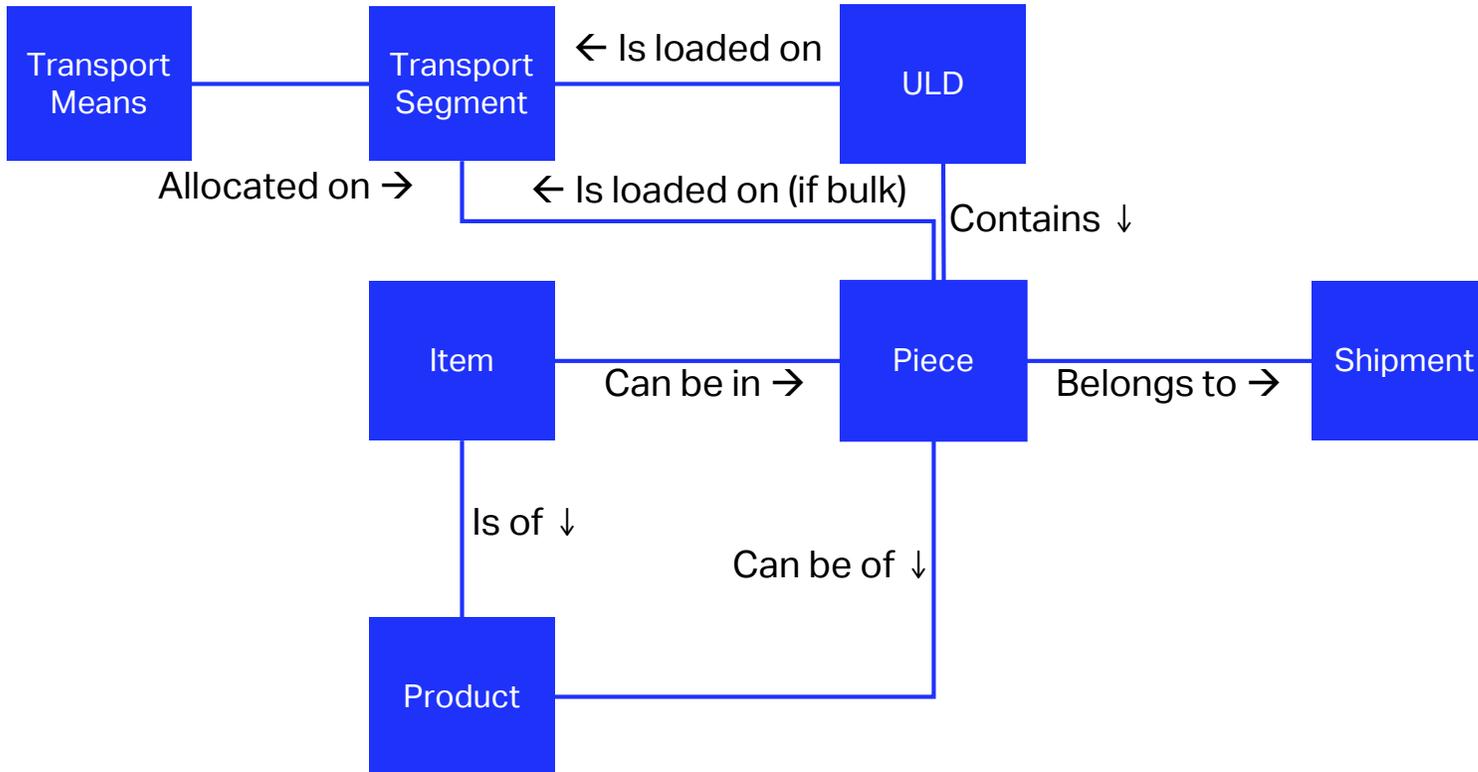
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A model that focuses on the goods ...



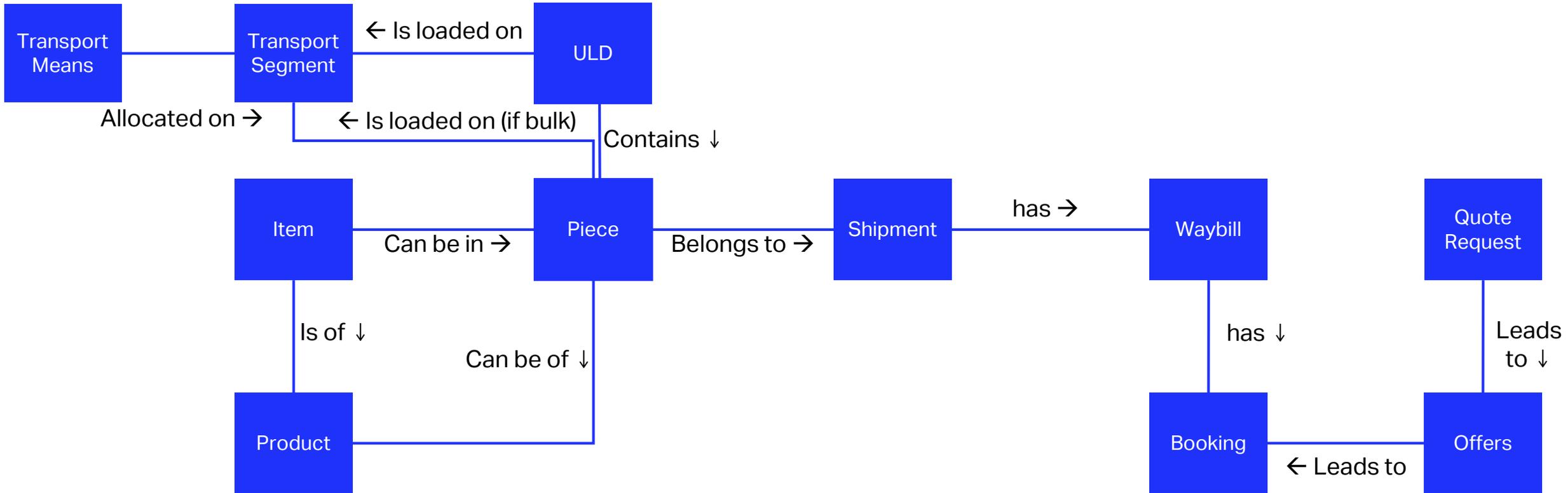
Product is mandatory,
either through Item or
directly linked with Piece

... has digital twins of physical assets ...



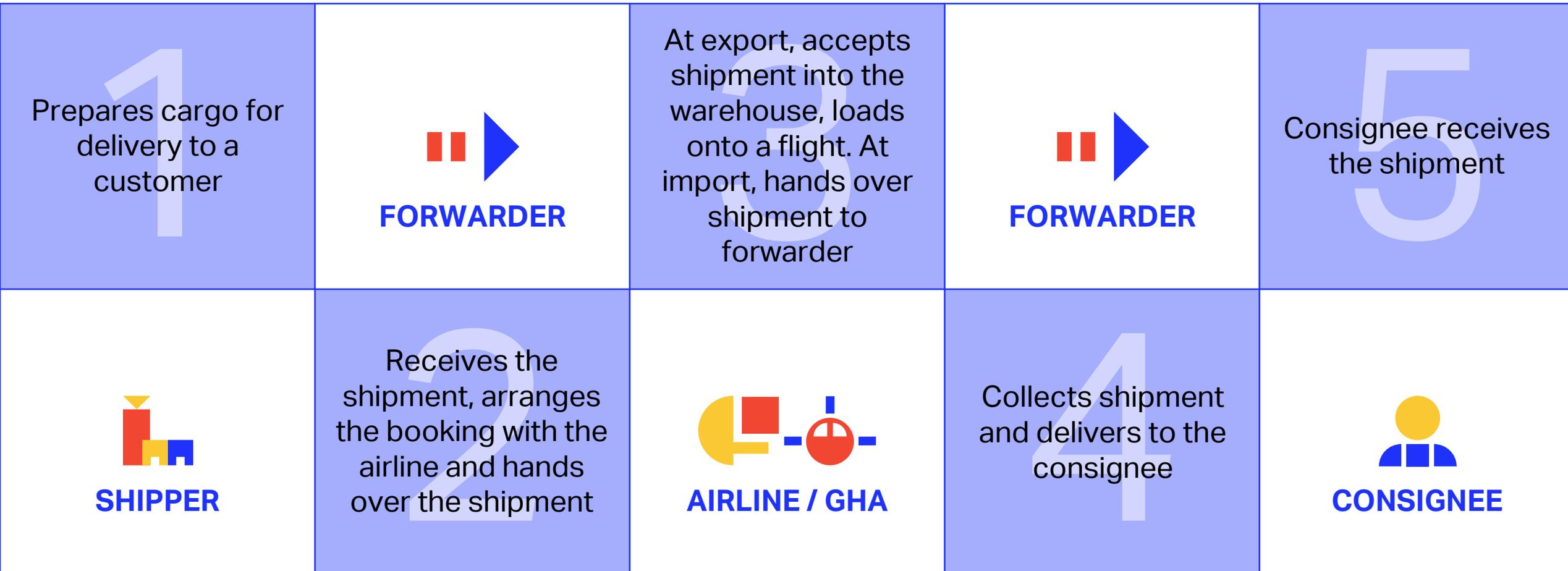
Product is mandatory,
either through Item or
directly linked with Piece

... and covers the booking process



Product is mandatory,
either through Item or
directly linked with Piece

The data model through a simplified use case



The data model through a simplified use case

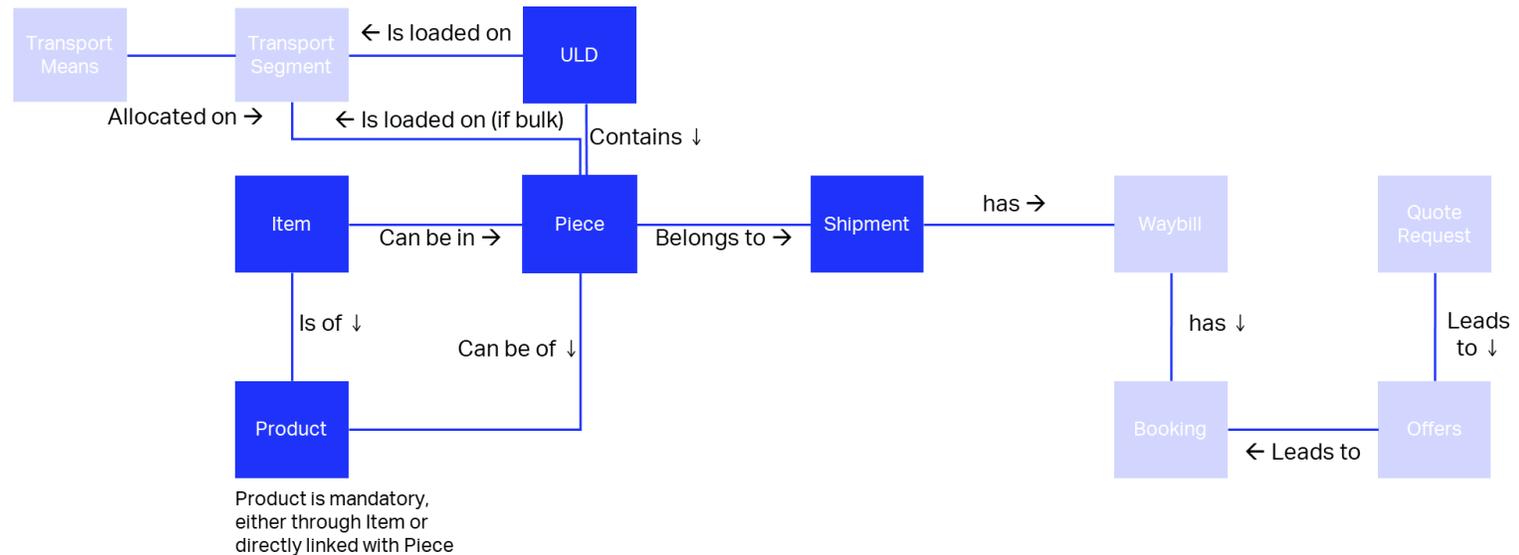
1

Shipper prepares cargo for delivery to a customer:

- Initialization of **"Piece"**, **"Item"**, **"Product"** and **"Shipment"** objects and appropriate links
- **"ULD"** can be used if the shipment is already in a ULD (e.g. pharma ULD)



SHIPPER



The data model through a simplified use case

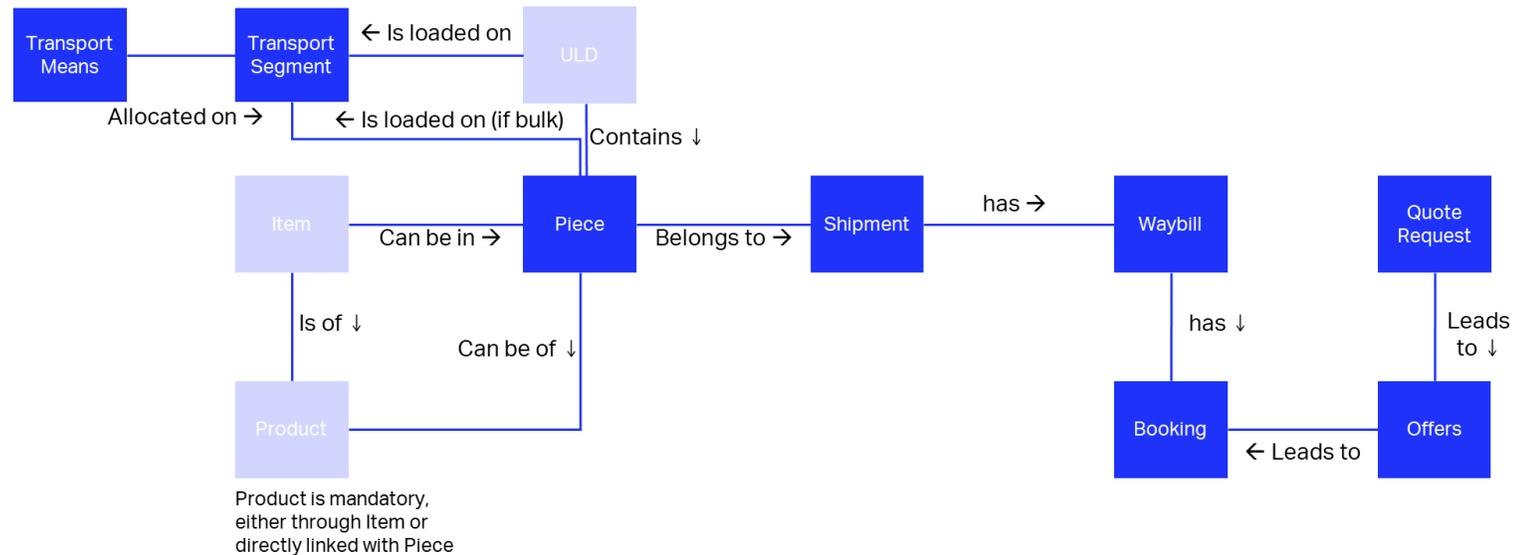
2

Receives the shipment, arranges the booking with the airline and hands over the shipment:

- Booking is made between forwarder and shipper, with the creation of **"Quote Request"**, **"Offers"**, **"Booking"** and **"Waybill"** objects.
- Movement of pieces to carrier domain with **"Transport segments"**, **"Transport Means"** and **"Events"**
- Update of the pieces' statuses with **"Events"**



FORWARDER



The data model through a simplified use case

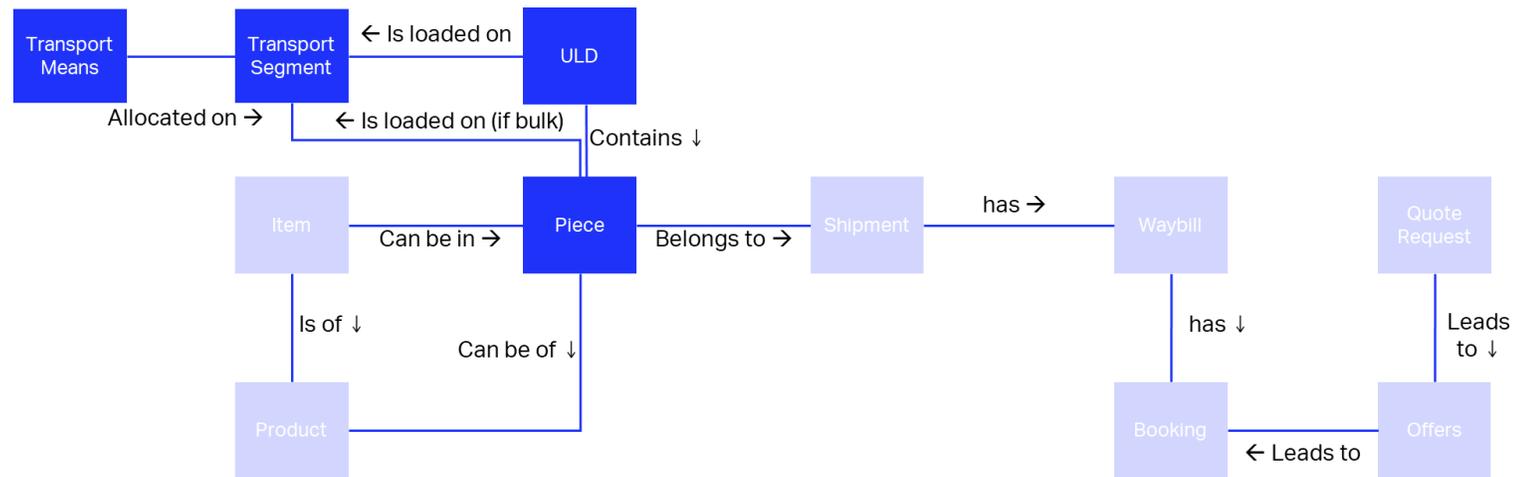
3

At export, accepts shipment into the warehouse, loads onto a flight. At import, hands over shipment to forwarder:

- Movement of pieces/ULD into the warehouses with **"Transport segments"**, **"Transport Means"** and **"Events"**
- Loading of pieces/ULD onto a flight with **"Transport segment"** and **"Events"**
- Departure and Arrival of the flight captured with **"Events"** and **"Transport segment"**
- Unloading of pieces from flight and loading of pieces on truck with **"Transport segment"**



AIRLINE / GHA



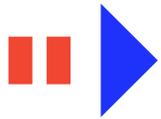
Product is mandatory,
either through Item or
directly linked with Piece

The data model through a simplified use case

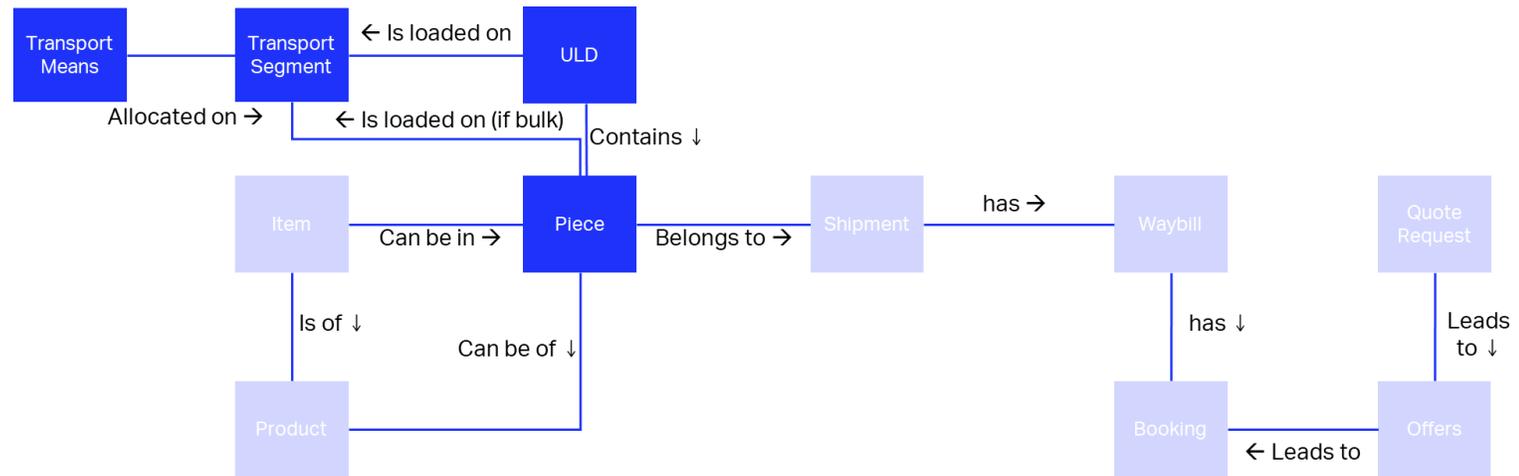
4

Collects shipment and delivers to the consignee:

- Movement of pieces to the forwarder hub with **"Transport segments"**, **"Transport Means"** and **"Events"**
- If a ULD is broken down, the respective **"ULD"** and **"Piece"** objects are updated
- Pieces are loaded onto truck for delivery to consignee with **"Transport segments"**, **"Transport Means"** and **"Events"**



FORWARDER



Product is mandatory,
either through Item or
directly linked with Piece

The data model through a simplified use case

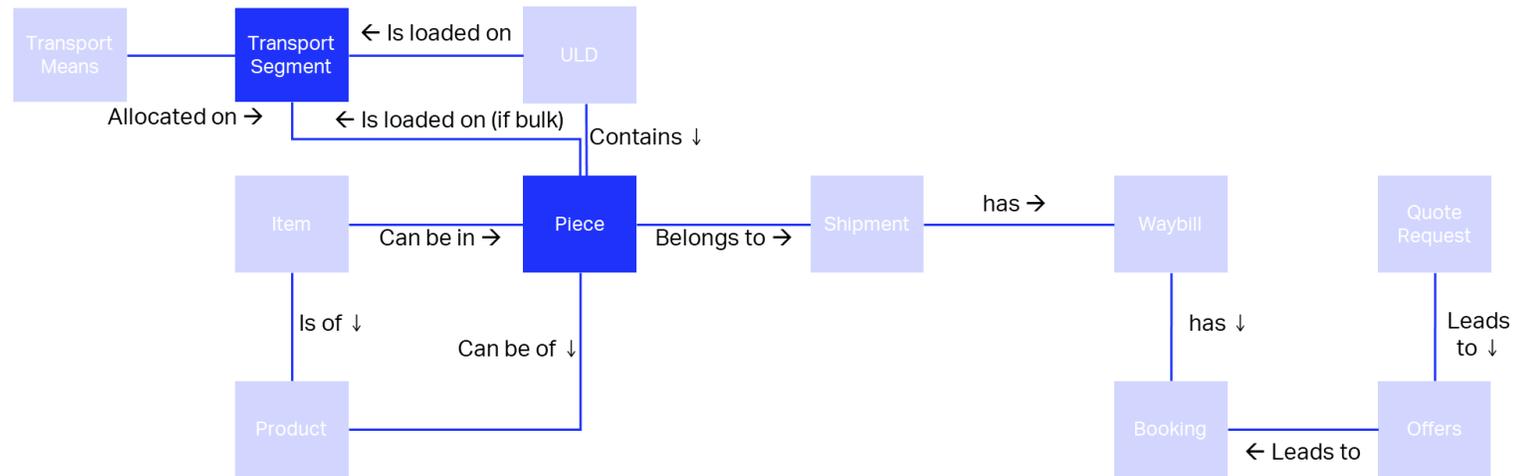
5

Consignee receives the shipment:

- Delivery to consignee with **“Transport segments”** and **“Events”**
- **“Event”** is added to the **“Piece”** to reflect the final delivery



CONSIGNEE



Product is mandatory,
either through Item or
directly linked with Piece

Deep dive into the ONE Record standard



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ONE Record Insights and White Papers

Don't miss our ONE Record Insights and White Papers



ONE Record Data Model
A digital twin of the air cargo

The vision for ONE Record is an end-to-end digital logistics and transport supply chain where data is easily and transparently exchanged in a digital ecosystem of air cargo stakeholders, communities and data platforms.

ONE Record is driven by the need of digitalization of the air cargo industry to achieve operational excellence through optimized data sharing and lean business processes while reducing the usage of paper documents.

Why a data model?

As ONE Record intends to define a data sharing standard among the deployment of a network of plug and play platforms, it is essential to define a standard data model that can be used and understood by any stakeholder in the industry. The data model that has been designed with a group of industry stakeholders aims to:

- Cover the end-to-end supply chain of goods transportation, including the possibility to integrate multi-modal transportation means;
- Find the optimal balance in simplicity, flexibility and robustness of the data model to ensure that all required data is captured and shared;
- Optimize the usage of modern technologies to facilitate and secure data exchange through APIs, state of the art security mechanisms, etc.
- Optimize data and minimize redundancy.

The data model will be transferred into an ontology to facilitate its understanding and implementation. Furthermore, the digital assets are accessible anywhere and allow for more reliable and real-time tracking through the supply chain.

How is it designed?

Four core design principles have been defined to design the ONE Record data model:

1. ONE Record Data Model

ONE Record Data Model



ONE Record & the power of ontologies
Looking beyond the hype for real solutions to real problems

ONE Record is a standard for data sharing that defines a common model for data that is shared via a standardized and secured API. The Data Model specification provides the air cargo industry with a common language and a standard data structure for data exchange based on three concepts: Semantic Web, ontologies and Linked Data.

This document focuses on a high level overview of what is Semantic Web and why the usage of concepts such as Linked Data and ontologies can be beneficial in a distributed end-to-end digital logistics and transport chain, such as the one that the ONE Record standard aims to support.

What is Semantic Web?

Semantic Web is an extension of the Web that adds semantics to the current format of data representation enabling considerable gains in the information treatment.

On the Web, you can post documents and photos about yourself, listen to podcasts, go shopping and have video chats with friends. With Semantic Web, you can create data about a topic, connect it with data created by others and link together the most relevant of your information, establishing a world-wide standard of communication.

Why is an ontology important?

An ontology defines a common vocabulary for different stakeholders who need to share information in a domain. It includes machine-readable definitions of basic concepts within a domain and relations among them.

Some of the reasons for which someone would want to develop an ontology are:

- To share common understanding of the structure of data among stakeholders;

1. ONE Record & the power of ontologies

ONE Record & The power of ontologies



Crafting Ontologies
From physical freight to machine readable data

Semantic Web data formats were designed to provide a way to describe and define data by using more data. The Web of Linked Data offers publishers to describe the data models and data concepts in such a way that they can be linked, described, and queried as if they were part of a single database.

Different tools can be used in order to model physical objects into an RDF compliant vocabulary. This tool helps operationalize the methodology used by the ONE Record data model and technical experts for creating the ONE Record ontology.

How to easily create ontologies?

Let's say that you understand [Semantic Web, RDF and OWL](#), and you feel that these concepts are the best thing since you have discovered how to use HTML. Even if you follow technical examples and tutorials, you realize that you would never be able to manually create and maintain RDF (Resource Description Framework) nor OWL (Web Ontology Language) in your favorite text editor. By copying and pasting model description from a spreadsheet, such a process would be long and error prone, and for big vocabularies, it would take hours and hours of copy-pasting.

Fortunately, there are different "non-manual editing" ways to create RDF data and OWL ontology models.

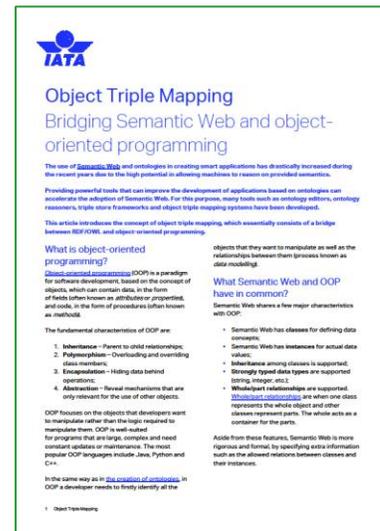
Protégé Tool

Protégé tool was selected.

[Protégé tool](#), developed by the Stanford Center for Biomedical Informatics Research at the Stanford University School of Medicine, is one of the oldest and most widely deployed ontology modelling tools. It was originally conceived as a frame-based modelling tool for rich ontologies in accordance with the [Open Knowledge Base Connectivity](#) protocol. Later iterations of Protégé have

1. Crafting Ontologies

Crafting Ontologies



Object Triple Mapping
Bridging Semantic Web and object-oriented programming

The use of [Semantic Web](#) and ontologies in creating smart applications has drastically increased during the recent years due to the high potential in allowing machines to reason on provided semantics.

Providing powerful tools that can improve the development of applications based on ontologies can accelerate the adoption of Semantic Web. For this purpose, many tools such as ontology editors, ontology reasoning, triple store frameworks and object triple mapping systems have been developed.

This article introduces the concept of object triple mapping, which essentially consists of a bridge between RDF/OWL and object-oriented programming.

What is object-oriented programming?

[Object-oriented programming \(OOP\)](#) is a paradigm for software development, based on the concept of objects, which can contain data, in the form of fields (often known as attributes, properties, and methods), in the form of procedures (often known as methods).

The fundamental characteristics of OOP are:

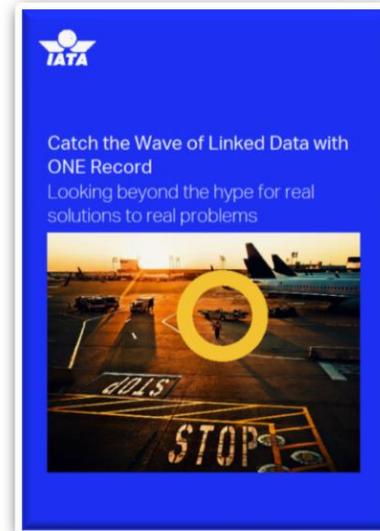
1. **Abstraction** - Permit to child relationships;
2. **Polymerphism** - Overloading and overriding class members;
3. **Encapsulation** - Hiding data behind operations;
4. **Abstraction** - Reveal mechanisms that are only relevant for the use of other objects.

OOP focuses on the objects that developers want to manipulate rather than the logic required to manipulate them. OOP is well suited for programs that are large, complex and need constant updates or maintenance. The most popular OOP languages include: Java, Python and C++.

In the same way as in [Data Model of ontologies](#), in OOP, developer needs to first identify all the

1. Object Mapping

Object Triple Mapping



Catch the Wave of Linked Data with ONE Record
Looking beyond the hype for real solutions to real problems

As the use of [Semantic Web](#) and ontologies in creating smart applications has drastically increased during the recent years due to the high potential in allowing machines to reason on provided semantics.

Providing powerful tools that can improve the development of applications based on ontologies can accelerate the adoption of Semantic Web. For this purpose, many tools such as ontology editors, ontology reasoning, triple store frameworks and object triple mapping systems have been developed.

This article introduces the concept of object triple mapping, which essentially consists of a bridge between RDF/OWL and object-oriented programming.

What is Semantic Web and OOP have in common?

Semantic Web shares a few major characteristics with OOP:

- Semantic Web has classes for defining data elements;
- Semantic Web has instances for actual data values;
- Inheritance among classes is supported;
- Strongly typed data types are supported (string, integer, etc.);
- Whole-part relationships are supported ([Linked Data](#));
- Whole-part relationships are supported ([Linked Data](#));

Aside from these features, Semantic Web is more rigorous and formal, by specifying extra information such as the allowed relations between classes and their instances.

1. Catch the Wave of Linked Data

Catch the Wave of the Linked Data

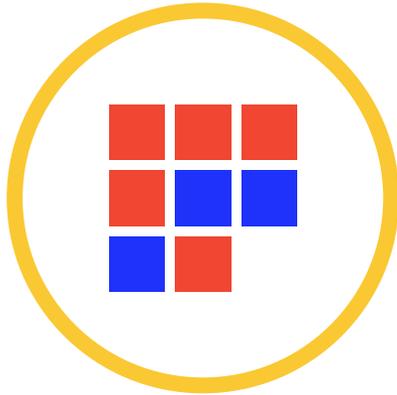
Step 4

Implement the ONE Record Infrastructure

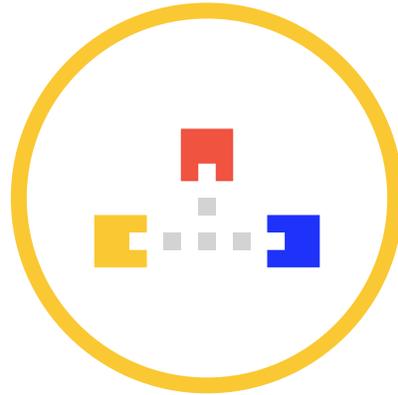


ONE Record infrastructure components

The ONE Record infrastructure is based on the three components below . Implementing these components will enable your organization to work in a ONE Record compatible environment.



[Get started with the ONE Record Ontology](#)



[Implement the ONE Record API](#)



[Secure the ONE Record API](#)



Get started with the ONE Record Ontology



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What is an Ontology?



Ontology

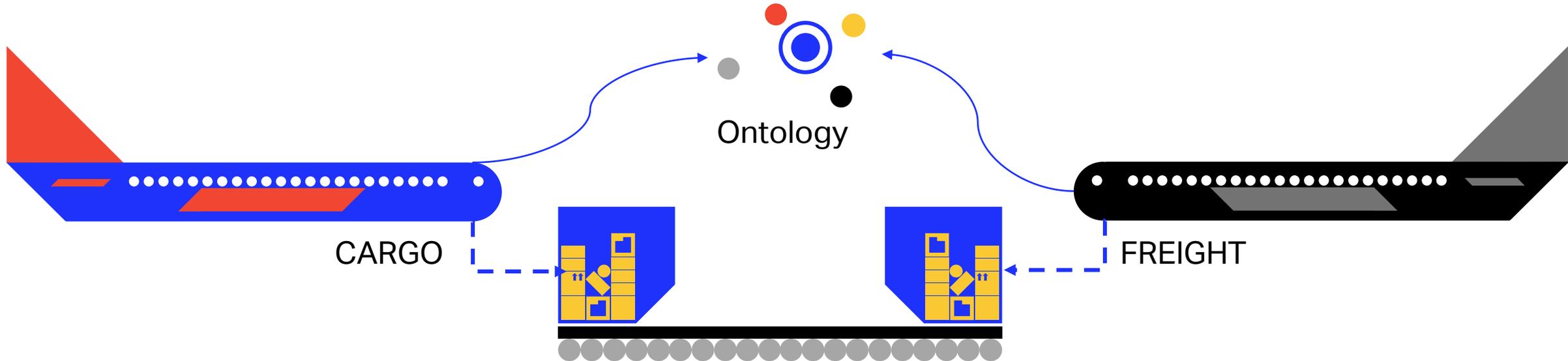


API



Security

Ontologies are frameworks for representing knowledge about concepts across a domain and the relationships between them. The ONE Record standard takes full advantage of their ability to describe relationships and their interdependence in order to model high quality, linked and coherent data.



One database may use the term "cargo", whereas the other may use the term "freight". To make the integration complete, an extra definition should be added to the RDF data, describing the fact that the relationship described as "freight" is the same as "cargo". This extra piece of information is, in fact, a simple ontology.

Get started with ONE Record Ontology

To incorporate the ONE Record Ontology in your systems, you can start with the below steps:

- 1 [Read](#) the Data Model materials
- 2 [Read](#) the ONE Record Whitepaper
- 3 [Download](#) the ONE Record Ontology

Catch the Wave of Linked Data with ONE Record

Looking beyond the hype for real solutions to real problems





Implement the ONE Record API

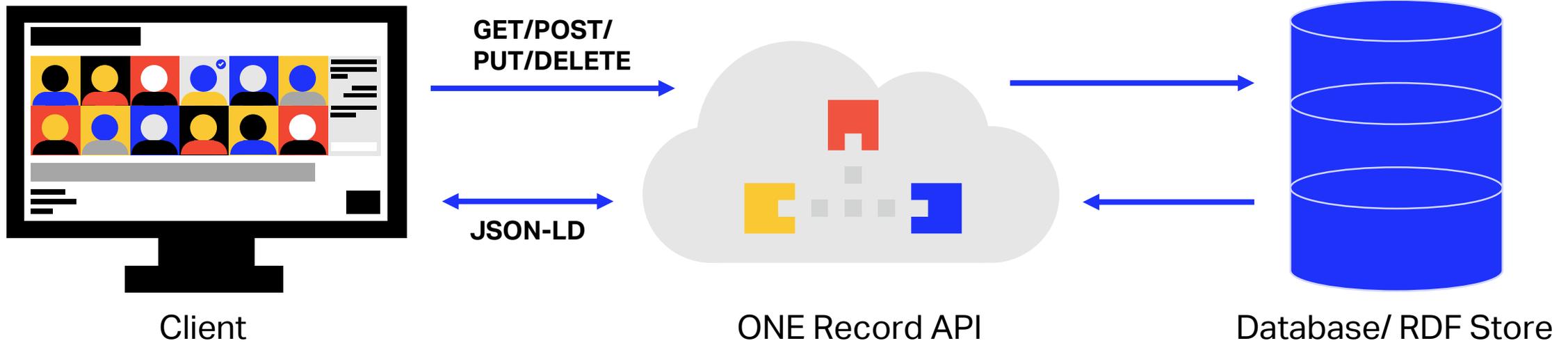


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What is an API?

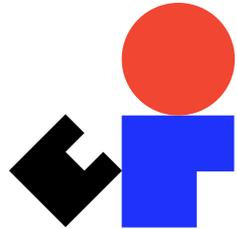


An API is a computing interface which defines interactions between multiple software intermediaries. It defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used and the conventions to follow.



Implement the ONE Record API

There are two ways to implement the ONE Record API



Code your own ONE Record API from scratch by using the ONE Record API Specifications and the ONE Record Ontology



Download the ONE Record Sandbox and integrate it into your system

[Download](#) the API Ontology

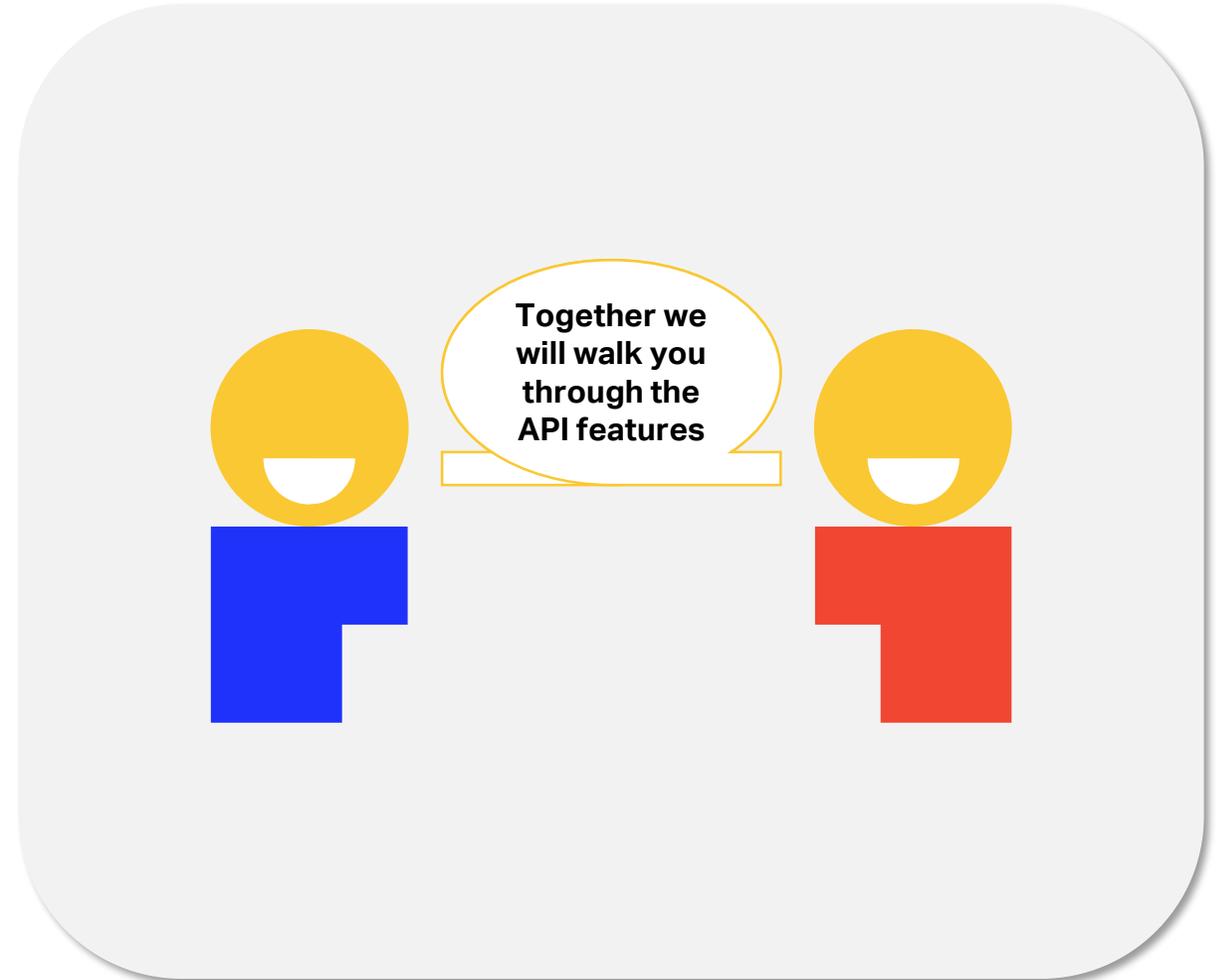
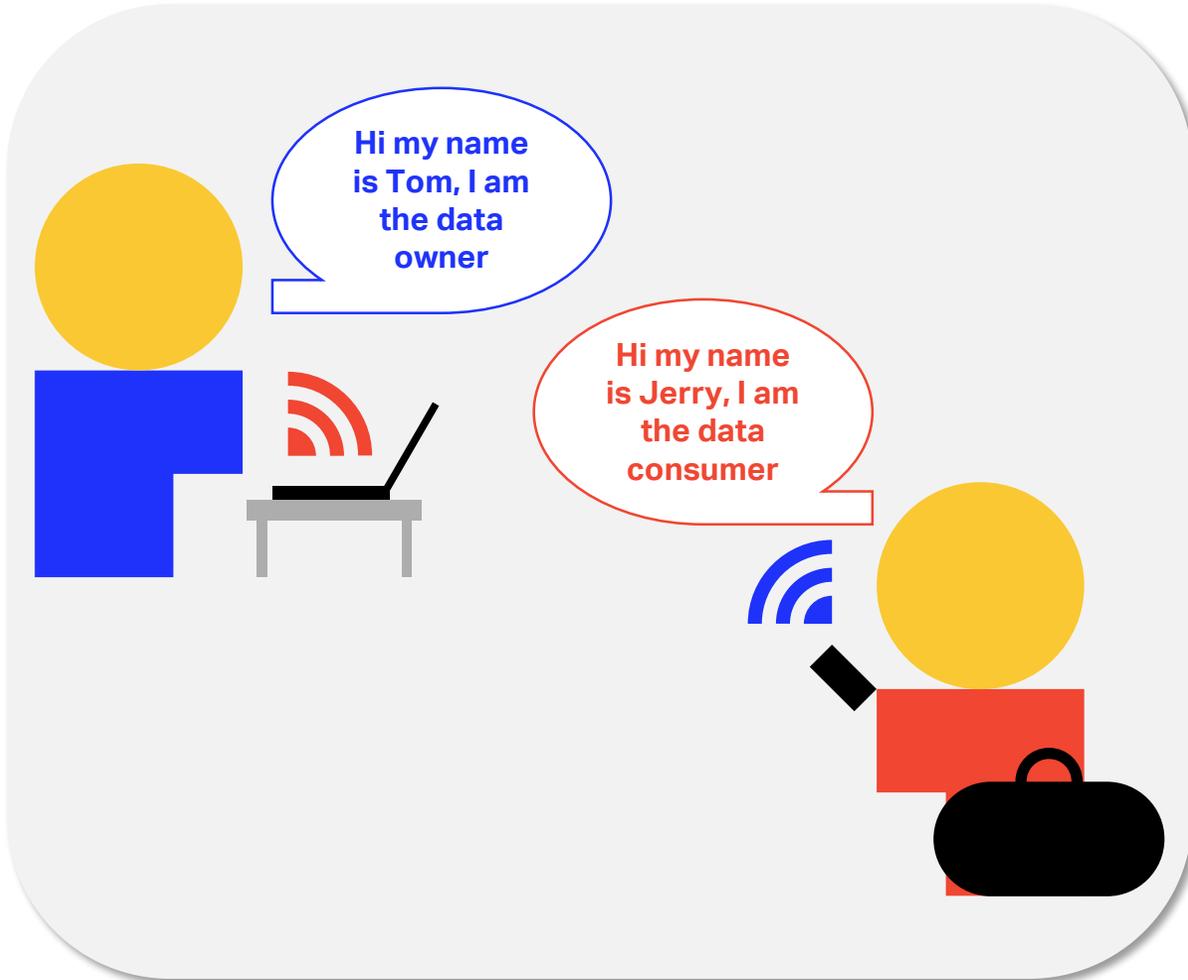
[Download](#) the Java Sandbox

[Read](#) the API specifications

What are the main features of the ONE Record API?



Introducing Tom & Jerry, API friends



Let's hear from Tom & Jerry challenges

Tom & Jerry are going to walk us through the different API features

1

[How do I make my data available?](#)

2

[How can I access the data?](#)

7

[How can we automate data notifications?](#)

8

[How can I send events related to data?](#)

3

[How do I raise a change request?](#)

4

[How do I update the data?](#)

9

[How can I define to whom I give data access?](#)

10

[How can I take a snapshot of the data?](#)

5

[How can I save the history of the data?](#)

6

[How do I give data access to my partners?](#)

11

[How can I retrieve a version of data at a certain moment in time?](#)

12

[How can I see all the existing versions of the data?](#)

How do I make my data available?

Publishing data with POST

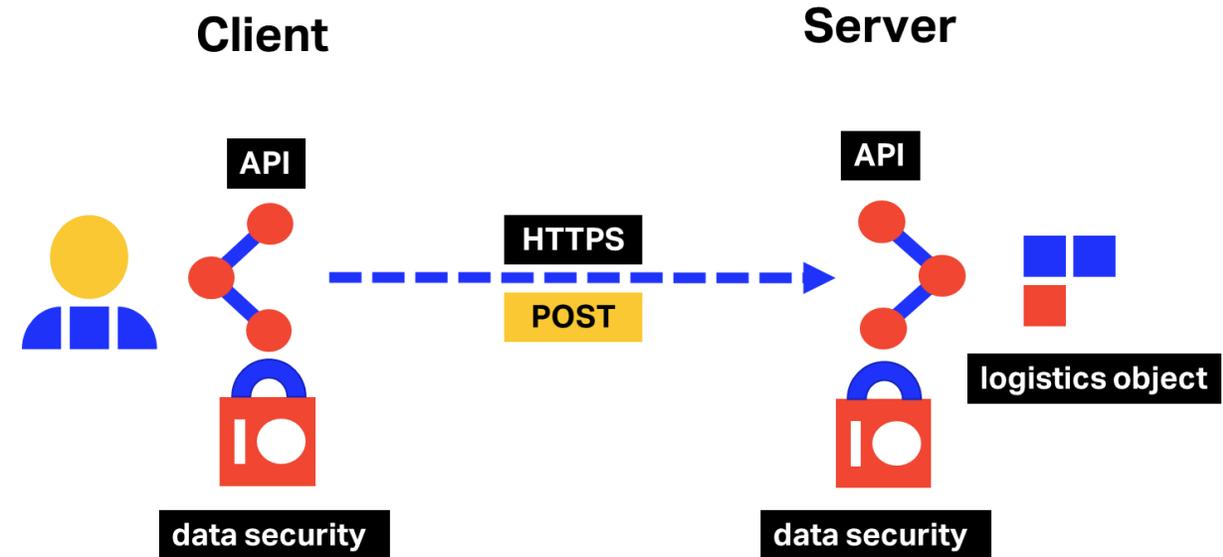
When creating a new [Logistics Object \(LO\)](#) on a ONE Record Server, you need to do a HTTPS POST request. The data for the LO should be included in the request body and provided that you are authenticated and authorized, the server will accept the request and [create](#) a new LO. This operation will be generally performed by the [owner](#) of the data, who in most cases owns or at least controls the server.



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1

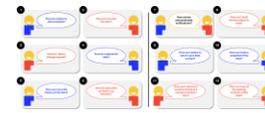
How do I make my data available?



How can I access the data?

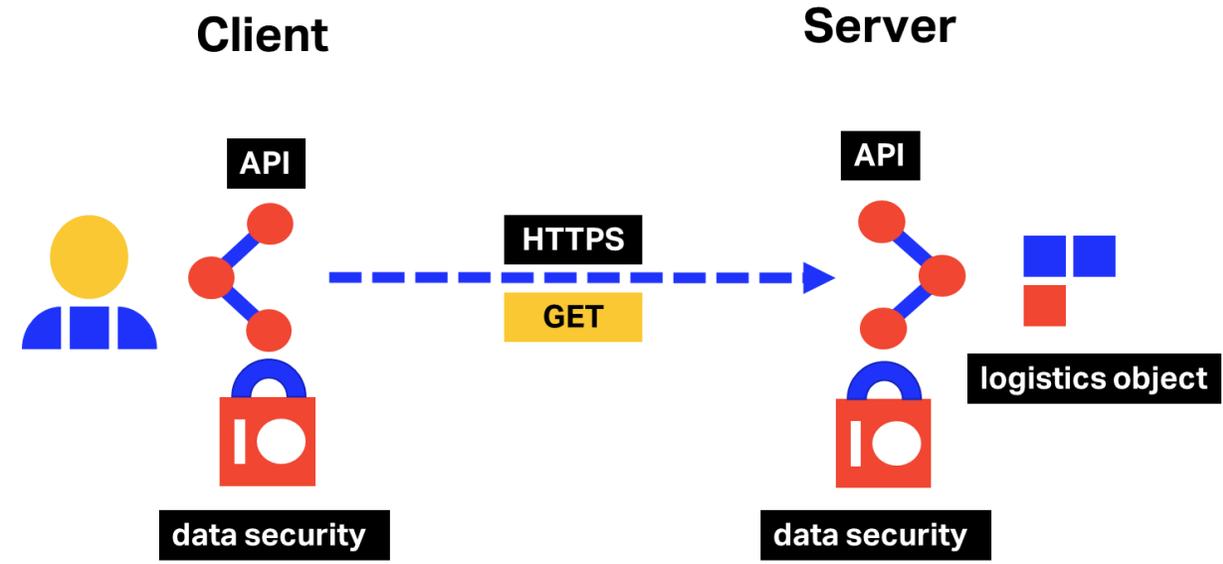
Reading data with GET

To [read](#) the content of a Logistics Object, you need to perform a HTTPS GET request. The server that you are accessing will check that you are an authenticated and authorized user before it will return you the data. [JSON-LD](#) (application/ld+json) is the standard response format for the ONE Record API.



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2



How do I raise a change request?

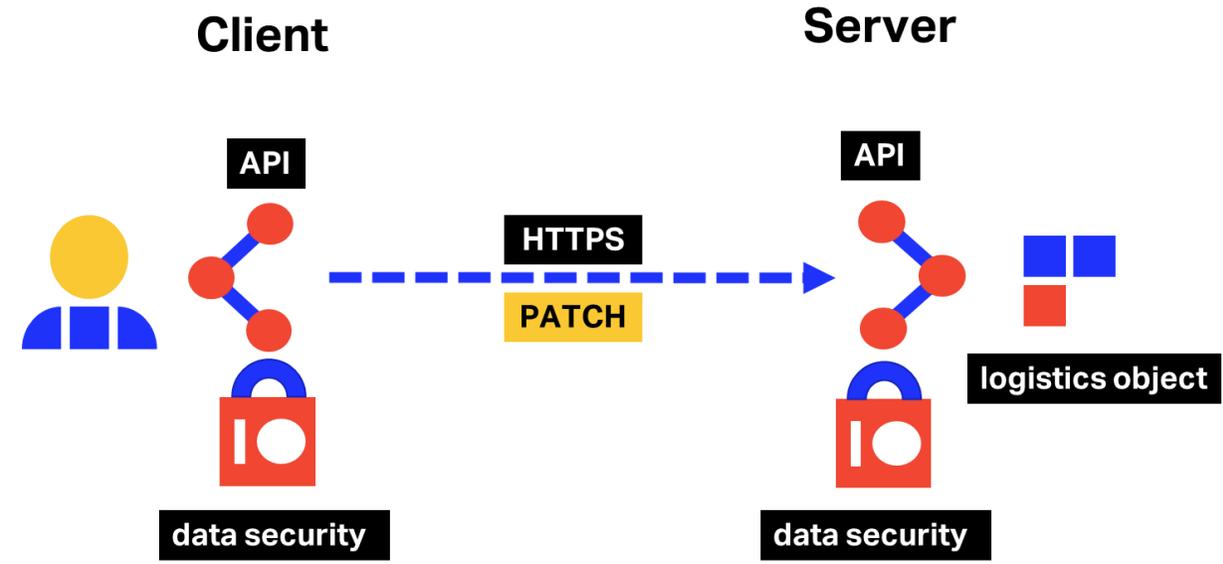
Change request with PATCH

Whenever you need to [request a change](#) to data in a Logistics Object, you need to use the HTTPS PATCH method. In ONE Record API, the PATCH request represents an array of objects. Each object represents a single operation to be applied to the target Logistics Object ([add](#) and/or [delete](#)).



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3



How do I update the data?

Updating data with PATCH

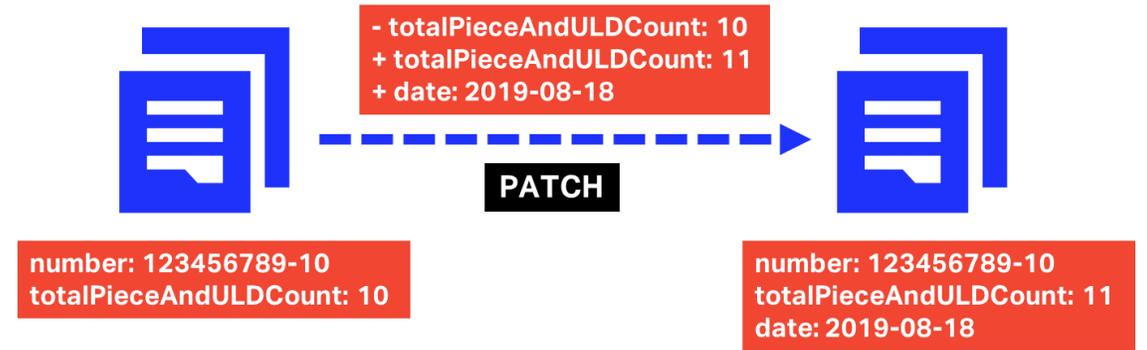
Only the publisher can change the Logistics Object, where the publisher is the party that creates the Logistics Object on the ONE Record server.

The evaluation of a PATCH request occurs as a **single event**. Operations are sorted and processed as groups of **delete** and then **add** operations until all the operations are applied, or the entire PATCH fails.



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4



The example below describes the change to be made – **delete** the **totalPieceAndULDCount** of value 10 and **add** value 11 instead. Also, a new field – **date** – is added.

How can I save the history of the data?

Audit trail of the changes

An [audit trail](#) (history) of all the change requests is stored and can be retrieved at any moment from a dedicated endpoint on the ONE Record API.

GET	http://localhost:8080/companies/myCompany/los/AWB-445555566/auditTrail
-----	--

GET	http://localhost:8080/companies/myCompany/los/AWB-445555566/auditTrail?updatedFrom=20200620120500&updatedTo=20200710120500
-----	--



[Back to questions](#)

5



```
"create":{
  "lo":"initial content of the Logistics Object"
},,
"logisticsObjectRef":"Logistics Object Id to which the audit trail applies",
"changeRequests":[
  { "timestamp":"2019-09-17T14:49:13+00:00",
    "companyId":"http://myonerecordserver.com/AIRLINE",
    "changeRequest":{
      "revision":"1",
      "description":"Updated number of total pieces count",
      "operations":[
        {
          "op":"del",
          "p":"http://onerecord.iata.org/Waybill#totalPieceAndULDCount",
          "o":{
            "value":"10",
            "datatype":"https://www.w3.org/2001/XMLSchema#decimal" }},
        {
          "op":"add",
          "p":"http://onerecord.iata.org/Waybill#totalPieceAndULDCount",
          "o":{ "value":"11",
            "datatype":"https://www.w3.org/2001/XMLSchema#decimal" }},
        {
          "op":"add",
          "p":" http://onerecord.iata.org/Waybill#date",
          "o":{
            "value":"2019-08-18",
            "datatype":"http://www.w3.org/2001/XMLSchema#date" }}}
      ],
      "status":"ACCEPTED"  ]}]
```



How do I give partners access to my data? (1/2)

Access Delegation

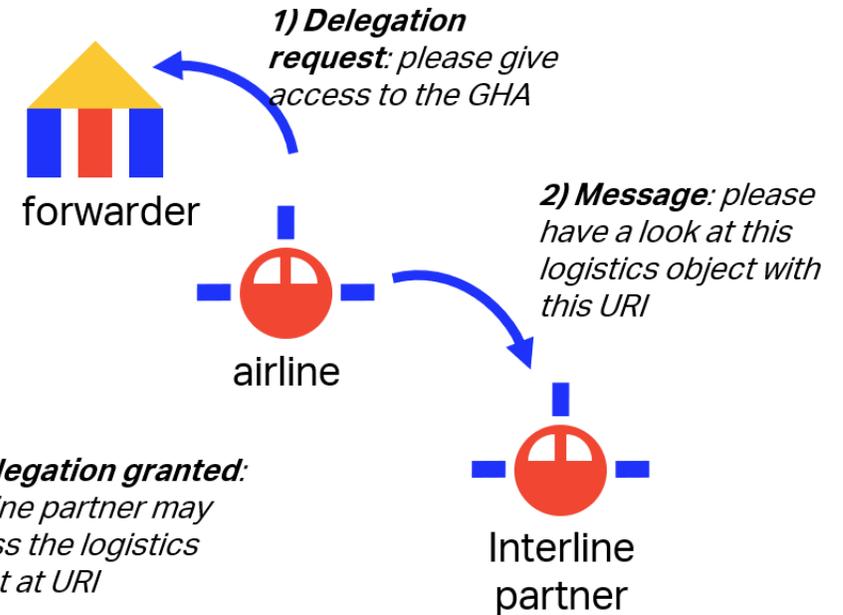
Typically, the company that has created the data will notify their partner and provide them access details such as the URI of the data. However, that second company may need to share the same data with another company downstream. This can be performed via the access delegation feature.



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How do I give data access to my partners?



How do I give data access to my partners? (2/2)

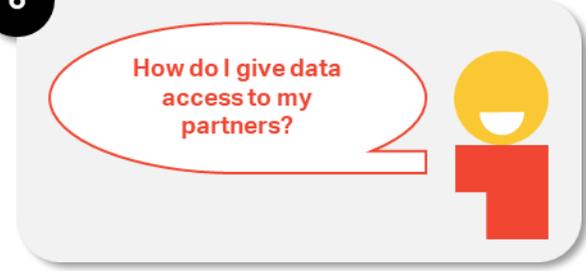
Chains of Trust

Chains of trust are based on **business partnerships** and **trust** in the transport chain. It ensures that the company who has shared a logistics object on a server, always knows who may access this and at any time, it can revoke all or part of the chain of trust.

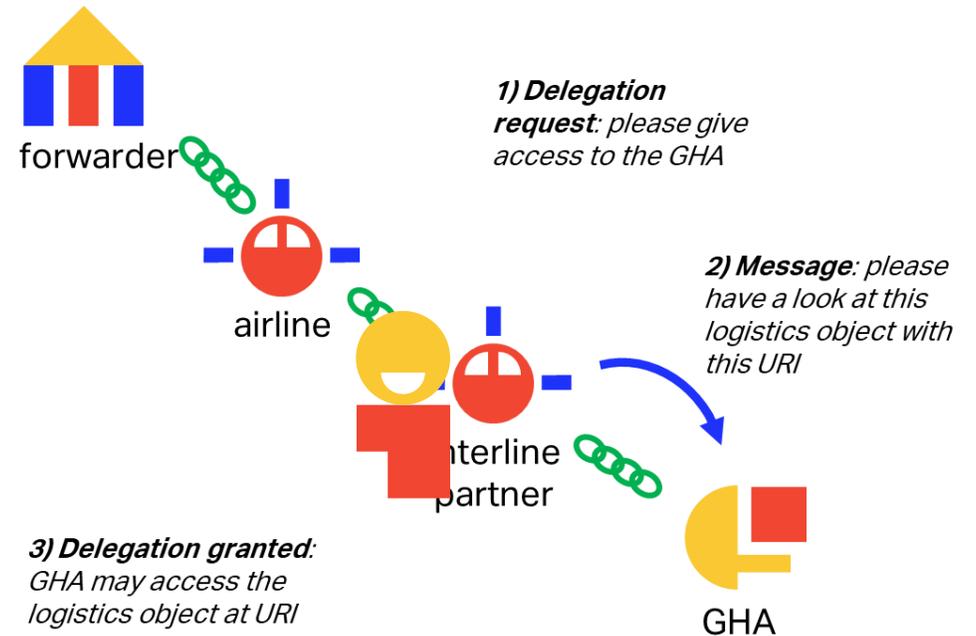


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6



 = Chain of Trust



How can we automate data notifications?

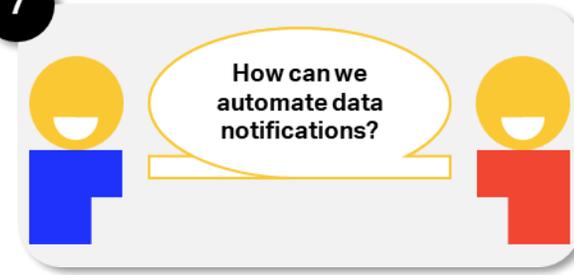
Automatic data updates through pub/sub

In distributed applications, components of the system often need to provide information to other components as events happen. For example, companies need to be notified when new data becomes available, so they can act accordingly if required.



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7



Publisher

Subscriber



How do I define to whom I give access to the data?

Access Control Lists

In ONE Record, access to resources can be handled by using [Access Control Lists](#) (ACLs) stored in the backend systems of the ONE Record Servers and defined using the [Web Access Control](#) standard from W3C. Each Logistics Object resource has a set of Authorization statements describing **who** has access to that resource and what **types (or modes) of access** they have.



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9



How can I define to whom I give data access?



READ / **GET**

Read the contents (including querying it)



WRITE / **POST** and **PATCH**

Write contents or modify part of it



CONTROL

Read and Write



How can I take a snapshot of the data?

Memento

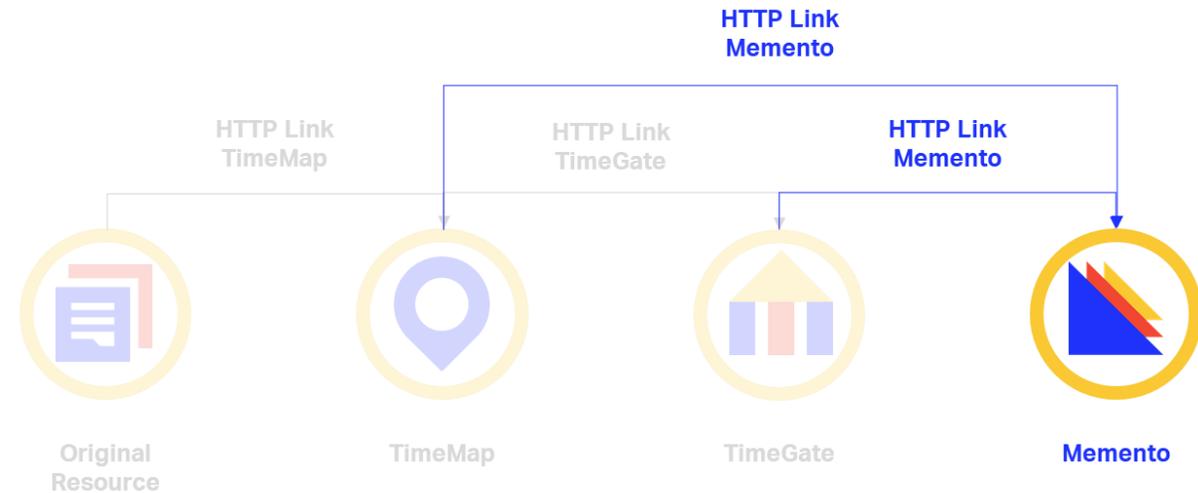
A Web resource that is a **prior version** of the Original Resource, i.e. that encapsulates what the Original Resource was like at some time in the past. In ONE Record, a Memento contains a **snapshot of the data** at a certain moment in time.



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How can I take a snapshot of the data?



How can I retrieve a version of data at a certain moment in time?

TimeGate

A Web resource that “decides” on the basis of a [given datetime](#), which Memento best matches what the Original Resource was like around that given datetime. When negotiating with the TimeGate, the client uses an [Accept-Datetime header](#) to express the desired datetime of a prior/archived version of the original resource. The TimeGate responds with the location of a matching version, a Memento.

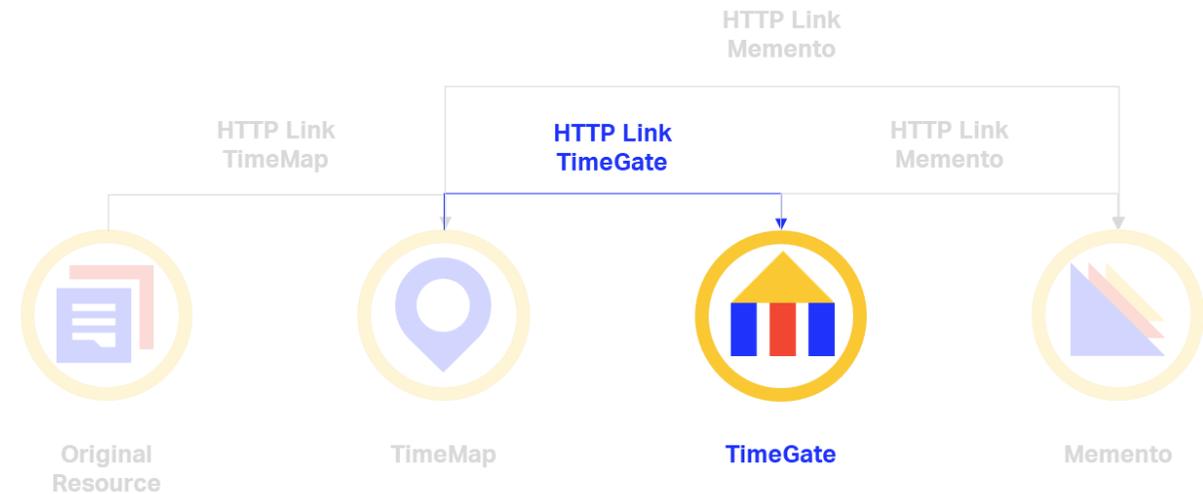


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How can I retrieve a version of data at a certain moment in time?



How can I see all the existing versions of the data?

TimeMap

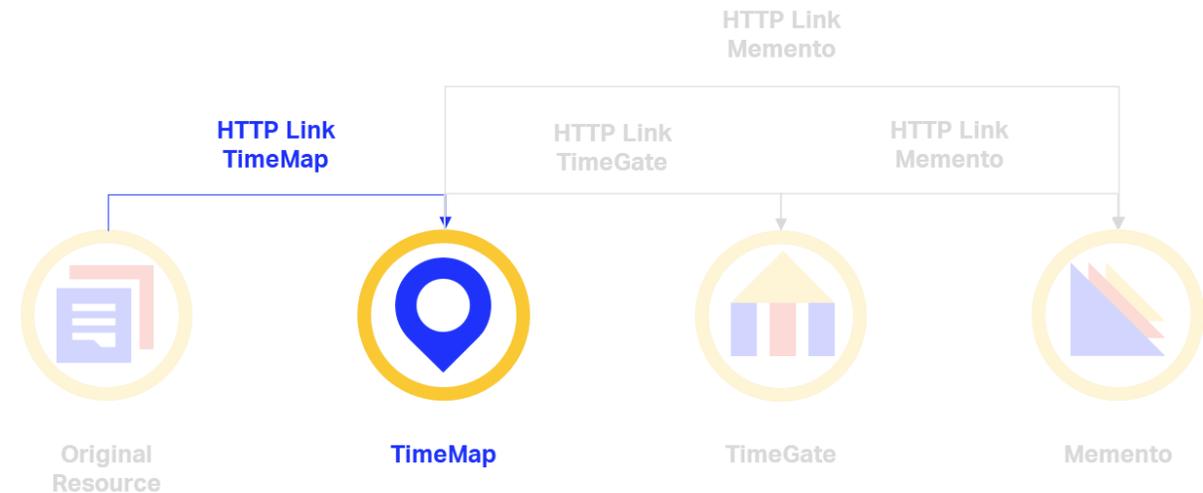
A TimeMap is a machine-readable document that lists the [Original Resource](#) itself, its [TimeGate](#), and its [Mementos](#) as well as associated metadata such as archival datetime for Mementos. TimeMaps are exposed by systems that host prior versions of Original Resources and allow for batch discovery of Mementos.



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How can I see all the existing versions of the data?





Secure the ONE Record API

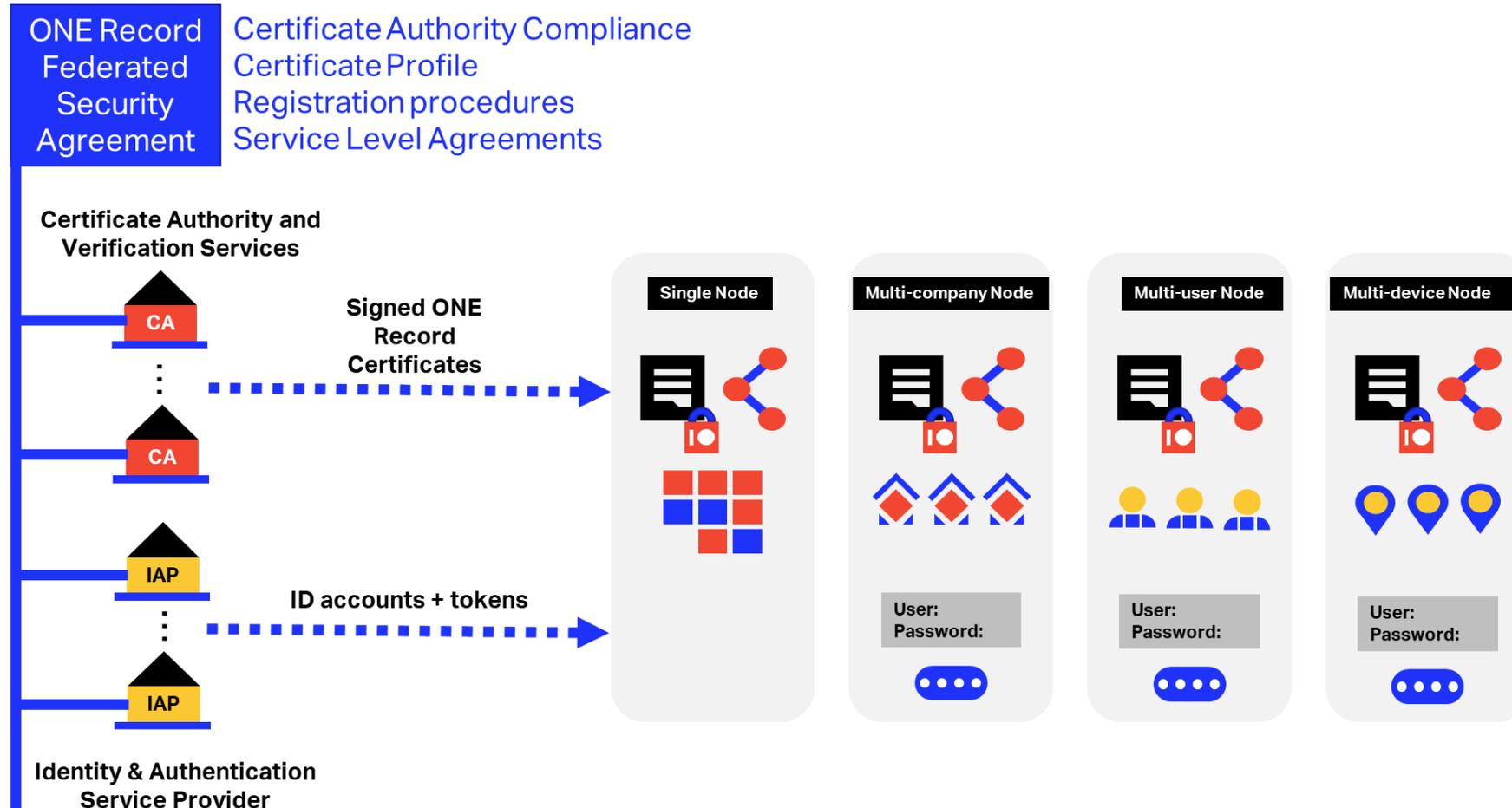


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Secure the ONE Record API



In order to meet the ONE Record security requirements, the security architecture is based on two layers:



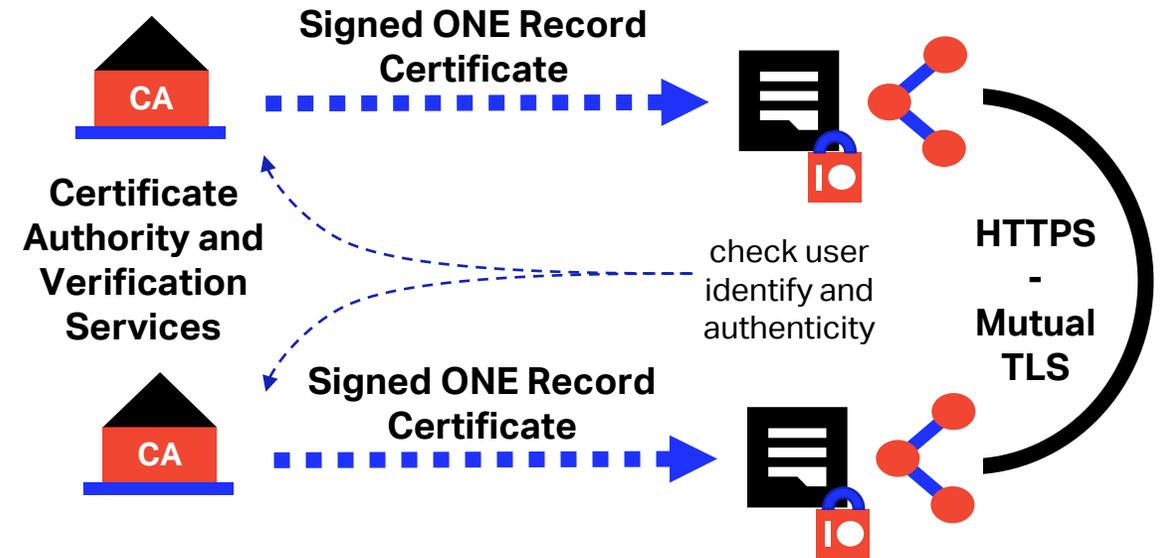
MUTUAL TLS

Mutual TLS (HTTPS)

- Mutual TLS secures the Node to Node channels
- Ensures PKI encrypted data channel
- Ensures that only ONE Record recognized servers are used

Certificate Authorities (CA)

- Issue and authenticate valid ONE Record certificates
- Must be internationally accredited to issue public certificates
- Meets ONE Record requirements for registration and service levels
- Is federated with other certificate authorities and identity & authentication services



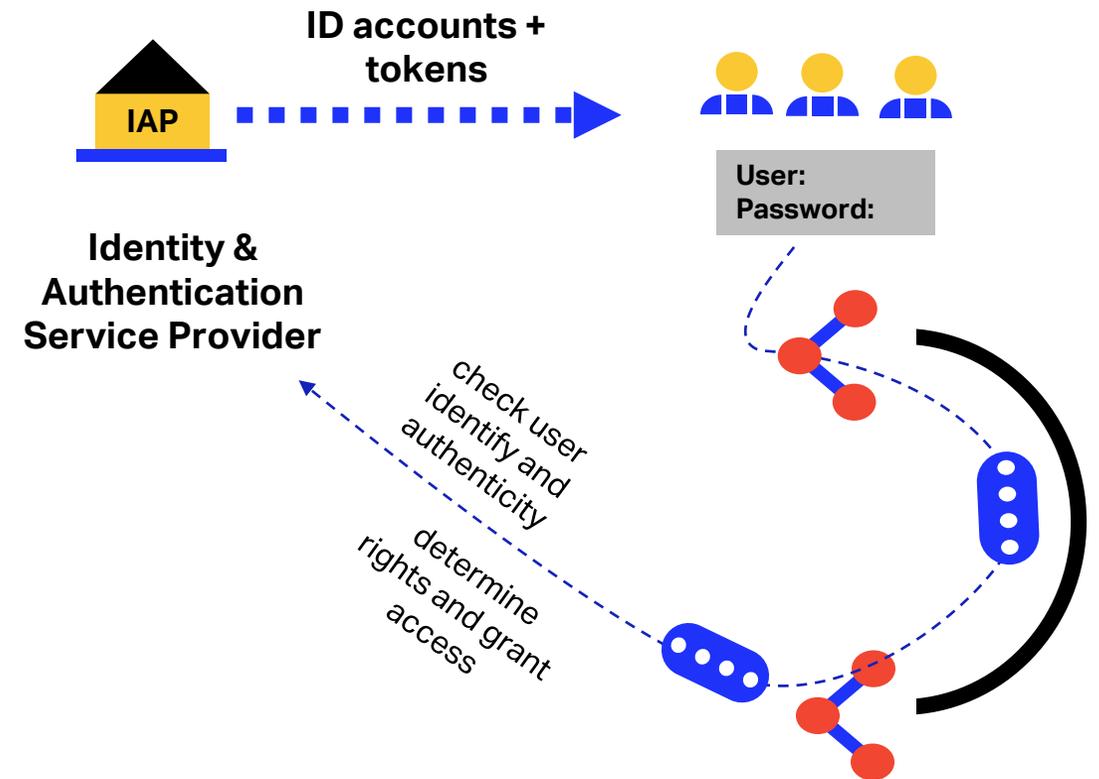
OAuth 2.0

OAuth 2.0 and Open ID Connect

- Framework for identification and authentication
- Open ID Connect facilitates user-based accounts
- Ensures identity & authenticity of users, companies and devices
- Ensures identity & authenticity of the IAP that issues the token for data exchanges
- Provides signed & encoded encryption of token (JWT) and payload

Identity & Authentication Providers (IAP)

- Meets ONE Record requirements for registration and service levels
- Is federated with other IAP's and CAs
- Can register companies, users and devices and provide user accounts
- Must hold a signed certificate issued by a ONE Record Certificate Authority
- Authenticates users and issues token for secured data exchange



Deep dive into the ONE Record Security

To know more about the implementation of the ONE Record Security mechanisms, please check our dedicated webinar on Security



IATA WEBINAR

ONE Record Insights

Episode 5

**Data Security:
Securing the Internet of Logistics**

Pedro Fuentes
CSO & Product Manager
Trust Services
WISeKey

Andra Blaj
Developer, ONE Record
IATA

Henk Mulder
Head, Digital Cargo
IATA

IATA

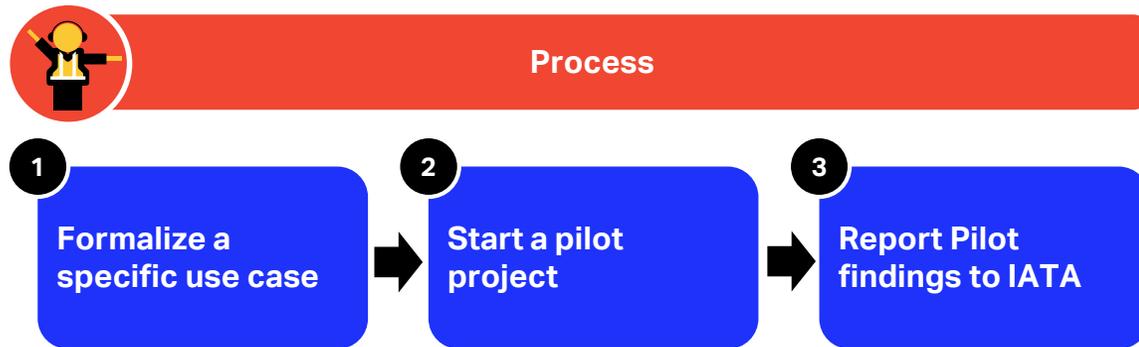
Step 5

Start a Pilot Project

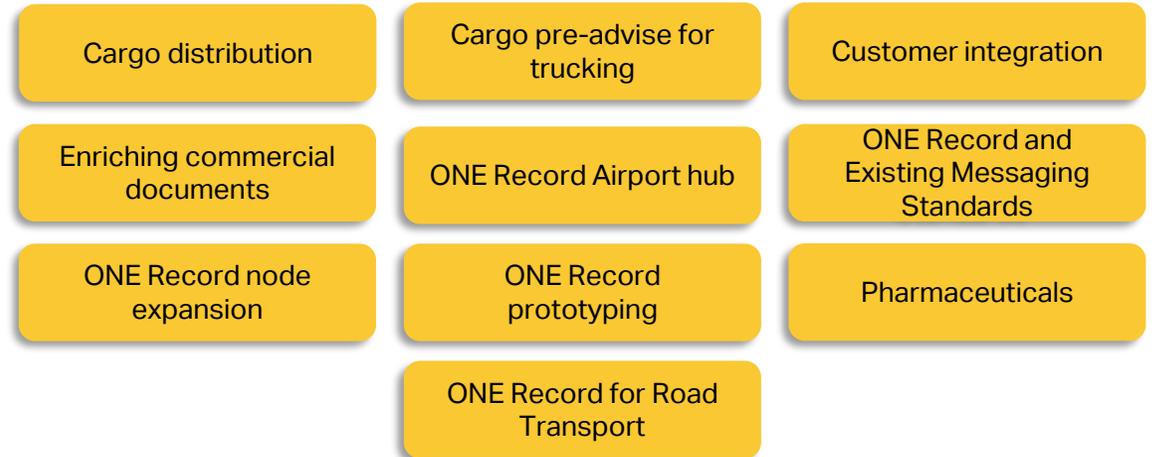


ONE Record Pilot Projects

The objectives of the pilot projects are to verify that the ONE Record standard components are fit for purpose, i.e. they bring the expected value, and to capture the lessons learned as an input for standard improvement. To join our pilot project program, please follow the below steps.



Existing Uses Cases



WRAP UP



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ONE Record Implementation Steps

1

Define the Digital Business Processes

- Identify the value-added activities
- Map the information flow against the physical flow
- Define the Target Operating Model
- Design the associated digital business processes

2

Sign the Multilateral Data Agreement

- Complete and submit the [Online Joining Form](#)
- Receive the Agreement by e-mail from IATA Cargo
- Review and e-sign the Agreement
- Receive counter-signed agreement from IATA

3

Adopt the ONE Record Data Model

- Read the Design Principles
- Integrate the Logical Data Model in your systems
- Understand the use cases

4

Implement the ONE Record Infrastructure

- Get started with the ONE Record Ontology
- Implement the ONE Record API
- Secure the ONE Record API

5

Start a Pilot Project

- Formalize a specific use case
- Start a pilot project
- Report Pilot findings to IATA

- For more information reach us at onerecord@iata.org

ONE Record

Progress Status



ONE Record Progress Status

In order to monitor the progress of the ONE Record standard development, IATA published a standard development dashboard and a quarterly newsletter

ONE Record – Standard development dashboard
Last update: 26 JUN 2020

General status

- The 2020 revision of the ONE Record standard has been endorsed by the COTB (identified as "Adopted" below)
- The group of experts (Data Model / API & Security) keep working on the enhancement/improvement of the standard
- IATA is working on a Multilateral Data Agreement (MDA) to facilitate the pilot implementation

Data Model		API / Security	
Airline Core Ontology	A	Interactive Cargo (IoT)	E
Shipper's Letter of Instruction	E	Dangerous Goods	I
Cargo Distribution	A	Pharmaceutical	I
CO2 Emission	A	Customs (PLACI, ICS2)	A
e-CMR	E	Ground Handling	I
ULD Tracking	E		
PUB/SUB	A	Access Control	A
LO update	A	Cascading status update - Pub/Sub in multi-chain	A
Access delegation	A	Data integrity / non repudiation with RDF	I
Security	P	SHACL shapes	I
Event	A	IoT updates	E
Audit trail / Versioning	P	Rich data	I

Pilot projects

Pilot projects 7 Use cases 12 Pilot companies 42

Red Flag

N/A

Legend: I Ideation, E Experimental, P Proposed, V Verified, A Adopted

ONE Record Standard Development Dashboard, which provide high level visibility on the features development split around the data model, API/Security and the Pilot Projects

ONE Record Quarterly
June 2020

What's new ?

- The 2020 revision of the ONE Record standard has been endorsed by the COTB
- Dedicated industry events planned to engage with the digital cargo community and technical articles, white papers and webinars are being delivered to support the industry education and adoption of ONE Record
- The production of a ONE Record Implementation Playbook and ONE Record Developer Portal are in progress

Standard development | Dashboard | GitHub

DATA MODEL

- Following on from a very productive Q1 the taskforce has worked on refining the data model, through a couple of online bootcamps, to produce the version that has been endorsed by the COTB during Q2 2020.
- The focus has then been on addressing the remaining open points, refining the Cargo Distribution integration and defining how the data model should be used in the scope of the Industry MDP through a dedicated use case document.

API & SECURITY

- Complemented the [API specifications](#) with definitions of new features such as access control, versioning, publisher/subscriber and IoT;
- Finalized the security Proof of Concept (PoC) together with our partner WISEKey. The PoC confirmed that the security proposal is compliant with the ONE Record security needs and also with the API specifications;
- The next step will be to incorporate the findings in an ONE Record pilot in order to fully showcase the security architecture defined by WISEKey.

PILOT PROJECTS

- During the first quarter of 2020, following the effect of COVID-19, it was anticipated to have a complete stop of the pilots due to resources and budget constraints. However, of the 12 use cases submitted at the beginning of 2020, 9 are currently underway. This shows resilience and support by the industry for this new data sharing standard. Additionally, in terms of pilot participants (companies) there is a near doubling from last year and this number keeps growing! Its not too late to join... contact us to get started: onerrecord@iata.org

Events

- ONE Record Insights – Series of six webinars, June/July 2020 [Replay](#)
- ONE Record Hackathon, 11-13 September 2020 [Register](#)
- Digital Cargo Conference, Week of the 14-18 September 2020, Online event [More info](#)

Knowledge

- Deep dive into the ONE Record concepts with our ONE Record Insights, including technical, data, pilot and project subjects
- Don't miss our series of three white papers coming this summer!
- All our publications [Discover](#)

www.iata.org/one-record

ONE Record Quarterly, a quarterly newsletter which will give you an update on the ONE Record development and engagement activities



Check our latest list of Pilot Project participants [here](#)



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Thank You

More info

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