6 DS2 Portal (PORTAL)

6.1 DS2 Portal (PORTAL)

Owner(s): i4RI
DOA Task: T6.4 - IDT Integrated Broker, Modules & Toolkit
Tier: 1
Nature: System
Result: K6.4a

This task will package the primary outcomes of the projects in a single containerised environment (K8 based) where all modules/concepts/information/ methodologies of WP3-5 along with those of T6.1/2/3 will be implemented with the adaptation to IDT being performed within those WPs. This will enable the users to pick-and-mix which final tools may be of use to them. As a modular environment based on the ZDMP Projects (Project Manager ICE) both existing and third-party tools should be accessible.

6.1.1 Introduction

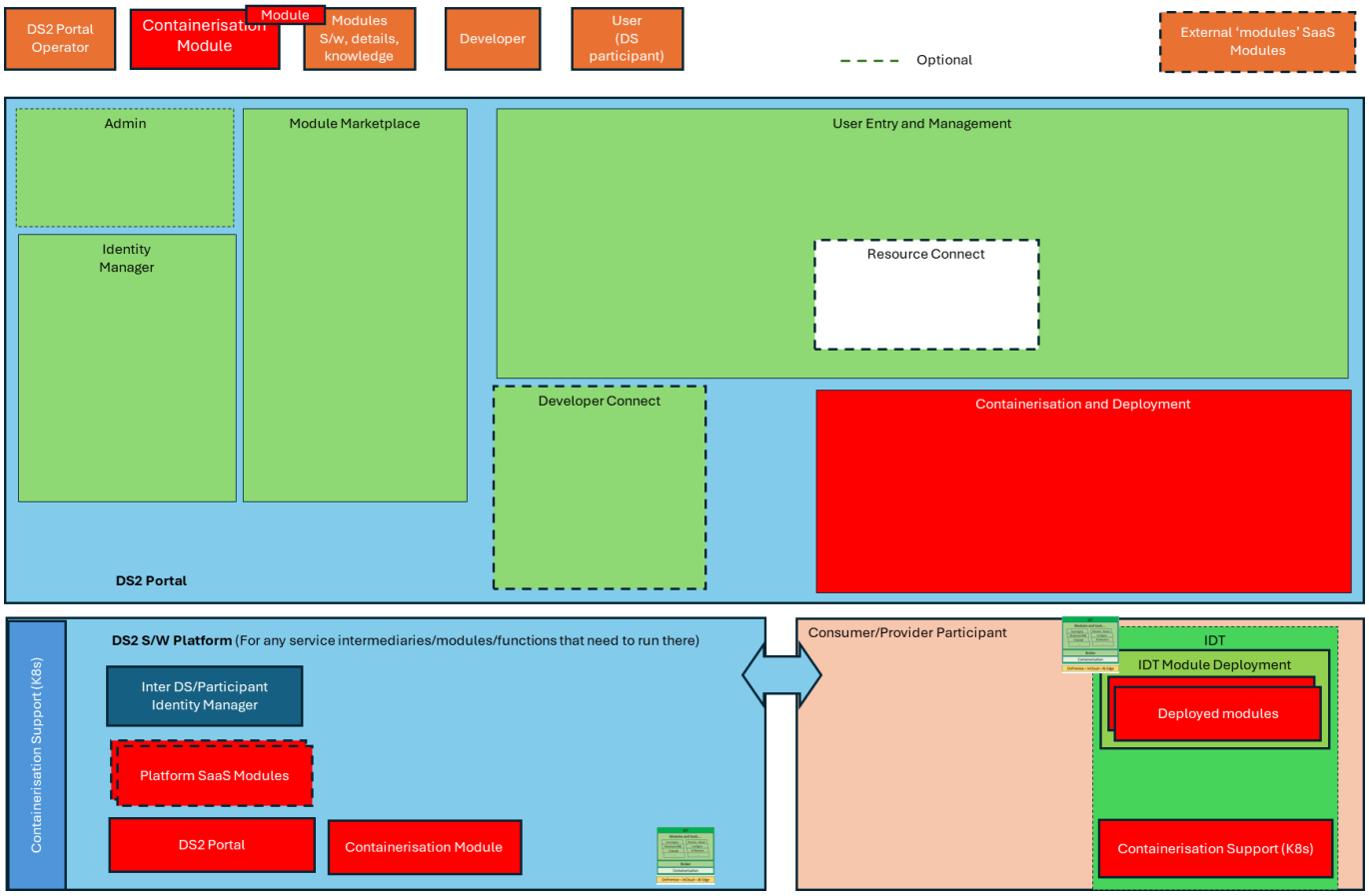
Purpose: To provide a user and developer friendly portal allowing dataspace participants to register and select DS2 modules which can then be packaged into a IDT environment subsequently deployed by participants enabling both In-Data Space and Inter-Data Space operations. As such it includes functionality for developers to include modules, users to find those modules, to trigger the packaging through links with the containerisation module, as well as supporting functionality for dataspace support, dataspace resources, registration and identity management, and administration. It also provides support for the Data Marketplace.

Description: The portal will operate in the DS2 cloud hosted by i4RI. Parties interested in DS may register – this includes participants, dataspace governance/operators, DS2 module developers as well as, potentially, service intermediaries. Developers will provide modules to the portal marketplace which can be selected/purchased by participants. Selected modules will then be downloaded and installed by and at a participant IDT. All parties involved will be granted unique IDs including DS-Pair IDs where DS's agree to cooperate. If manpower resources allow ,a subcomponent will also support user-developer and developer-developer interactions as well as additional static resources such as useful materials or links to IDSA etc. The portal will run on the DS2 platform as a central node but in itself will not be involved in any participant-participant process either at the control or data plane levels. It operates at Tier 1, so is not a "module" in-itself, even though it will be deployed and run on top of IDT like a module, so participants would not deploy it. However, conceptually it could be run locally. It could be run by any one as an additional service – for example dataspace operators. Its main interfaces are to the Containerisation module for module description and packaging, IDT for deployment, the Platform where it is both deployed and will interface to some system modules, and the Data Marketplace which uses it for base marketplace functions.

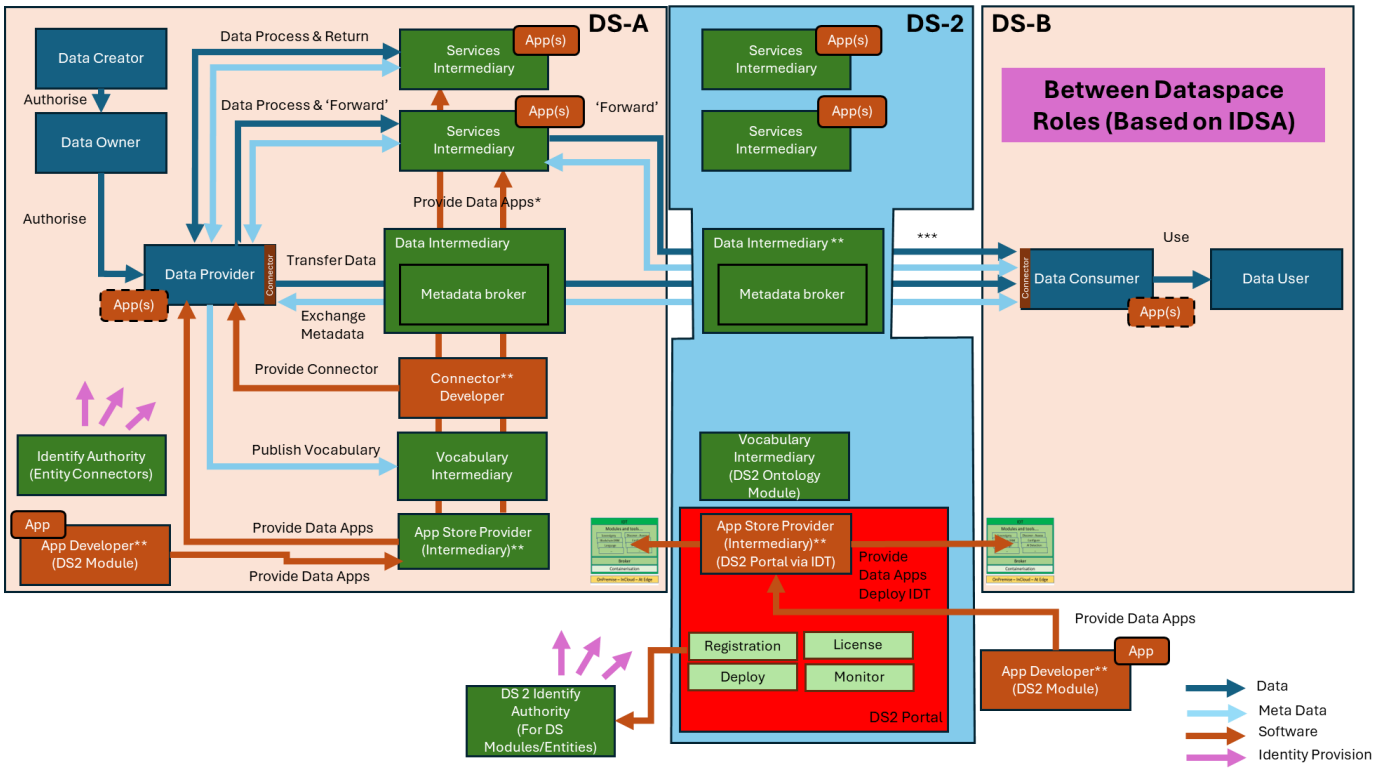
6.1.2 Where this component fits

6.1.2.1 Big Picture

The portal is a key initiating piece which allows users to join and deploy the DS2 environment and additional modules as these see fit. It has strong links to the containerisation module (for module packaging and in turn IDT for deployment). It will also interface with the identity module. The big-picture first diagram shows its fit to key other modules, and broad functions. This is followed by its fit into a DS-DS environment and finally a diagram including subcomponents and full module linkages. In the final section of this document more information on the 'Platform' is presented



Its fit (RED BOX) in to the DS-DS environment is as follows



Where	Status
Within a single Dataspace for use between participants in that Dataspace only	N/A. Whilst this could be used in a similar way as with the Across Dataspace scenario, this is not the focus of the project/pilots/validation.
Deployed and used by a single participant to enable the participant in either an In-Data space or Inter- Data space scenario	N/A
Across Dataspaces without Service Intermediary	N/A
Across Dataspace with Intermediary	Yes. In its loosest sense the Portal provides an intermediary role in support inter dataspace communication primarily at the design stage through the participant acquiring modules and deploying through IDT.
Other Comments	Choice dependent on user needs and they are not mutually exclusive

6.1.2.2 Within a single Dataspace (where applicable)

N/A

6.1.2.3 Deployed and used by a single participant

N/A

6.1.2.4 Across Dataspaces without Intermediary(where applicable)

N/A

6.1.2.5 Across Dataspace with Intermediary (where applicable)

The portal will be hosted by a central DS2 platform and will allow participants of any dataspace, and dataspaces to take advantage of its functionalities. It will not be deployed as a module since its purpose is only to include and support individual participants with purchased modules and their IDT deployment. Theoretically there could be more than one DS2 portal.

6.1.3 Component Definition

The figure below represents the actors, internal structure, primary sub-components, primary DS2 module interfaces, and primary other interfaces of the module.

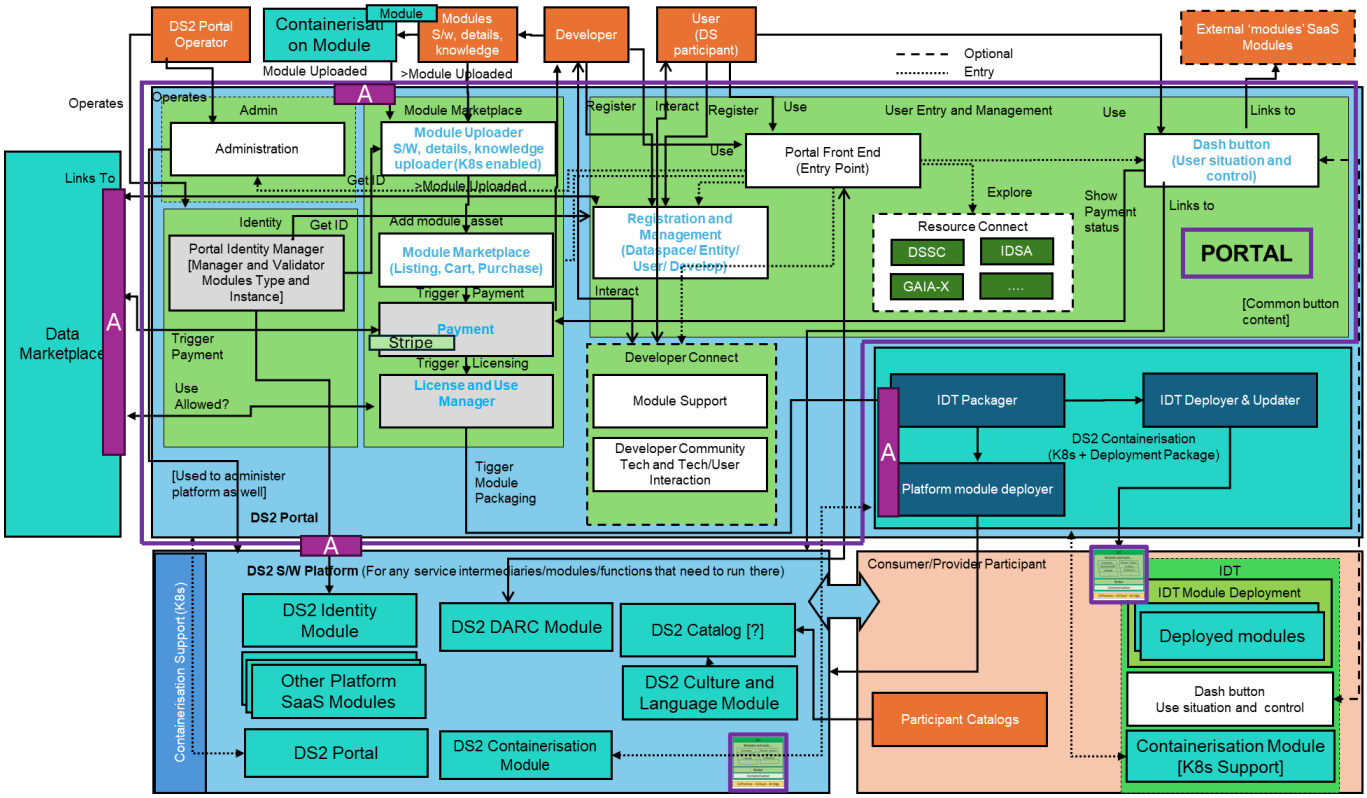


Figure 1: Schema for the DS2 Module

This module has the following subcomponent and other functions:

- **Portal Front End**: This is the initial web front end entry point seen by any user of the portal, regardless of participant type or if an external party (eg developer). If unregistered, it directs them to the Registration and Management component and if registered a login process follows. Dynamic menus then allow users to navigate to the elements they wish to see and have access for and as such there is an inferred link to all subcomponents with some form of UI. Of particular relevance is the Dashbutton which is a kind-of mini-Portal Front End embedded in all subcomponents and modules including the Portal itself.
- **Registration and Management**: This allows the registration of any actor which wishes to take advantage or use DS2. This includes human actors such as user's requiring IDT/modules and developers through to system actors such as dataspaces. This will be a customised version of ICE's existing portal registration system. It's primary link is to the DS2 Identity Manager.

- **Dash button.** The Dashbutton is a DS2 library feature used by most modules and is a dynamic shortcut menu to things of most relevance to the user (eg mainly their installed modules). It allows users to quickly get awareness of their personal DS2 environment as well as control it. The Dashbutton dynamic is detailed within the IDT Module. The base functionality of the Dashbutton exists now but needs to be highly customised for the DS2 environment. It relies on embedded HTML vs an API and enables a holistic environment for DS2 in an easy way. It is detailed in the IDT module.
- **Resource Connect**: This will have no deep functionality but allows the users to navigate to further web/document/video type resources both within DS2 and externally (eg IDSA). For example, to read more technical details, look up example dataspaces or any other material. This component is an “if-time-allows” option.
- **Developer Connect**: This is intended to simplify casual chat-like interaction between users and developers or in fact any set of participants subscribed to DS2. For example, for support or to discuss new ideas. If included it will be based on existing third part components. This component is an “if-time-allows” option.
- **Module Marketplace: Listing, Cart, Purchase**: DS2 modules need to be selected from a catalogue of all modules, purchased (which may be for 0 EUR), and licensed which then makes them available to be packaged into IDT. Except for the latter this is classic marketplace functionality and is mainly configuration of ICE’s existing marketplace module. Its primary links are to the Module uploader to populate its shopfront and once a module is ’purchased’ the License and Use Manager.
- **Module Uploader:** Beneficiaries (or third parties) develop data-orientated DS2 modules which can be put on DS2 Marketplace. A main link is to the DS2 Identity Manager to give unique identities to the module uploaded. This subcomponent ensures all relevant information is provided and packaged in the right way. This includes software, module details (eg price, licenses, description, logo...), and accompanying knowledge (eg How To’s, Videos…). It ensures a module is K8s/Helm compliant so that it can be potentially packaged into IDT. It will be based on ICE Asset upload being customised for the DS2 environment and all modules must confirm to its needs.
- **Payment**: Once agreed the product is paid for and both the portal and the developer compensated. An existing payment service (stripe) will be used and a cart-mediator service is used to link to that (strip link is not shown in architecture). This service will also be used by the Data Marketplace
- **License and Use Manager:** Following potential purchase from the marketplace the asset is then licensed for use (fixed licenses, subscription etc – however developer determines) and a Payment is then due. Once licensed it becomes available for the Containerisation and Deployment grouping to either issue a new IDT or to upgrade and existing IDT. The components is based on existing ICE Marketplace technology upgraded for DS2. Other modules can also use the licensing system – eg the Data Marketplace (TBD). Note that on first use core modules such as containerisation will also be packaged
- **Administration**: A UI for Portal (and Platform) administrator to use to configure other elements and functions of the portal based on access credentials.
- **Portal Identity Manager:** Provides identities for actors (parties and modules) relevant to the Portal. All DS2 users must have a DS2 ID, as should Dataspaces, and Dataspace Pairs. The Portal Identity Manager will where necessary interface with the DS2 Identity Module (IDM) to validate participant IDs which will run on the DS2 Platform

- **DS2 Containerisation** and **API:** This provides two basic services to the portal: A) Assisting and ensuring a developer uploads a containerisation compliant module. B) Once modules are selected and licensed, they can be packaged and deployed via this module to downloadable/upgradable IDTs
- **DS2 S/W Platform** and **API**: This platform is available to all modules and is the cloud home of the Portal as well as the Portal hosting an administrative interface to configure it
- **DS2 Data Marketplace and API**: The cloud base data marketplace may take advantage of some of the portal common administration function – user management, licensing, payment
- **DS2 IDT Broker**: The licensed modules are packaged via DS2 Containerisation and deployed as a bespoke IDT to the participant
- **DS2 Portal Operator:** This represents the administrator and operator of the system who use the Administration UI
- **Modules, s/w, details, knowledge:** This represents the upload of the module and accompanying information to become an asset in the portal which can be later explored and purchased. The upload is to the Module Uploaders.
- **Developers:** Technicians and business partners representing a developed module to be uploaded
- **User:** Any participant of any data space, or future potential participant who wishes to explorer/download modules available
- **External Modules:** Other modules which could be applicable to show on a users Dashbutton

6.1.4 Technical Foundations and Background

The foundations of the Portal are on a previous Portal (open source – Apache) used by ICE in the ZDZW project which was a portal in the field of zero defect manufacturing. Whilst much of the functionality is similar (eg user registration) many of the modules will need to be customised for DS2. For the payment module it has been tightly integrated with the “stripe” payment platform which is SaaS

Subcomponent/Component	Owner	License
ICE Portal	ICE	Apache 2.0
ICE Marketplace	ICE	Apache 2.0

6.1.5 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	Receives From/Gives To	What
DS2 Dash button	Gives To	Dash button will be encoded with the portal entry point to allow users to quickly access the portal
DS2 Identity Module	Gives To	Information necessary to create an identity of a DS2 portal actor (stakeholder or module)
DS2 Identity Module	Receives From	Actor identification token
DS2 Containerisation	Gives To	Software module(s) to be packaged into an IDT

DS2 Containerisation	Receives From	Software Module packaged to be conformant to DS2 marketplace needs
DS2 S/W Platform	Gives To	Administrative commands. NB The portal administration function is to administer the portal and the platform
DS2 S/W Platform	Receives From	Status information. NB The portal administration function is to administer the portal and the platform
DS2 Data Marketplace	Gives To	Login approval and user information to allow access to the marketplace
DS2 Data Marketplace	Receives From	Purchase information for payment
DS2 IDT Broker	N/A	This is shown in the picture so the cycle can be shown but the portal does not deal directly with IDT only through Containerisation

6.1.6 Technical Risks

Risk	Description	Contingency Plan
Minimal	The platform itself is largely Background and has been tried and tested so minimal issues are expected. The main activity is related to their adaptation to DS2 – new UIs and configurations which takes time but is not a major barrier	Check after first round of architecture to see if any major functionality is missing

6.1.7 Security

Security Issue	Description	Need
Access Control	The portal is the place where actors are given tokenised IDs and these are used throughout the entire ecosystem to access modules and the portal via role-based access	These aspects are largely implemented in the portal already, but the approach needs to be adopted in DS2 modules and IDT. However, similar has been performed in other projects so no surprises are anticipated

6.1.8 Data Governance

Data Governance Issue	Description	Need
User Registration	Human actors will be registered and need to give typical personal details away – name, email etc	This is typical of any portal types system so there are no exceptional problems expected but of course the system needs to be GDPR aware and complaint

6.1.9 Requirements and Functionality

This functionality will be used in all usecases since its use is a premise of the project which includes the ability to select and deploy any module those cases may need

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

Because off this premise there is not specific use case requirements related to this

WHERE	WHAT	WHY	Run/Design Time	Priority
	Use Case 1: City Scape			
Section 2.2 UC1.x	N/A since its use is a mandatory fundament of the project		D	M
	Use Case 2: Green Deal			
Section 2.2 UC2.x	N/A since its use is a mandatory fundament of the project		D	M
	Use Case 1: Agriculture			
Section 2.2 UC2.x	N/A since its use is a mandatory fundament of the project		D	M

6.1.10 Workflows

The following sub-sections describe the sequence diagrams of the Module:

- Organisation Registration
- Portal Login
- Dataspace Registration
- Upload of modules to the marketplace by developers
- Browse of modules,
- Module purchase, and licensing

6.1.10.1 Organisation Registration

This feature provides the capability to register an organisation in the Portal that will then perform required DS2 Portal tasks such as Dataspace registration, module upload, module purchase, etc.

The main steps/functionalities are as follows:

- Fill in Registration Form
- Send Registration Information
- Register Organisation
- Registration Result

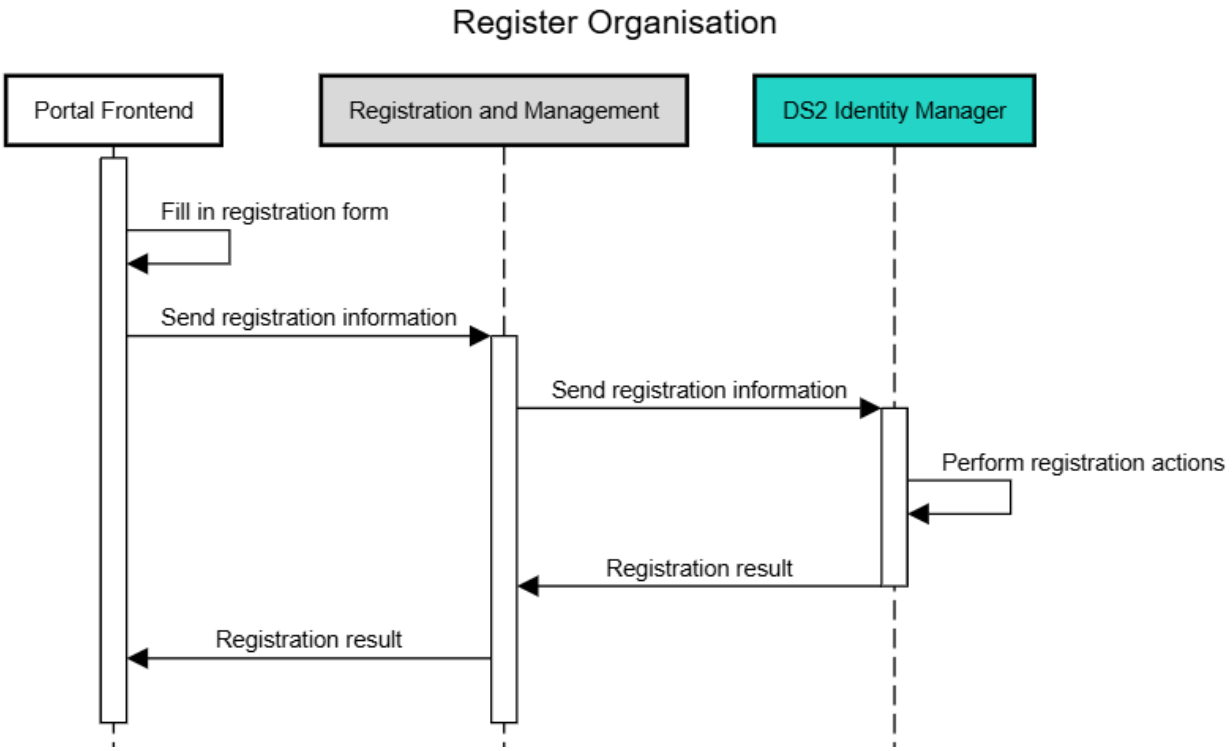


Figure 2: Register Organisation

6.1.10.2 Portal Login

This feature provides the capability to login to the Portal with organisation credentials.

The main steps/functionalities are as follows:

- Enter login details
- Send login to DS2 Identity Manager
- Validate login
- Return login result

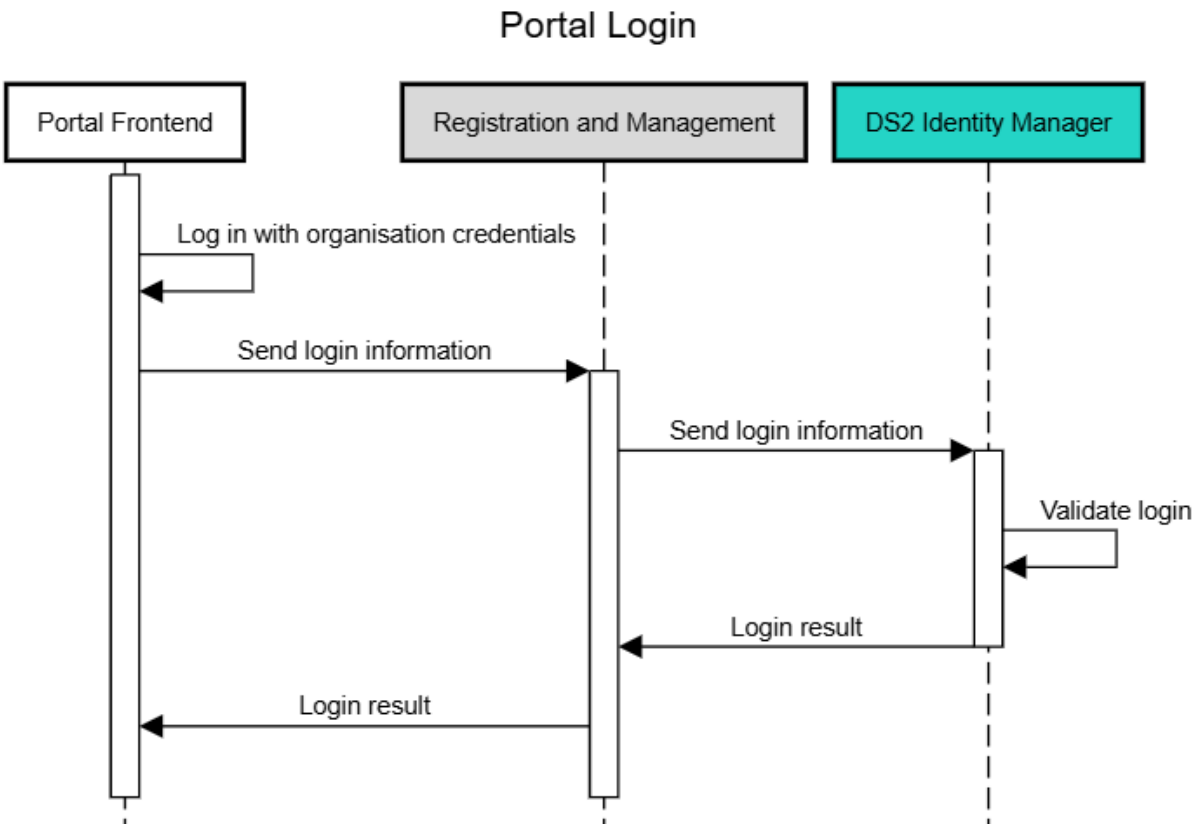


Figure 1: Portal Login

6.1.10.3 Dataspace Registration

This feature provides the capability to register a Dataspace in DS2 for DS2 transactions. This will return the DS2 Dataspace ID. This workflow is the same for Dataspace pair registration that will return the DS2 Dataspace pair ID with the difference that there are two Dataspaces involved in that workflow and there has to be a previous agreement.

The main steps/functionalities are as follows:

- Fill Dataspace registration form
- Send Dataspace registration info
- Perform Dataspace registration
- Return registration result and ID

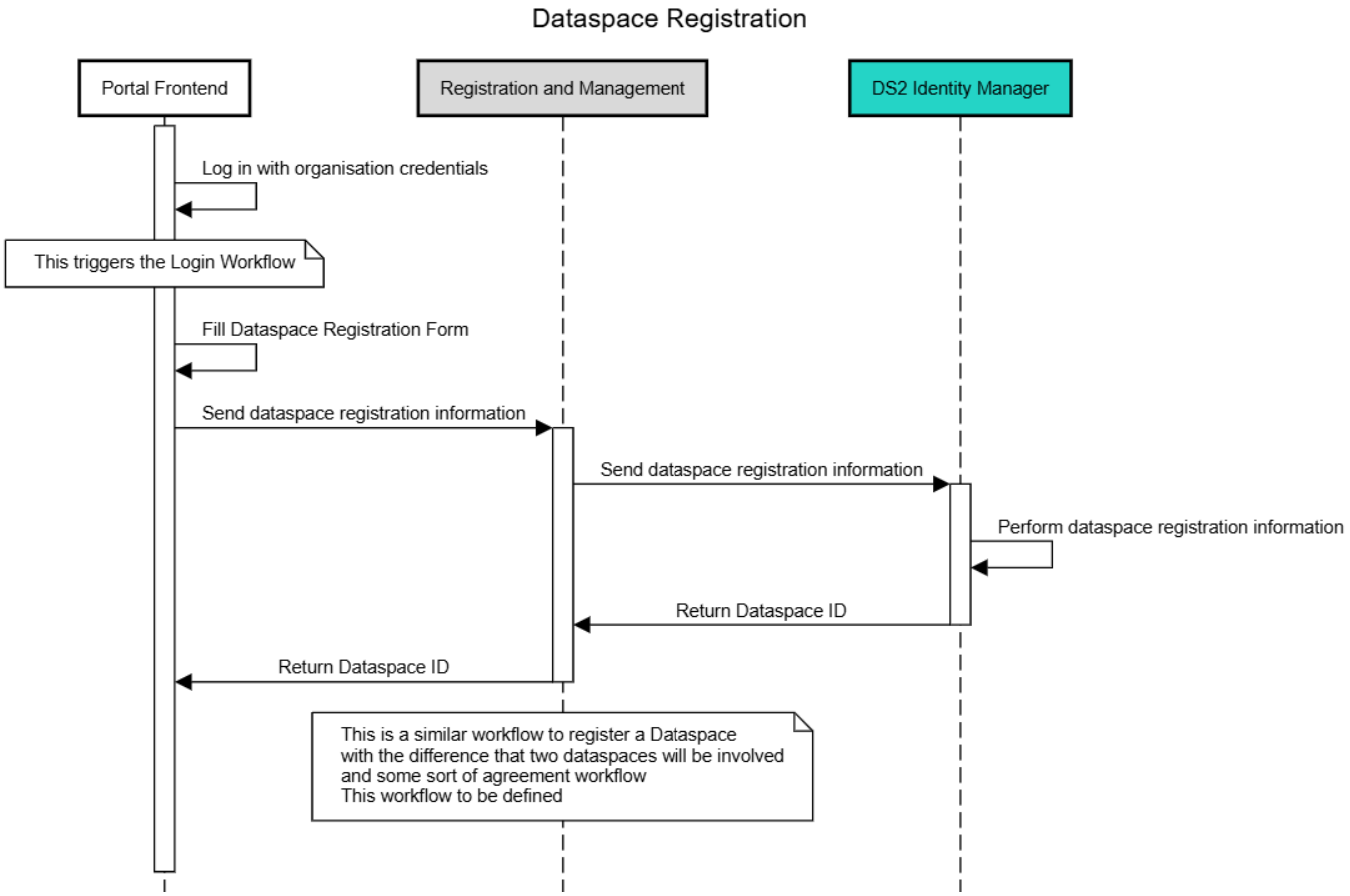


Figure 1: Dataspace Registration

6.1.10.4 Publish Module

This feature provides the capability to publish a module in the Portal Marketplace for later purchase and deployment on a participant IDT.

The main steps/functionalities are as follows:

- Fill Module details form
- Upload Module files (images and descriptors)
- Send Module details and files to Marketplace backend
- Store and Publish the Module

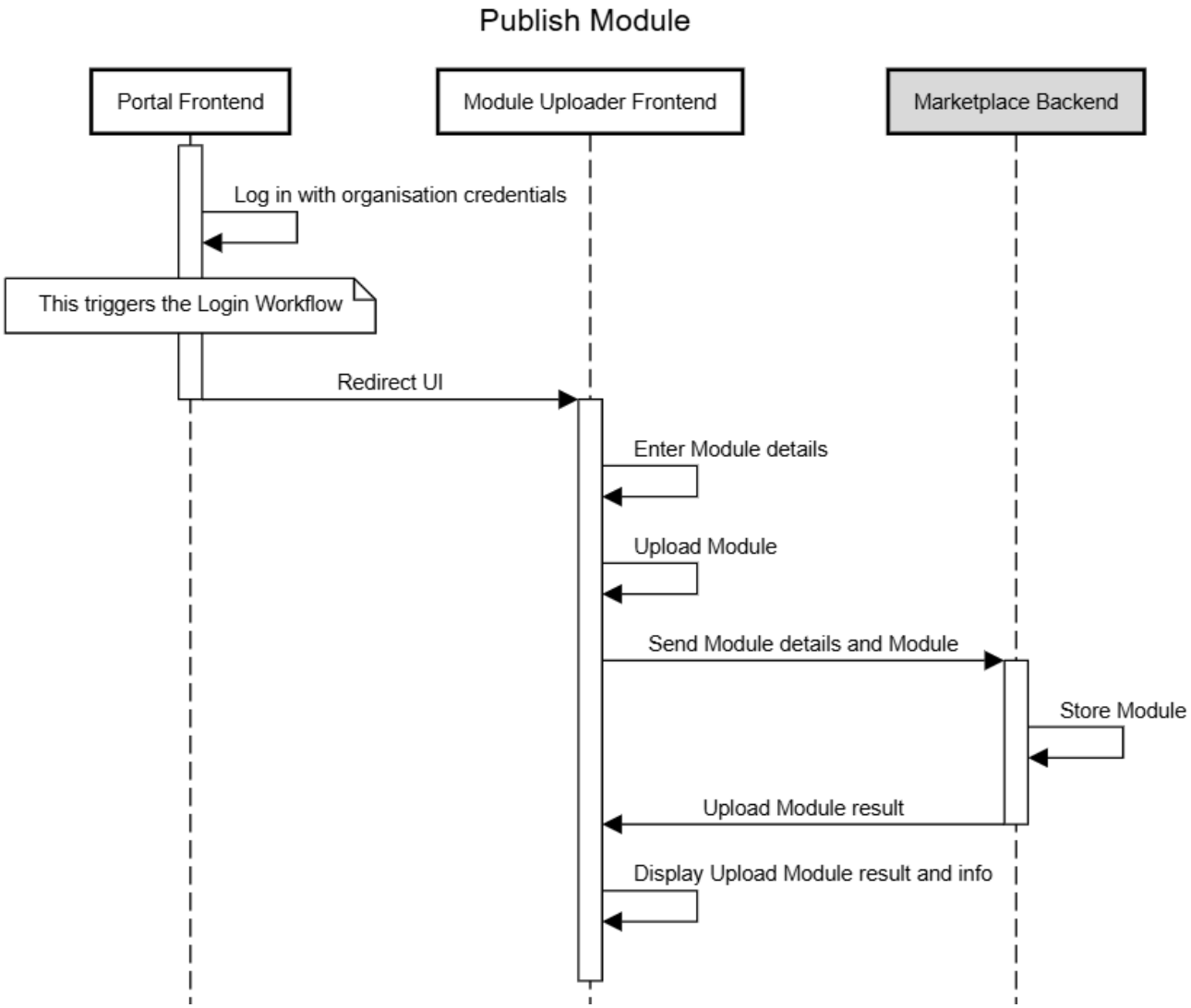


Figure 1: Publish Module

6.1.10.5 Browse Module

This feature provides the capability to browse the list of modules in the Portal Marketplace for later purchase and deployment on a participant IDT.

The main steps/functionalities are as follows:

- Request list of Modules
- Display list of Modules

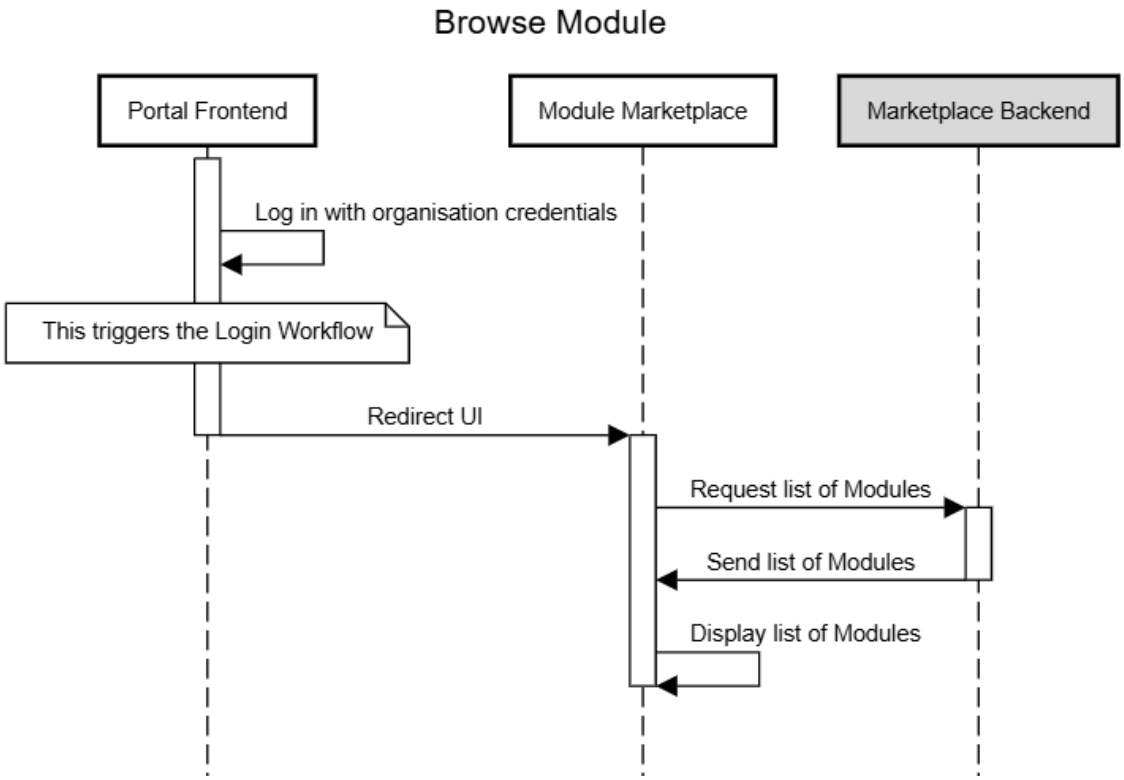


Figure 1: Browse Module

6.1.10.6 Purchase Module

This feature provides the capability to purchase a module from the Portal Marketplace for later deployment on a participant IDT.

The main steps/functionalities are as follows:

- Select Module
- Select License
- Purchase Module License
- Pay Module License
- Module is published in the participant IDT UI and Containerisation for deployment

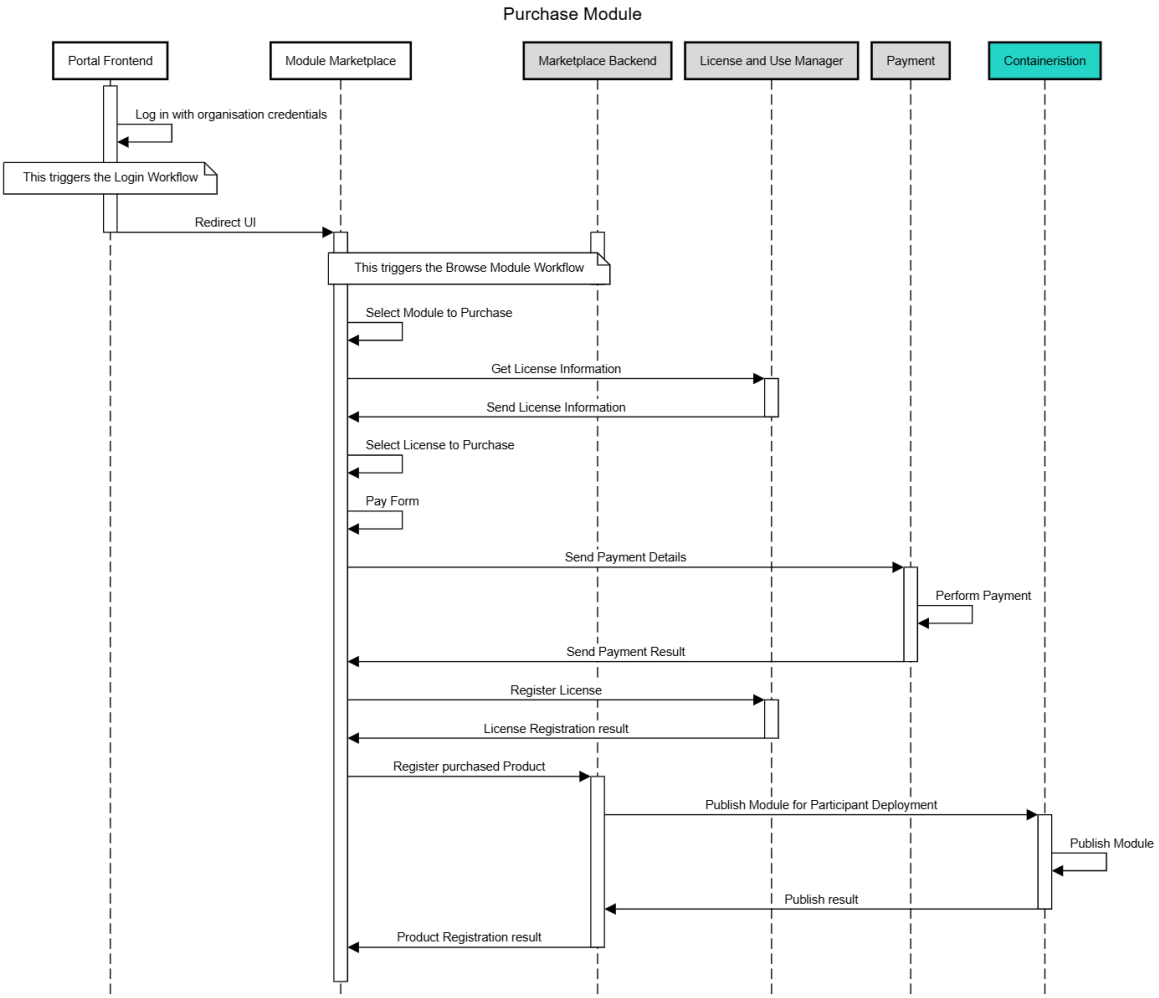


Figure 1: Purchase Module

6.1.11 Role, Resourcing, and Milestones

Sub-component	Main Activity	ICE Person Months	M18	M24	M30	M36
Portal Front End	This will be a new front end and adapted throughout the project as functions are added and modules are linked to	2				
Registration and Management	Registration will be adapted for the nuances of dataspace ID management and the DS2 Identity Module	2				
Dash button	Adaptation and testing with new module as they implement the button	1				
Resource Connect	Connectivity of resources which can assist users – videos, sites, documents etc	If time				
Developer Connect	Enabling a TBD external module to allow chat, possibly other, type interaction between users and developers	If time				
Module Marketplace	Adaptation of existing system to adopt to the parameter of DS2 compatible modules	0				
Module Uploader	Acting as a bridge between the containerisation module and the marketplace itself for the s/w upload but also to ensure other module properties necessary for the marketplace are entered	2				
Payment	Only minor adjustment to the interfaces will be necessary since an external provider is used for this	0.25				
License and Use Manager	Upgrades to the details of licensing to match module and revision of system– another significant time is helping module developers adapt to system	0				
Administration	Rewiring the administration module to reflect the needs of DS2	0				
Bug Fixing and followup	Rewiring the administration module to reflect the needs of DS2	1.5				
Table Total/DOA Task Total/Resilience	**Comments:**	**9 9 / 0**				

6.1.12 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
Data Marketplace	This is based on existing INDRA technology which has some similar functions or functions they would like to develop but this means overlap	Explore to reduce overlap – After initial discussions, there is a clear overlap and that means we may have two separate Marketplaces, one for modules and one for data – INDRA could also redirect efforts to other modules and use the Portal Marketplace	INDRA
Identity Module	How precisely the registration system of the portal links to the identity modules particularly for DS Pair and DS registration	Dataspaces and DS Pairs will register via the Portal, and identities will be stored in the identity module – still to define the specific format	ICE

6.1.13 Annex: DS2 Platform

The DS2 Platform is the central Cloud DS2 environment where the Portal and some of the key intermediary services run, such as the Identity module.

It is the central platform where Dataspaces and participants will first register to the DS2 concept, using the Portal to get their DS2 IDs, and download the IDT and the necessary modules from the Marketplace.

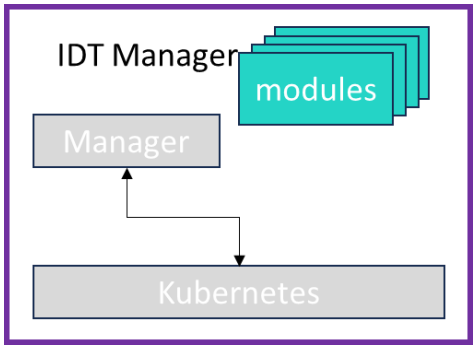
The DS2 Platform is in essence an IDT but “bigger” and hence it’s functionality is largely duplicate to IDT and the IDT Broker module should be read for details. This is in the sense that it will be deployed on a multi-node environment in the cloud with way more resources than the required by a participant local IDT. Thus the DS2 Platform, like the IDT, is a core Kubernetes runtime to potentially run any other modules in a containerised way with all the other components from the IDT, such as the Containerisation module, the Kubernetes UI, the Management and Monitoring Controller, even the DS2 Connector. In practice, and in DS2, it is expected only a few modules would use this wider facility – specifically those requiring a service intermediary.

The only difference from a participant IDT may be some of the additional cloud components used, depending upon the specific cloud vendor, such as the network, the servers, a managed Kubernetes service, load balancers, edge gateways and storage systems.

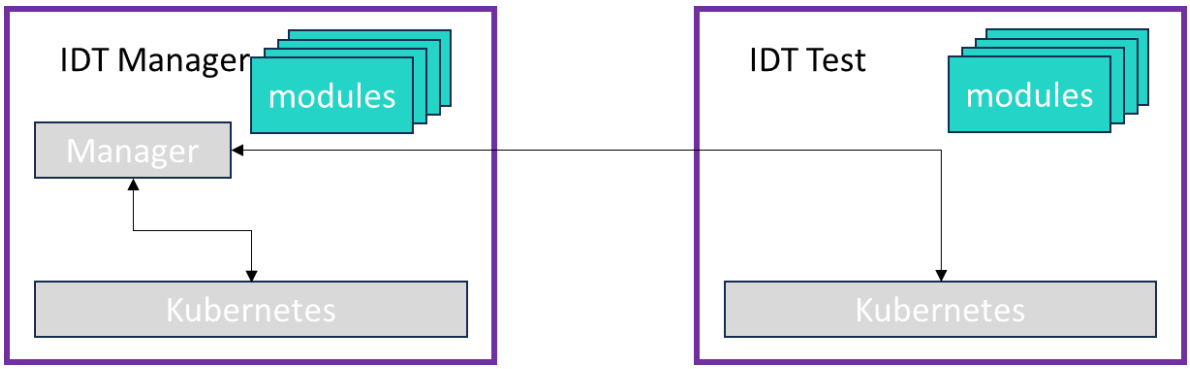
The work related to the DS2 Platform is mainly that of creating the cloud platform, ie. network and servers, then installing and configuring the Platform IDT, then deploying all the required modules for this central system: Portal, Identity Management, Containerisation, Marketplace. In principle there is no strong development.

Further research will be made to select the adequate cloud provider and architecture. Since there is a need to test and validate the modules before they are uploaded to the Marketplace, the platform could contain two different IDTs, the Platform IDT and the test IDT. The Platform IDT would be the full production IDT and the test IDT would contain a subset of the components, being managed from the Platform one. Even some of the Platform IDT components could be split into a different Kubernetes cluster, such as the Kubernetes UI and the Management and Monitoring Controller, so that the load is distributed.

The following diagrams illustrate the different architecture possibilities for the IDT in the DS2 Cloud Platform. The first diagram represents a single IDT that runs all the platform modules and the test of the modules being uploaded to the Marketplace. It also runs the management components.



The second diagram represents a test IDT together with the main Platform IDT. The main IDT runs the platform and the management modules and manages the test IDT. The test IDT runs the test of the modules before being uploaded and accepted in the Marketplace.



The third diagram represents an extension of the previous one, where the main IDT is split into two, one that runs the management and manages all the IDTs, and the other to run the platform modules. The test IDT, as in the previous example, is used to test the modules before being published in the Marketplace.