

3.2.2 Agricultural Supply Chain Col (ASCC)

User Scenario: Supply Chain

As part of the OP, Sal downloads the [DIDO Platform](#) selected by the OPC (we refer to this as DIDO Platform O). The OPC have defined several [Data Objects \(DOs\)](#) that they are going to have on their DIDO. When a DO is deployed to a DIDO, it is referred to as a [Smart Contract](#).

2.1 DO: Participant

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Participant - A Participant is any person or operation that engages with the ASCC. A Participant can have many roles within the ASCC. For example, a producer can also be a handler, a driver, [processor](#) and a packer.

- **Note:** Much of the Participant data is covered by privacy laws and rules for [Personal Identifiable Information \(PII\)](#) such as:
 - [General Data Protection Regulation \(GDPR\)](#)
 - [Data Protection Act 2018](#)
 - [California Consumer Privacy Act \(CCPA\)](#)

```
DEFINE Participant AS OBJECT
{
  firstName TextType NOT NULL PII,
  middleName TextType NOT NULL PII,
  lastName TextType NOT NULL PII,
  streetAddress TextType NOT NULL PII,
  mobilePhone TextType NOT NULL PII,
  taxPayerId TextType NOT NULL PII
};

DEFINE ORACLE VerifyParticipant SYNCHRONOUS AS
(
  participant Participant IN,
  valid BooleanType OUT,
  queryTimeStamp TimestampType OUT
)
{
  EXECUTE verificationPerson
  (
    participant Participant IN,
    valid BooleanType OUT,
    class TextType OUT
  );
  queryTimeStamp TimestampType = CURRENT_TIME;
};
```

2.2 DO: Role

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Role - The role is the related to the activity the participant performs within the ASCC. As an example, on a small farm, the owner may participate in lots of roles from planting to harvest and even being a broker.

```
DEFINE TYPE RoleType AS ENUM
  WITH CONSTRAINTS
    { { 0, "Participant", "Any person or operation engaging with the ASCC"
  DEFAULT},
    { 1, "Cartage", "Any person or operation moving things from one
  geographical position to another"},
    { 2, "Handler", "Any person or operation coming in direct contact
  with the products"},
    { 3, "Processor", "Any person or operation involved in converting
  the raw products into finished products"},
    { 4, "Packer", "Any person or operation involved in the packing
  of the product into packages, boxes and pallets"},
    { 5, "Broker", "Any person or operation engaged with the selling
  and buying of the products anywhere along the Supply Chain"},
    { 6, "Q&A", "Any person or operation engaged in assessing the
  quality of the product" },
    { 7, "Packer", "Any person or operation involved in packing of
  the product into packages, boxes and pallets" }
  }
  VALUE = DEFAULT;

DEFINE ROLE AS OBJECT
  { name TextType IS NOT NULL,
    description TextType IS NOT NULL,
    kindOfActivity ActivityType IS NOT NULL
  };
```

2.3 DO: Privileges

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Privileges - The Privileges should not be confused with the **Roles**. Privileges grant permissions for accessing the DIDOs such as READ, UPDATE, UPLOAD, SEARCH, DELETE.

Privilege Type	Description
READ	Granting READ privilege allows the access to all the Read attributes or operations associated with the ASCC
UPDATE	Granting UPDATE privilege allows the access to all the writable attributes or operations associated with the ASCC
UPLOAD	Granting UPLOAD privilege allows for new content to be added to the ASCC record (i.e., images, invoices, Bill of Lading (BL or BoL) , etc.
SEARCH	Granting SEARCH privilege allows for the Read attributes or operations to be searched for particular strings. It only returns a TRUE or FALSE. All Personal Identifiable Information (PII) can be hidden from the search.
DELETE	Granting DELETE privilege allows for the content of the Participant record to be marked as deleted OR optionally for the content to be burned by destroying the private key

```
MANAGE GRANT
{ Participant :
  { "id" : "0xDC25EF3F5B8A186998338A2ADA83795FBA2D695E",
    "by" : "0xDC25EF3F5B8A186998338A2ADA83795FBA2D695E",
    "Cartage" : "READ, UPDATE, UPLOAD"
  }
}

MANAGE GRANT
{ Participant :
  { "id" : "0xDC25EF3F5B8A186998338A2ADA83795FBA2D695E",
    "by" : "0xDC25EF3F5B8A186998338A2ADA83795FBA2D695E",
    "Packer" : "SEARCH"
  }
}
```

2.4 DO: Cartage

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Cartage - The Cartage is the process of moving things from one geographical position to another. This includes the small delivery trucks that can be used at either end of the [Supply Chain](#) or the long and short haul trucks. This also covers the Drivers, however, each state has its own driver license classification¹⁾

```
DEFINE TYPE TruckClassificationType AS ENUM
WITH CONSTRAINTS
{ { 1, "Class 1", "GVWRs < 6,000 lbs" DEFAULT},
  { 2, "Class 2", "GVWRs 6,001 to 10,000 pounds" },
  { 3, "Class 3", "GVWRs 10,001 to 14,000 pounds" },
  { 4, "Class 4", "GVWRs 14,001 and 16,000 pounds" },
```

```
        { 5, "Class 5", "GVWRs 6,001 to 19,500 pounds" },
        { 6, "Class 6", "GVWRs 19,501 and 26,000 pounds" },
        { 7, "Class 7", "GVWRs 26,001 and 33,000 pounds (usually have three
axles or more)" },
        { 8, "Class 8", "GVWRs over 33,001 pounds" },
    }
    VALUE = DEFAULT;

DEFINE TYPE CaDriversClassificationType AS ENUM
WITH CONSTRAINTS
    { { 1, "Class A", DEFAULT},
      { 2, "Class B"},
      { 2, "Class C"},
      { 2, "Class M1"},
      { 2, "Class M2"},
    }
    VALUE = DEFAULT;

DEFINE Truck AS OBJECT
{ vin          TextType,
  manufacturer TextType,
  gvw           PositiveWholeNumber,
  numberOfAxels PositiveWholeNumber,
  dotNumber     TextType,
  mcNumber      TextType
};

DEFINE ORACLE VerifyDriver SYNCHRONOUS AS
( driver Driver          IN,
  valid BooleanType      OUT,
  class TextType         OUT,
  queryTimeStamp TimestampType OUT
)
{ EXECUTE verificationProcedure
  ( driver Driver IN,
    valid BooleanType OUT,
    class TextType OUT
  );
  queryTimeStamp TimestampType = CURRENT_TIME;
};

DEFINE Trailer AS OBJECT
{ vin          TextType,
  manufacturer TextType,
  gvw           PositiveWholeNumber,
  numberOfAxels PositiveWholeNumber
};
```

```
DEFINE Driver AS OBJECT
{
  driverLicenseNumber TextType,
  stateOfIssue         TextType,
  dateOfBirth          DateTimeValue,
  expirationDate       DateTimeValue
};
```

2.5 DO: Transport

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Transport - Transportation vehicles should be clean and sanitary. Co-mingling of organic and non-organic fruits and vegetables is prohibited unless organic products are protected from contact with prohibited substances. See [Bill of Lading \(BL or BoL\)](#).

```
DEFINE TYPE TransportModeType AS ENUM
WITH CONSTRAINTS
{
  { 1, "Road", DEFAULT },
  { 2, "Rail" },
  { 3, "Air" },
  { 4, "Sea" },
  { 5, "Bicycle" },
  { 6, "Motorcycle" },
  { 7, "Horse" },
  { 8, "Other" },
  VALUE = DEFAULT;
}

DEFINE TYPE Incoterms AS ENUM
WITH CONSTRAINTS
{
  { 1, "EXW", "Ex Works", DEFAULT },
  { 2, "FCA", "Free Carrier" },
  { 3, "CPT", "Carriage Paid To" },
  { 4, "CIP", "Carriage and Insurance Paid To" },
  { 5, "DPU", "Delivered at Place Unloaded" },
  { 6, "DAP", "Delivered at Place" },
  { 7, "DDP", "Delivered Duty Paid" },
  { 8, "FAS", "Free Alongside Ship" },
  { 8, "FOB", "Free on Board" },
  { 8, "CFR", "Cost and Freight" },
  { 8, "CIF", "Cost, Insurance, and Freight" },
  VALUE = DEFAULT;
}

DEFINE TYPE KindsOfShippingUnits AS ENUM
WITH CONSTRAINTS
```

```
    { { 1, "boxes", DEFAULT},
      { 2, "pallets"}
    }
DEFINE LineItemType AS OBJECT
{ lineItemNumber PositiveWholeNumber,
  description      TextType,
  kindsOfUnits     KindsOfShippingUnits,
  numberOfUnits    PositiveWholeNumber,
  weight           PositiveWholeNumber
};

DEFINE BillOfLading AS OBJECT
{ transportCompanyName TextType,
  loadingSite           GeolocationType,
  destination           GeolocationType,
  mode                  TransportModeType,
  incoterms             Incoterms,
  lineItemType          LineItemType[]
};

DEFINE DeliveryVehicle AS OBJECT
{ truck      Truck,
  trailer     Trailer,
  driver      Driver,
  billOfLading BillOfLading
};
```

2.6 DO: Handler

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Handler - Anyone who comes in direct contact with the products such as farm hands, warehouse workers, processors, packers, etc. Some Participants may not be handlers (i.e., the brokers).

2.7 DO: Storage

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Storage - Storage is any place where the Supplies are kept while not being transported. For food, there are different kinds of Cold Storage based on what is being stored (i.e.,

2.8 DO: Processor

[Return to Top](#) **Processor** - The Processors are the people involved in converting the raw products into finished products. For example, for strawberries it might be the washers, de-stemmers, and initial quality control to remove damaged or bad fruit.

2.9 DO: Packer

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Packer - These are the people involved in the packing of the product into packages, boxes and pallets

2.10 DO: Broker

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Broker - These are the people that are engaged with the selling and buying of the products anywhere along the Supply Chain. The more the Supply Chain is added to a [Value Chain](#), the fewer brokers that involved.

2.11 DO: Quality Assurance and Inspection

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Quality Assurance and Inspection - These are people that are engaged in assessing the quality of the product. They are also responsible for grading the products (U.S. Grade A or U.S. Fancy, U.S. Grade B or U.S. Choice, U.S. Grade C or U.S. Standard, or substandard. ²⁾

2.12 DO: Retail Outlet Provider

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Retail Outlet Provider - A Retail Outlet Provider person or establishment that sells the produce directly to the Human Consumers. Some examples are grocery stores, fruit stands, convenient stores, kiosks, etc.

2.13 DO: Discretionary Providers

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Discretionary Providers - A Discretionary Providers are places where the products are sold as part of something else to the Human Consumers. Some examples are restaurants, ice-cream stores, etc.

2.14 DO: Human Consumer

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Human Consumer - The Human Consumers are the people that actually buy the products and consume them.

2.15 DO: Processing Consumer

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Processing Consumer - The Processing Consumers are people or establishments that buy the products and further process them into other products such as ice-cream products, jams, jellies, or candies.

1)

AAA, Types of Driver's Licenses, Accessed: 18 May 2021,
<https://drivinglaws.aaa.com/tag/types-of-drivers-licenses/>

2)

U.S. Department of Agriculture, Grades of Frozen Strawberries, Accessed: 18 May 2021,
<https://www.ams.usda.gov/grades-standards/frozen-strawberries-grades-and-standards>

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