# 4       DS2 Data Marketplace Module (DMK)

## 4.1       DS2 Data Marketplace Module (DMK)

**Owner(s):**          INDRA
**DOA Task:**          T6.1
**Tier**:                   1
**Nature**:               Optional
**Result**:               Outcome

*This task is two-fold: a) It will create the underlying infrastructure to allow for the efficient transfer of vast amounts of data between data stores. This includes novel solutions such as intelligent data placement and caching of data (in conjunction with T4.1), the establishment of secure connectivity between distributed data stores and observability of created data pipelines to monitor threats to data quality during transfer (in conjunction with 4.2). b) Alongside this it will provide an experimental data space as a service for companies interested in data economy and data sharing. The experimental data space infrastructure will be used as a baseline for developing customized data space solutions for specific application domains or use cases. This allows the testing of business concepts and building of proof of concepts before investing in real-life solutions. The DSIL implements the key components of International Data Spaces (IDS) reference architecture and is part of the VTT Data Space Innovation Lab (DSIL)*
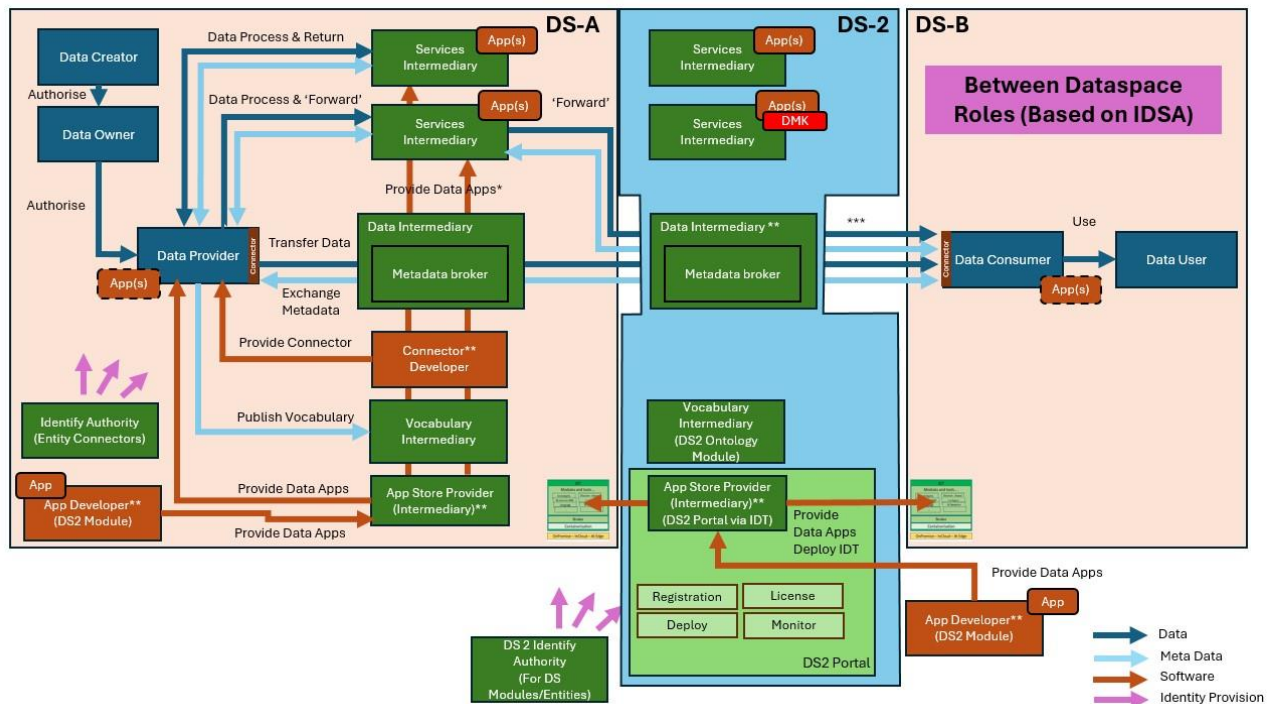
### 4.1.1       Introduction

**Purpose:** The Data Marketplace Module will provide a marketplace for data and data models. It will allow the registration of data from a catalog, record all transactions, and communicate transactions to any external system if required (e.g. Data Rights Management Module, Clearing House). Data will not be stored in the Data Marketplace Module. It will the capability to support not only datasets but also algorithms.

**Description:** The Data Marketplace Module allows the registration of data (datasets and APIs) and algorithms as products to be sold. The Data Marketplace will include an interface with a Catalog Module to facilitate Providers to register their products in the Data Marketplace. The Data Marketplace will store the metadata required to perform and control transactions but not the data themselves. Additionally, it will support the registration of data products not in the DS2 Catalogue as algorithms. Consumers will be able to browse available products and purchase those of interest. The Data Marketplace Module will register all transactions and allow external systems, such as the Policy Enforcement Module, to validate if a product has been purchased. For example, it can verify a data purchase before allowing data sharing. It will interface with the Portal Module marketplace to provide registration and payment functionality.

### 4.1.2　Where this component fits

### 4.1.2.1　Big Picture



| Where | Status |
|---|---|
| **Within a single Dataspace** for use between participants in that Dataspace only | Not for implementation in DS2 but the Data Marketplace might potentially be used within a single dataspace by a service intermediary for participants in the dataspace. The functionality will be the same as the Across Dataspace with Intermediary scenario |
| **Deployed and used by a single participant** to enable the participant in either an In-Data space or Inter- Data space scenario | No |
| **Across Dataspaces without Service Intermediary** | No |
| **Across Dataspace with Intermediary** | Yes: The Data Marketplace serves as a Service Intermediary complementing the DS2 Catalogue. |
| Other Comments | N/A |

### 4.1.2.2　Within a single Dataspace (where applicable)

The Data Marketplace may potentially be used within a single dataspace; however, its interface with the catalogue will be through the DS2 Catalog Module. The same applies to other integrations, such as with the Portal Module and Data Rights Management. Therefore, for optimal use within a single dataspace, it may be necessary to implement these integrations specifically for that dataspace.

### 4.1.2.3 Deployed and used by a single participant

No

### 4.1.2.4 Across Dataspaces without Service Intermediary (where applicable)

No

### 4.1.2.5 Across Dataspaces with Intermediary (where applicable)

The Data Marketplace serves as a Service Intermediary.

The Data Marketplace will facilitate the buying and selling of data products and algorithms. It will allow providers to submit their datasets descriptions to the Data Marketplace and, when possible, integrate with the DS2 Catalog to obtain metadata for these products.

In a basic use case, a participant from one dataspace can register a data product they own, which is already listed in the DS2 Catalog, to sell it in the Data Marketplace. Participants from other dataspaces registered in DS2, who have access to the data, will then be able to purchase it.

The Data Marketplace will use the DS2 Portal to identify and authorize participants and will log all transactions in the Data Rights Management Module of DS2. It integrated with the Portal Module to utilise the registration and payment capabilities it implements.

### 4.1.3 Component Definition

The figure below represents the actors, internal structure, primary sub-components, primary DS2 module interfaces, and primary other interfaces of the module.
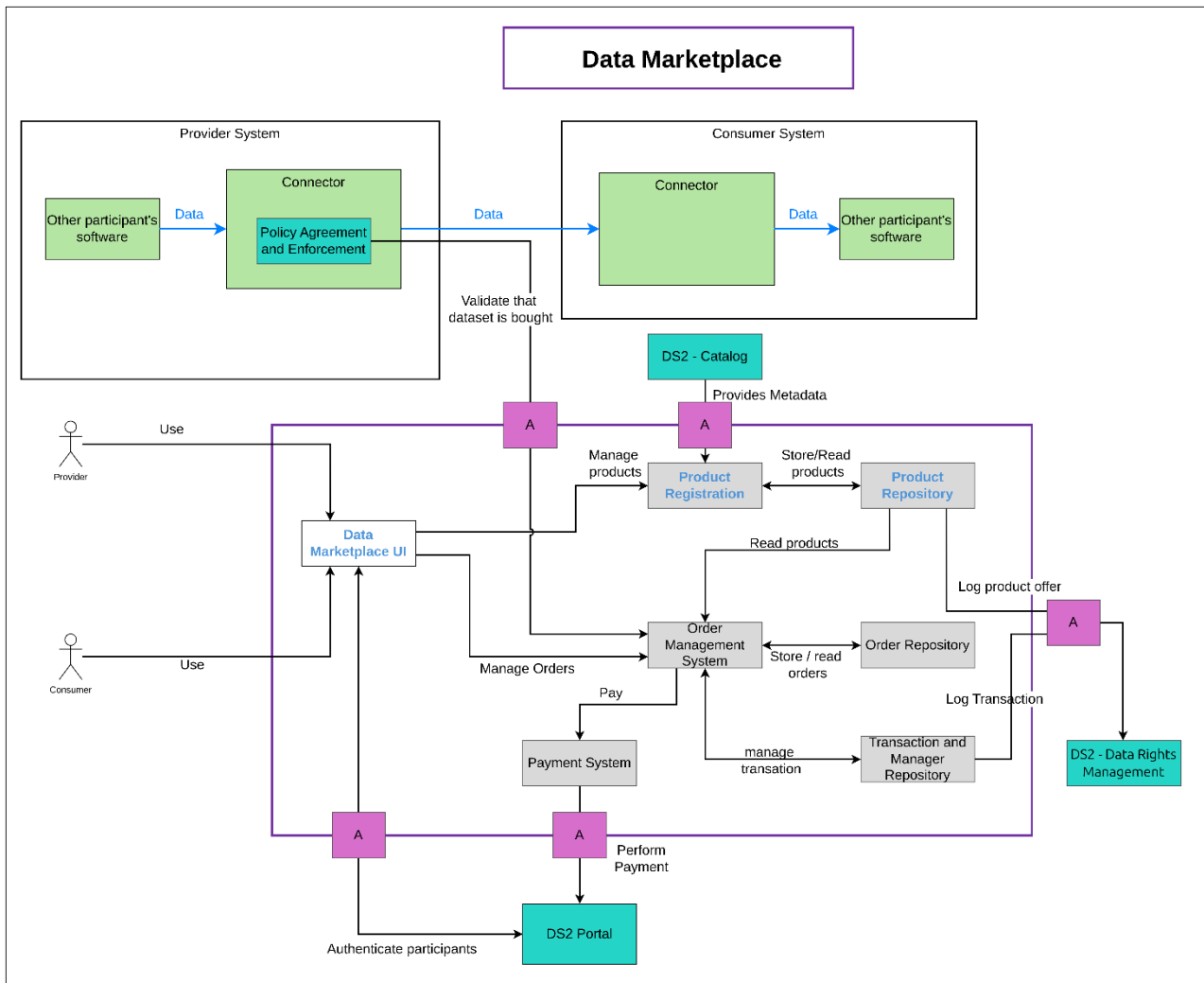
Figure 1: Schema for the Module

This module has the following subcomponent and other functions:

- **Marketplace:**

  - **Data Marketplace UI:** This component provides the user interface where data suppliers and data shoppers can access the functionalities of the data marketplace.
  - **Product Registration:** This feature allows suppliers to register data products for sale, including datasets, API access, and algorithms. It will include an interface for incorporating products already available in DS2 product catalogues to prevent duplication and ensure synchronization in product definitions.
  - **Product Repository:** This component stores and provides the required information for each product offered.
  - **Order Management System:** This subcomponent manages orders placed by providers, defines the purchasing process, records any changes in order status, and coordinates all components involved in the purchase. It manages the full life cycle of the orders. This component ensures that all steps in the purchase process are executed correctly and fulfil the required conditions.

- **Order Repository:** This subcomponent stores orders and their statuses. It is primarily used by the Order Management System to store and retrieve the state of orders. It also provides historical information about orders.
- **Payment System:** This subcomponent provides payment capabilities to the Order Management System, primarily acting as an intermediary with the payment system implemented in the Portal Module.
- **Transaction Manager and Repository:** The Transaction Manager will register actions in the Data Rights Management Module and maintain an additional transaction repository for detailed information.
- **DS2 Portal:** The DS2 Portal Module will be used to obtain and validate the identities of providers when they supply data assets to the Data Marketplace and consumers when they purchase data assets. It is also responsible of payment capabilities.
- **Data Rights Management (DRM):** The Data Marketplace may log all necessary information in the DRM for accountability in data provision and purchases.
- **DS2 Catalog:** The Data Marketplace can offer the datasets present in the DS2 Catalog Module to describe data offerings.
- **Policy Agreement and Enforcement:** The Data Marketplace will be queried by the Policy Enforcement module to obtain additional information if a policy requires a purchase to have been made to obtain data.

### 4.1.4 Technical Foundations and Background

This module will involve a comprehensive overhaul of the existing data marketplace in the Onesait Platform product. The current data marketplace is a basic catalogue of data available within Onesait Platform, enabling users to share data among themselves. After the rework, the data marketplace will support external data and will include robust new features such as an Order Management System, Payment System, and Transaction Manager modules, which are not present in the current version.

| Subcomponent/Component | Owner | License |
|---|---|---|
| Onesait Platform | INDRA | Apache 2.0 |

### 4.1.5 Interaction of the Component

The following table specifies the primary input/output controls/data to blocks which are not part of the module

| With Module/Feature | Receive From/ Gives To | What |
|---|---|---|
| Data Rights Management | Receive from | Data Marketplace will register transaction en the DRM Module. |
| DS2 Catalog | Receive from | Catalog will provide metadata for data products. |
| DS2 Portal | Receive from | DS2 Portal provides authentication and authorization services. |
| Policy Agreement and Enforcement | Gives to | Data Marketplace provides an API to check if a purchase has already been made for the policy enforcement process. |
| DS2 Portal | Receive from | DS2 Portal provides payment functionality. |

### 4.1.6    Technical Risks

| Risk | Description | Contingency Plan |
|------|-------------|------------------|
| Data Ownership Verification | The Data Marketplace will rely on the Catalog to obtain information about the datasets a provider intends to include. However, matching users logged into the Data Marketplace with the corresponding datasets in the Catalog may be difficult to implement. | If the metadata obtained from the Catalog and Portal does not provide sufficient information about ownership, we will assess where to add this information. For instance, the Identity Manager could assign attributes to users that grant them permissions to expose data through a connector |

### 4.1.7    Security

| Security Issue | Description | Need |
|----------------|-------------|------|
| Authentication / Authorization | The data marketplace requires authentication of consumers and providers and authorizes them to offer and purchase data. | Authentication and authorization are delegated to the Portal Module. |
| Offers of data outside the data marketplace domain | A participant can offer data assets in the data marketplace linking the data assets published in the catalog. As the data marketplace does not store the data, it cannot control if the data is available, or not, once the purchase is done. | When a provider publishes a data offer, they accept the responsibility of keeping the data available for any subsequent purchases. The data marketplace, in conjunction with the Data Rights Management Module, will record all operations to support potential future claims. |

### 4.1.8    Data Governance

| Data Governance Issue | Description | Need |
|-----------------------|-------------|------|
| Handling order data | This module handle data about orders | The data marketplace does not handle the datasets offered or purchased. However, it will store the necessary information about orders to ensure accountability and support any future claims between consumers and providers. |

### 4.1.9    Requirements and Functionality

This module will be used in the following use cases:

| | |
|---|---|
| City Scape | ✓ |
| Green Deal | ✓ |
| Agriculture | ✓ |
| Inter-Sector | TBD |

Their requirements and functions/extensions to achieve them relative to this module, specifically extracted from the use case are as per the table below noting that in many cases further discussion might need to take placed between pilot partner and module partner to determine if a fit or the scope of the precise fit.

In respect to all use cases the DS2 Data Marketplace module is a system/optional module meaning that s an intrinsic part of the project since it is automatically provided at the centre although it is a participant's choice whether to use it.

| WHERE | WHAT | WHY | Run/Design Time | Priority |
|---|---|---|---|---|
| | **Use Case 1: City Scape** | | | |
| UC1.1 | N/A | N/A | N/A | N/A |
| | **Use Case 2: Green Deal** | | | |
| UC2.1 | N/A | N/A | N/A | N/A |
| | **Use Case 3: Agriculture** | | | |
| Section 1.1.4 UC3.1 | "...the ability to offer their models as a (paid) service on demand." | Marketplace also includes models, and not only data | R | C |
| Section 1.1.4 UC3.2 | "...the ability to offer their models as a (paid) service on demand." | Marketplace also includes models, and not only data | R | C |
| Section 1.1.4 UC3.3 | "...the ability to offer their models as a (paid) service on demand." | Marketplace also includes models, and not only data | R | C |

### 4.1.10    Workflows

The following sub-sections describe the sequence diagrams of the Module
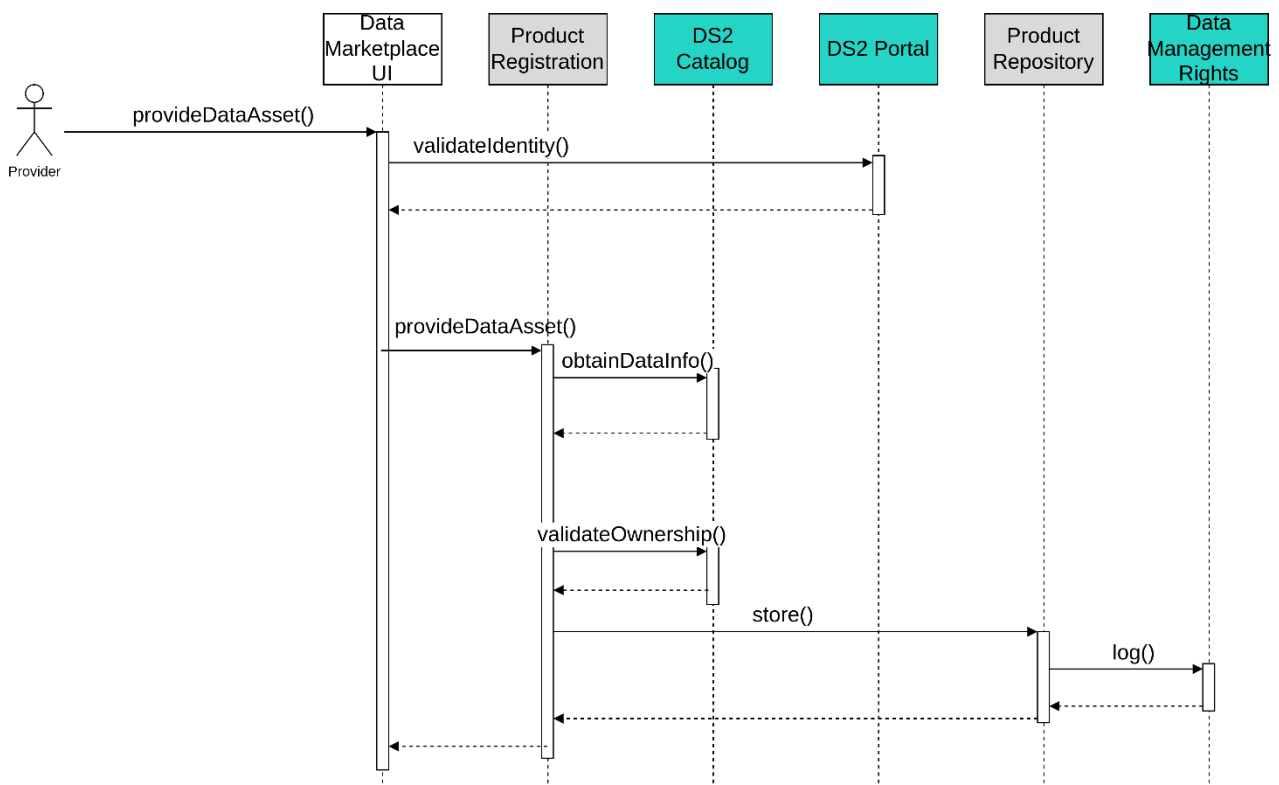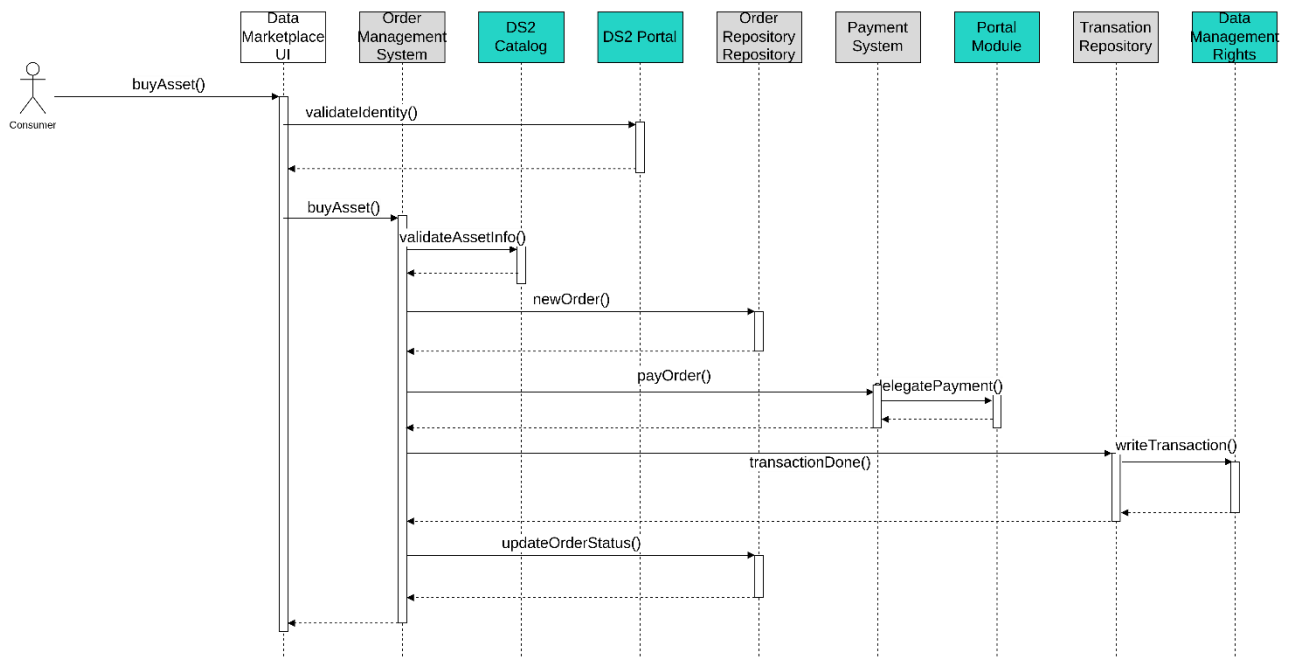
### 4.1.11 Role, Resourcing, and Milestones

| Sub-component | Main Activity | M18 | M24 | M30 | M36 |
|---|---|---|---|---|---|
| Data Market place UI | Development of new UI | | ■ | | |
| Product Registration | New development to register products | | ■ | | |
| Product Repository | Model and create persistence for products | | ■ | | |
| Order Management System | New development of the software that control the full flow of a purchase. | | ■ | | |
| Order Repository | Model and create persistence for orders | | ■ | | |
| Payment System | New development | | ■ | | |
| Transaction Repository | Model and create persistence for products | | ■ | | |
| DS2 Portal | Integration for login and to use payment system of the portal | | | ■ | |
| Data Right Management | Integration to register transitions | | | ■ | |
| DS2 Catalog | Integration to obtain information about datasets | | | ■ | |
| Policy Agreement and Enforcement | Interface to allow the policy enforcement verify purchases | | | ■ | |
| Bug Fixing and Maintenance | Maintenance after release | | | | ■ |
| **Table Total/DOA Task Total/Resilience** | **Comments:** | | | | |

### 4.1.12 Open Issues

The following table summarise open issues/uncertainties that need to be resolved during the next stages or implementation.

| Issue | Description | Next Steps | Lead or Related Component |
|---|---|---|---|
| Portal integration | The portal has many similar features so how this is taken advantage of still need to be determined | In discussion with portal architecture team, it was agreed that although both solutions share technical similarities, they have different functional scopes, making it easier to keep them separate. | ICE |