

System Design Document and Master ICD



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1. Introduction

1.1 Scope

This document provides the SDD and ICD for the "Destination Earth – DestinE Core Service Platform Framework – Platform & Data Management Services".

1.2 Purpose

This System Design Document (SDD) and Master Interface Control Document (ICD) provides a comprehensive view on the design and overall architecture of the DestinE Core Service Platform.

1.3 Applicable Documents

Ref.	Title	Reference and Version
AD-1.	System engineering general requirements	ECSS-E-ST-10C, Rev.1
AD-2.	OpenStack	https://www.openstack.org/
AD-3.	Kubernetes	https://kubernetes.io/

1.4 Reference Documents

Ref.	Title	Reference and Version
RD-1.	DestinE Platform Operations Concept Document	DEST-SRCO-TN-2300330, v2.4
RD-2.	DestinE Platform Framework – Platform & Data Management Services – Technical and Service Requirements	ESA-EOPG-EOPGD-RS-10, v1.0
RD-3.	DestinE Core Service Platform Security Requirements	ESA-ESO-SSRS-2022-0111, v1.0
RD-4.	DestinE Platform Service Portfolio	DEST-SRCO-TN-2300324, v2.0
RD-5.	Onboarding Policy and Process	DEST-SRCO-PR-2300339, v3.3
RD-6.	DestinE Platform Anomaly Management Procedures	DEST-SRCO-PR-2300315, v2.1
RD-7.	DestinE Platform DMS Integration procedure Runtime	DEST-SRCO-TN-2300355, v4.11
RD-8.	DestinE Platform PMS Integration procedure Runtime	DEST-SRCO-TN-2300417, v2.11
RD-9.	DestinE Platform - Monitoring System Interface Control Document	DEST-SRCO-IF-2300369, v3.1

RD-10.	DestinE Platform - Booster Software Design Document	DEST-SRCO-DD-2400667, v0.4
RD-11.	DestinE Platform - Calculator Design Document	DEST-SRCO-DD-2400452, v1.1
RD-12.	DestinE Platform – Data Management Services Statement of Work	DESP-DMS-SOW, v1.0
RD-13.	DestinE Platform - Tenancy Operations Concept	DEST-SRCO-DD-2400645, v1.6
RD-14.	DestinE Platform - Monitoring System Design Document	DEST-SRCO-DD-2300376, v2.1
RD-15.	DestinE Platform System Verification and Validation Plan	DEST-SRCO-PL-2300328, v1.3
RD-16.	DestinE Platform Service Level Agreement	DEST-SRCO-RD-2300319, v1.3
RD-17.	DestinE Platform - Monitoring System Integration Procedures	DEST-SRCO-TN-2400648, v2.5
RD-18.	DestinE Platform Learning Hub - Developer Manual - Deployment & Architecture	DEST-SRCO-TN-2501077, v1.2
RD-19.	DestinE Platform - Data Model of Data and Services	DEST-SRCO-TN-2400459, v3.5
RD-20.	Destination Earth Core Service Platform Cybersecurity Incident Management Plan	DESP-SERCO-TAS-PL-009, v1.2
RD-21.	Destination Earth Core Service Platform Security Operations Procedure	ESA-DESP-TAS-PROC-012, v1.0
RD-22.	DestinE Platform Security Risk Assessment	DEST-SRCO-TN-2400610, v2.9
RD-23.	DestinE Platform Security Management Plan	DEST-SRCO-PL-2300325, v1.9
RD-24.	DestinE Platform Cyber Crisis Management	DEST-SRCO-TN-2501021, v1.0
RD-25.	DestinE Platform Data Assessment Methodology	87216548-DOC-GRP-EN-001, v1.0
RD-26.	DestinE Platform Security Coding Rules	83231328-DDQ-TAS-EN, v4.0
RD-27.	DCAT-AP 3.0	https://semiceu.github.io/DCAT-AP/releases/3.0.0/

RD-28.	Destination Earth Interoperability System Technical Note	DEST-SRCO-TN-2501090, v1.1
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1.5 Acronyms and Abbreviations

Acronym	Definition
ACC	Accounting & Clearing House Service
AD	Applicable Document
AI	Artificial Intelligence
API	Application Programming Interface
BOOST	Booster Service
BSE	Booster Sponsor Entity
CaaS	Container as a Service
CALC	Calculator Service
CCN	Change Contract Notice
CPU	Central Processing Unit
CSV	Comma-Separated Values
DBaaS	Database as a Service
DCAT	Data Catalog Vocabulary
DCAT-AP	DCAT Application Profile
DCMS	Data Cache Management Service
DEDL	DestinE Data Lake
DESP	DestinE Core Service Platform
DEV	Development
DevSecOps	Development, Security and Operations
DMS	Data Management Service
DSK	Service Desk
DSP	DestinE Platform System
DT	Digital Twin
DTE	Digital Twin Engine
DWH	Data Warehouse
E2E	End-to-End
EBIOS	Expression des Besoins et Identification des Objectifs de Sécurité
EC	European Commission
ECMWF	European Centre for Medium-Range Weather Forecasts
eIDAS	Electronic Identification, Authentication and Trust Services
EOF	ESA Earth Observation Framework
ESA	European Space Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EXT	External
FAIR	Findability, Accessibility, Interoperability, Reuse
GDPR	General Data Protection Regulation
GHG	Greenhouse Gas
GPU	Graphics Processing Unit
GTW	DestinE Gateways
GUI	Graphical User Interface

HPA	Horizontal Pod Autoscaling
HPC	High-Performance Computing
HTTP / HTTPS	Hypertext Transfer Protocol (Secure)
IaaS	Infrastructure as a Service
IAM	Identity and Access Management
ICD	Interface Control Document
IDOS	Information Dissemination & Onboarding Support Service
IdP	Identity Provider
ISIMIP	Inter-Sectoral Impact Model Intercomparison Project
ISO	International Organization for Standardization
IVV	Integration, Verification and Validation
KO	Kick-Off
KPI	Key Performance Indicator
MCP	Model Context Protocol
MNS	Monitoring Service
MOOC	Massive Open Online Course
NASA	National Aeronautics and Space Administration
NFS	Network File System
NRSD	New Registered Service Design principle
NWD	Normal Work Days
NWH	Normal Work Hours
OCD	Operations Concept Document
OGC	Open Geospatial Consortium
OVH	OVHcloud - Cloud infrastructure provider
PaaS	Platform as a Service
PMS	Platform Management Service
RBAC	Role based Access Control
RD	Reference Document
REST	REpresentational State Transfer
SAML	Security Assertion Markup Language
SDD	System Design Document
SIMPL	Smart Open-source Middleware
SRG	Service Registry
TAS	Thales Alenia Space
TLS	Transport Layer Security
TO	Technical Officer
TSR	Technical and Service Requirement
URL	Uniform Resource Locator
USR	User
VCM	Variable Cost Model
VM	Virtual Machine

1.6 Terms and definitions

Ecosystem:

The Ecosystem defines a governed perimeter that leverages data and services, along with a set of members (participants) that are interlinked for reciprocal interactions and the exploitation of data and services.

Data Space:

Open ecosystem of distributed and federated actors sharing data, applications, services, and infrastructure.

In our framework, the Ecosystem concept is applied to DestinE Ecosystem. Please refer to Section 2.

System/Engineered System:

A *system* is an arrangement of parts or elements that together exhibit behaviour or meaning that the individual constituents do not. An *engineered system* is a system designed or adapted to interact with an operational environment to achieve one or more intended purposes while adhering to applicable constraints.

The system's properties (as a whole) result, or emerge from:

- the parts or elements and their individual properties; AND
- the relationships and interactions between and among the parts, the system and its environment.

In our framework, the engineered system is the DestinE Platform.

System Element:

A *system element* is a member of a set of elements that constitutes a system. It can be any or all of people, products, services, information, processes, and natural elements which constitute it (the term subsystem is sometimes used instead).

In this document, system elements are all the Services and Infrastructure elements constituting DestinE Platform Management Services. The architecture of the elements composing the Data Management Services is not discussed in this document.

System Component:

A *system component* is a system element. It can be a software package, a web service, a web resource, etc. Each component is an essential part of the system element and is necessary for it to function correctly.

Workflow:

A *Workflow* is any user coding architecture, including the data management with inputs, retrieval, transformation and writing outputs.

2. DestinE Platform design overview

DestinE Core Service Platform (DestinE Platform) is a user-friendly platform, funded by the European Commission in the frame of the DestinE initiative, for the delivery of DestinE services to users.

The DestinE Platform supports user communities in exploiting data within local or remote environments. It is based on an open, flexible, federated, scalable, evolvable, and secure cloud-based architecture. The platform connects to existing and future HPC resources as well as public cloud computing infrastructures.

2.1 DestinE Platform Design Drivers

The main drivers, i.e., the guidelines used to define the architecture are derived from the following documentation:

- DestinE Platform Framework – Platform & Data Management Services – Technical and Service Requirements [RD-2], providing the full set of contractual technical requirements.
- Services Portfolio, described in [RD-4] which documents all services provided as part of the contract.
- Service Level Agreement [RD-16] which defines the expected levels for service delivery.
- the Architectural Principles of the European Initiative SIMPL.

Analysis of these sets of documents and information is conducted to derive design drivers and constraints for subsequent development of the system.

Main drivers related to system design activities are detailed in Table 1:

Table 1: DestinE Platform Design Drivers

Driver ID	Driver	Description
DRIVER#1	Cloud-native applications	System elements shall be deployed onto a cloud environment
DRIVER#2	Data-driven approach	System functions shall be applied as soon as data is available, consistent with the overall dataflow design.
DRIVER#3	Data agnostic approach	System functions shall be as much as possible independent of the data characteristics (e.g. type, format, timeliness, size).
DRIVER#4	High availability	System functions shall be as much as possible made redundant, implementing the high-availability paradigm.
DRIVER#5	Federation	System functions providing the capability for interacting actors to directly or indirectly consume, produce, or provide resources.
DRIVER#6	Modularity	System functions shall be modular, allowing plugging in/out, change or replace any system element or component.
DRIVER#7	Loose coupling	System elements work independently with respect to others, without affecting the way in which other elements or actors interface with them.
DRIVER#8	Resilience	System functions shall ensure that the failure of one element or component has the minimum impact on others interacting with it.

DRIVER#9	Openness and agnosticism	System functions shall make use of open standards, open interfaces and open-source components, so as to ease deployment on any infrastructure.
DRIVER#10	Composability and extensibility	Following microservices design approach, system elements or components shall be headless and independent, shall be implemented via containerization.
DRIVER#11	Interoperability	System functions shall rely on a shared information model and adhere to common standards guaranteeing the communication with complementary ecosystems of users and services.
DRIVER#12	Scalability and elasticity	System components shall scale resources according to the infrastructure layer.
DRIVER#13	Security, privacy and trust	System functions shall implement security principles and standards and be compliant with the GDPR.
DRIVER#14	Discoverability	System functions shall aim to make it easy for users to find, access, and understand the service's value proposition.
DRIVER#15	AI-Readiness	System shall provide an AI-ready infrastructure with native integration with MCP, enabling seamless adoption of advanced AI capabilities.

2.2 External elements

DestinE Platform external elements are defined as systems/services deployed outside the DestinE Platform cloud infrastructure and run by administrators according to an agreed service level.

Table 2: DestinE Platform External elements

External elements	Description
DEDL	DestinE Data Lake (DEDL): A space fulfilling the storage and access requirements for any data that is offered to DestinE users. It provides eligible DestinE Platform users with a harmonized access to datasets, regardless of data type and location, as well as with near-data processing capabilities. This service is implemented by EUMETSAT.
DTE	DestinE Digital Twin (DT) Engine (DTE): An engine capable of providing a common system approach to a unified orchestration of Earth-system simulations, delivering data from digital replicas of the Earth through the fusion of observations with models. This service is implemented by ECMWF.
External Identity Providers	External Identity Providers (IdPs) are trusted authentication sources outside the DestinE Platform, enabling Federated Users to access DestinE Platform services using their institutional or national credentials. These IdPs may include eIDAS-compliant providers or other federated identity systems and are integrated with the DestinE Platform IAM service to support Single Sign-On and role propagation.
External Data Providers	External Data Providers are trusted sources outside the DestinE Platform that offer access to scientific and environmental datasets. These providers, such as Copernicus or NASA, are integrated via standard data interfaces (e.g., OGC APIs, HTTPS) and support federated data access for DestinE Platform services and users.

Actors	All the actors and user categories are described in the OCD ([RD-1]).
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2.3 DestinE Platform context

The DestinE Platform System is designed as a public cloud platform that serves as an access and orchestration point for services, data, and applications within the DestinE ecosystem.

Through uniform interfaces, DestinE Platform exposes services for authentication and authorization, data discovery and access, visualization, transformation, user support, and monitoring.

As a black box, DestinE Platform interacts with external actors through well-defined interfaces that enable:

- Access to and management of data by users
- Integration with simulation services (DTE) and data storage (DEDL)
- Federation with external identity providers
- Monitoring and supervision by ESA
- Technical support and integration of Use Cases by selected partners

The system ensures interoperability, scalability, and continuous support, maintaining a high level of abstraction to facilitate integration and the evolution of the framework.

In Figure 1, the System context diagram of the DestinE Platform is depicted.

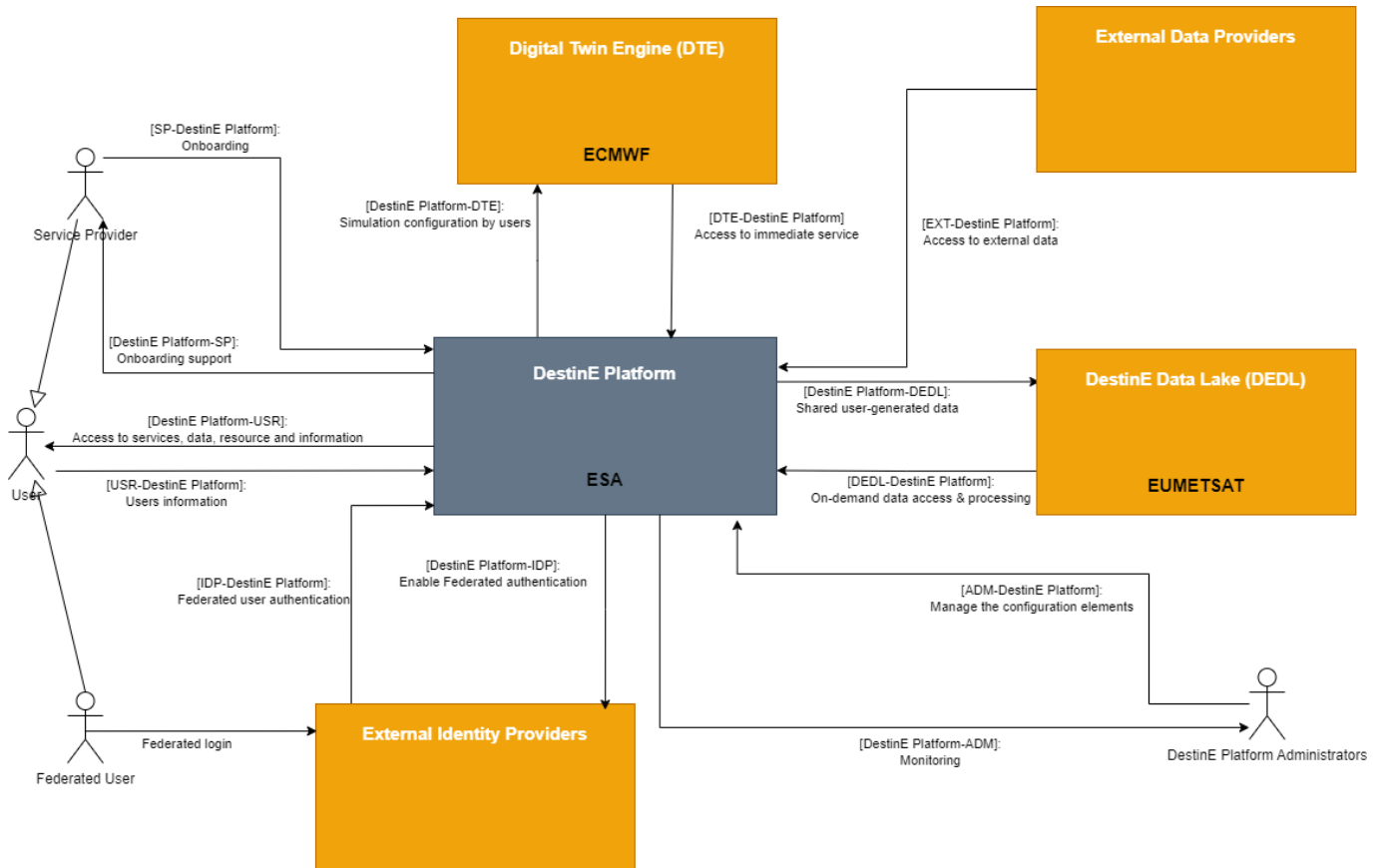


Figure 1: DestinE Platform context diagram

The interfaces are described below:

- **[DestinE Platform-USR]** this interface represents all services, data and information made accessible to Users via DestinE Platform. It includes the provisioning of data i.e.
 - DestinE generated data from the DTs or
 - Promoted DestinE User generated data and
 - Datasets from federated data holdings.

Moreover, it also includes the provisioning of storage resources, application services, engineering support and collaborative environments to the user community. Finally, such interface also includes the information generated by the activities of DestinE community engagement such as event organizations, social media content publication and web forum interactions.

- **[USR-DestinE Platform]** this interface represents the set of information provided by Users to the DestinE Platform. It includes identity information, simulation configuration, generated data, models, applications, feedback, and comments. This interface also encompasses information provided by users in dedicated community channels, such as web forum discussions and co-design sessions.
- **[DestinE Platform-DEDL]** this interface applies to the activity of data storage provided by DEDL for DestinE Platform.

- [DEDL-DestinE Platform] this interface represents the capability for DestinE Platform to request data stored in DEDL storage.
- [DestinE Platform-DTE] this interface represents the exchange of simulation data and configurations from DestinE Platform to the Digital Twins.
- [DTE-DestinE Platform] this interface includes the provisioning of immediate services exposed by the Digital Twins to DestinE Platform.
- [IDP-DestinE Platform] this interface represents the federated identity integration between external Identity Providers (IdPs) and the DestinE Platform. It enables the authentication and propagation of user identity attributes from trusted external sources to DestinE Platform.
- [DestinE Platform-IDP] this interface represents the set of interactions initiated by the DestinE Platform towards external Identity Providers (IdPs) to enable federated authentication and trust integration.
- [DestinE Platform-ADM] this interface represents the set of services, tools and information made available by the DestinE Platform to Platform Administrators. It enables the execution of operational routines, configuration management, monitoring, and reporting activities.
- [ADM-DestinE Platform] this interface represents the set of actions, configurations and operational inputs provided by Platform Administrators to the DestinE Platform. It enables the management and evolution of the platform's core services and governance mechanisms.
- [SP-DestinE Platform] this interface represents the onboarding and management of services by external Service Providers into the DestinE Platform. It enables the registration, publication, and lifecycle control of services listed in the DestinE Platform Service Registry.
- [DestinE Platform-SP] this interface represents the set of information and tools made available by the DestinE Platform to Service Providers. It includes access to the Service Registry, onboarding guidelines, validation feedback, and usage analytics.
- [EXT-DestinE Platform] this interface between external entities and DestinE Platform represents the federated access, via DestinE Platform interfaces, to datasets produced by Copernicus, EC EUROPA Data Store, ISIMIP, IAGOS, NASA. This interface is implemented by Services external to the platform.

3. DestinE Platform System Design

Design is performed via the following steps:

- generation of System Functional model (Section 3.1) which defines how the System satisfies requirements and user scenarios;
- identification of System Elements able to implement the identified functions.
- association of System Functions to Elements.

3.1 Functional model

The features of the DestinE Platform are realized through various functions, which are enumerated in the subsequent paragraphs and distinguished by a selected identifier.

Their implementation through the System Elements chosen to compose the DestinE Platform Management Services is fully described in Section 4, which reports the functional decomposition models.

The chosen approach is to define high-level functional areas, which group main functions.

3.1.1 F1 Identity and Access Management

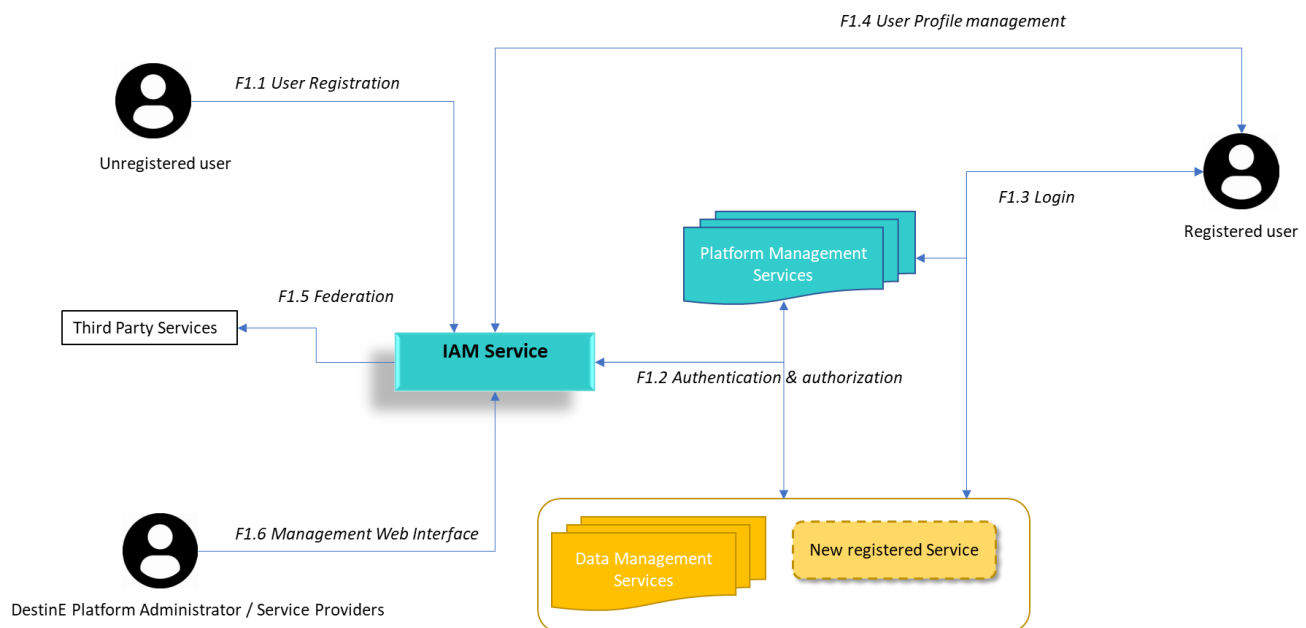


Figure 2: Identity and Access Management Functional Area

This functionality covers the following requirements (RD-2):

Requirement ID	Requirement Text
[DSP-TSR-007]	<i>The Contractor shall ensure the availability of a unified IAM service, authorizing user access to DESP Registered Services through a common DESP Framework service.</i>

[DSP-TSR-008]	<i>The Contractor shall ensure that 'DESP Code Of Conduct' and any DESP Registered Services applicable Terms and Conditions are acknowledged by users prior to access the specific service.</i>
[DSP-TSR-010]	<i>The Contractor shall ensure that DESP IAM service allows the categorization of users in different roles or profiles, defined by the Contractor, supporting access to services or data (e.g., accesso to data only for a specific user group).</i>
[DSP-TSR-063]	<i>The Contractor shall ensure the possibility to configure restricted access to specific datasets.</i>

3.1.1.1 F1.1 User Registration

The registration function covers the registration of any kind of user into DestinE Platform, thanks to self-registration via Information Dissemination & Onboarding Support Service - which redirects to the IAM Service dedicated panel.

3.1.1.2 F1.2 Authentication & Authorization

This function implements authentication, which confirms the validity of user identities, and authorization, which grants users permission to access DestinE Platform functions or parts thereof upon approval, ensuring no unauthorized access is permitted.

The access to services is managed through the definition of user groups and service groups which are linked by an authorization scheme.

Upon registration, users are authorized by default to access a specific group of DestinE Platform services. Additionally, users can request authorization to access other groups of services, such as those providing access to DestinE data and derived information. The authorization process is asynchronous and involves the EC as the approving entity.

3.1.1.3 F1.3 Login

The login function allows users to access their accounts on the DestinE Platform by providing their credentials.

Once a user is logged in, he/she may access:

- User Profile area storing personal account information
- All services which are not providing users the possibility to access DestinE data
- Onboarding request form
- Upgraded access request form
- "Submit an idea" form, to suggest new features

Moreover, depending on the level of authorization, users can access:

- Services allowing access to the original DestinE data and
- Service allowing access to information/data derived from DestinE data.

Please note that the first User Login includes the acceptance form of DestinE Platform "Code of Conduct", "Terms and Conditions", "Privacy Policy", "Cookie Policy" and "Legal Notice", read and access them through Web Portal.

3.1.1.4 F1.4 User Profile Management

This function implements user account management for registered users and administrators on the DestinE Platform.

In particular:

- 1) Users will be able to manage their user attributes.
- 2) Users will be able to change their password and email.
- 3) Users will be able to manage/monitor Tenancy features.

3.1.1.5 F1.5 Federation

This function enables federated access of third-party services. It enables Service Providers to publish their services to the DestinE Platform user community, allowing DestinE Platform users to access these third-party services using their existing DestinE Platform accounts.

3.1.1.6 F1.6 Management Web Interface

This function allows DestinE Platform Administrators to:

- Register services (i.e. client, applications) that can be used for authentication by users
- Register service resources
- Manage IAM configuration
- Manage the user authorization over its resources based on policies over custom attributes and permissions schemes

Moreover, EC will have the authority to grant DestinE Platform users access to Digital Twin Data and Services that are not available by default (i.e., services immediately accessible after registration).

3.1.2 F2 Tenancy Management

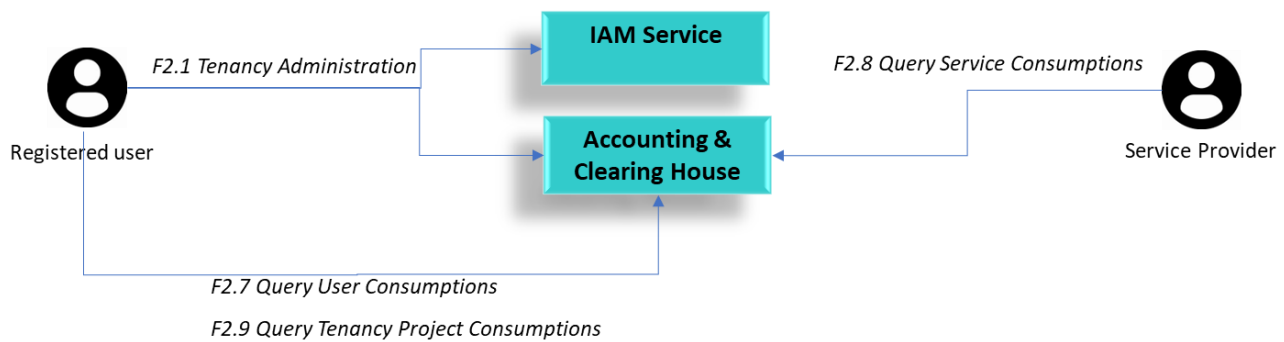


Figure 3: Tenancy Management Functional Area

This functionality covers the following requirements (RD-2):

Requirement ID	Requirement Text
[DSP-TSR-001]	<i>The Contractor shall implement an API for DESP Core Services belonging to the VCM type that provides performances and consumption information associated to Service Usage Profile characteristics (e.g., estimated time for completion, quota consumption, status of requests, ...)</i>
[DSP-TSR-010]	<i>The Contractor shall ensure that DESP IAM service allows the categorization of users in different roles or profiles, defined by the Contractor, supporting access to services or data (e.g., accesso to data only for a specific user group).</i>

Further details about Tenancy operation are provided in [RD-13].

3.1.2.1 F2.1 Tenancy Administration

This functionality enables groups of Users to access dedicated Resources provided by DestinE Platform Services.

It relies on:

- Resource Access Control Layer provided by the IAM to ensure dedicated and secure access
- Accounting & Clearing House component to track DestinE Platform Resource Consumptions
- Tenancy Management component provided by the IAM to support Tenancy Feature scenarios:
 - o Tenancy Members and Project Participants management
 - o Tenancy Projects Management

- Tenancy Resource discovery and allocation to Projects

3.1.2.2 F2.7 Query User Consumptions

This function enables Users to monitor their Resource Consumption across all Resources provided by every Service within the DestinE Platform.

3.1.2.3 F2.8 Query Service Consumptions

This function allows Service Providers to check the Resource Consumptions happened through the provided Resources.

3.1.2.4 F2.9 Query Tenancy Project Consumptions

This function enables Tenancy/Project Admins to monitor Resource Consumptions within managed Projects, relating to the Allocated Resources.

3.1.3 F3 Service Registration and Discovery

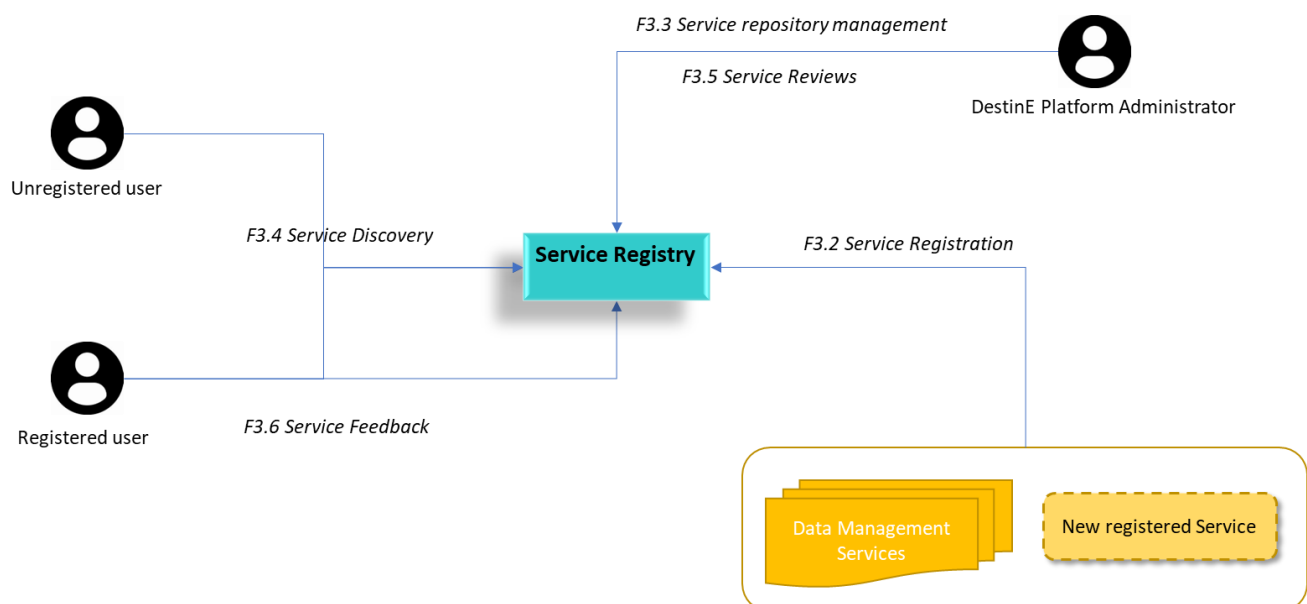


Figure 4: Service Registration and Discovery Functional Area

This functionality covers the following requirements (RD-2):

Requirement ID	Requirement Text
[DSP-TSR-012]	<i>The Contractor shall support registered users to benefit from DESP Core Services and integrate their own applications and services, including management of their own user community and access to data or results.</i>

[DSP-TSR-013]	<i>The Contractor shall include in the Registry Service a specific area of search for documentation based on keywords.</i>
[DSP-TSR-014]	<i>The Contract shall include in the Registry Service a specific area for receiving feedback on quality of service and satisfaction.</i>

3.1.3.1 F3.2 Service Registration

This function involves the registration of a new service into the Service Registry following its successful revision and approval. A registered service may also be unregistered.

Those new services expand the DestinE Platform capabilities, providing to the User the functionalities described in Section 3.1.8.

3.1.3.2 F3.3 Services Repository Management

This function implements the storing and maintaining of the list of the available DestinE Platform registered Services list and their relevant metadata.

3.1.3.3 F3.4 Service Discovery

This function, accessible to both unregistered and registered users, enables the search and identification of available registered services for consumption.

3.1.3.4 F3.6 Service Feedback

This function covers the process of leaving feedback for a service. Only DestinE Platform users (registered or federated) and Service Providers can leave feedback for a service.

3.1.4 F4 User Community Management

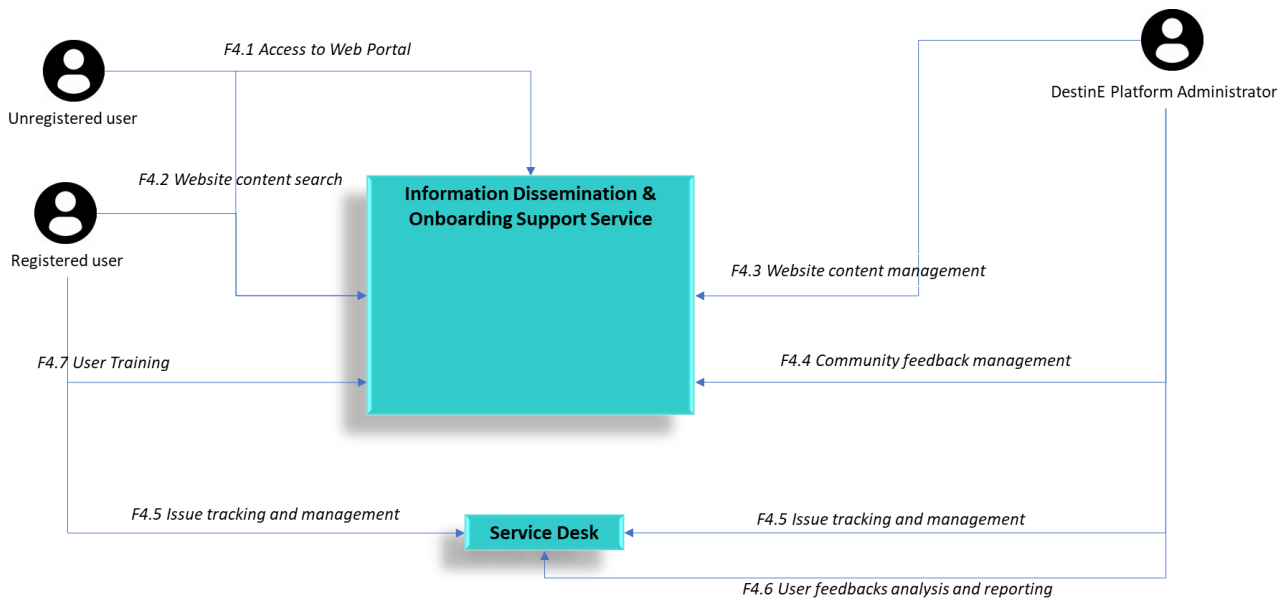


Figure 5: User Community Management Functional Area

This functionality covers the following requirements (RD-2):

Requirement ID	Requirement Text
[DSP-TSR-015]	<i>The Contractor shall ensure the operations, maintenance, and evolution of Service Desk to respond to inquiries, suggestions, and complaints relative to DESP Framework.</i>
[DSP-TSR-019]	<i>The Contractor shall ensure the availability of a Service Desk supporting a web-based forum to which user may post open questions, and to which the Service Desk can respond in a way that is visible to all users. Furthermore, the forum shall allow users to reply to openly posted questions or to provide other kind of content useful for the user community.</i>
[DSP-TSR-020]	<i>The Contractor shall support, through the Service Desk, the integration of DestinE Use Cases and Partnerships through a case-specific open discussion area.</i>
[DSP-TSR-021]	<i>The Contractor shall ensure the availability of a Service Desk with a web-based issue/ticket tracking tool.</i>

[DSP-TSR-022]	<i>The Contractor shall ensure that DESP Service Desk proactively coordinates with other DestinE components to respond to user inquiries and forwards an any inquiry which is outside the scope of its services.</i>
[DSP-TSR-023]	<i>The Contractor shall ensure the availability of a Service Desk that systematically captures, analyses, and reports feedback and satisfaction relative to DESP Framework services and available data.</i>
[DSP-TSR-024]	<i>The Contractor, through DESP Service Desk, shall facilitate the participation of users in DESP design by allowing the provision of feedback on potential new services and applications.</i>
[DSP-TSR-025]	<i>The Contractor shall establish a direct link with DTEs and DEDLs support services to transmit specific requests in relation to DEDL and DTE services.</i>
[DSP-TSR-026]	<i>The Contractor shall allow for non-registered access to some functionalities of DESP Service Desk to facilitate the onboarding of new users.</i>
[DSP-TSR-027]	<i>The Contractor shall guarantee the access to DESP monitoring dashboard from DESP Service Desk.</i>
[DSP-TSR-042]	<i>The Contractor shall make available comprehensive documentation in relation to DestinE and to the DESP Framework to all users.</i>
[DSP-TSR-043]	<i>The Contractor shall ensure the availability of user information web pages with full, accurate, and up-to-date documentation of the platform, including DESP Code of Conduct, Terms and Conditions to access data, user guide for GUI, user guide for API(s), video tutorial, news feed, monitoring and reporting elements highlighting platform performance, and relevant links and reference documentation</i>
[DSP-TSR-044]	<i>The Contractor shall guarantee open access to the information dissemination service.</i>

[DSP-TSR-045]	<i>The Contractor shall ensure the possibility to DESP Registered Services to disseminate documentation and information to the DESP users.</i>
[DSP-TSR-046]	<i>The Contractor shall ensure the operations, maintenance and evolution of an interactive image gallery highlighting and promoting the use of DestinE data.</i>
[DSP-TSR-047]	<i>The Contractor shall ensure the availability of an image gallery service for the publication of DestinE data with accompanying factual and articles, according to topics requested by ESA, or suggested by the service operator and subsequently approved by ESA.</i>
[DSP-TSR-049]	<i>The Contractor shall guarantee the existence of training material associated to each DESP Registered Service in the user information web page.</i>
[DSP-TSR-051]	<i>The Contractor shall regularly collect user feedback and seek for a continuous service improvement</i>
[DSP-TSR-052]	<i>The Contractor shall provide free to the users engineering support service to generate a joint plan with users requesting to onboard services or applications making use of the DESP Framework</i>
[DSP-TSR-055]	<i>The Contractor shall support multi-language web interfaces and documentation</i>

3.1.4.1 F4.1 Access To Web Portal

This function covers the access to the Information Dissemination and Onboarding Support Service, implemented by the Web Portal, without registration and authentication.

3.1.4.2 F4.2 Website Content Search

This function allows users to search for any content published in the DestinE Platform Information Dissemination and Onboarding Support Service (Web Portal), thanks to dedicated filters and search engines.

Included in the documentation published and available via the Web Portal, registered users can find the DestinE Platform Information Model and its relevant Ontology.

3.1.4.3 F4.3 Website Content Management

This function covers the creation and management of digital content within the DestinE Platform Information Dissemination and Onboarding Support Service, covering:

- publication of information concerning DestinE Platform and its Services, including relevant news.
- users' access to the official content such as the "DestinE Platform Code of Conduct", the "DestinE Platform Terms and Conditions" and the "DestinE Platform Privacy Policy".
- knowledge base management enabling users to easily search information (e.g. User Guides).

3.1.4.4 F4.4 Community Feedback Management

This function manages feedback, suggestions (community ideas), and service ratings, ensuring the collection of valuable data to improve services and support. It fosters user interaction and facilitates information sharing via online messages (Forum).

3.1.4.5 F4.5 Issue Tracking And Management

This function covers:

- handling incoming requests. These requests may include technical support issues, questions about products or services, or requests for information or assistance.
- tracking and resolving issues, assigning them to the appropriate staff member, and monitoring their progress until resolution.

A resolution confirmation is automatically sent to the ticket originator, with the option to provide feedback.

3.1.4.6 F4.6 User Feedback Analysis And Reporting

This function covers the collection, analysis and reporting of user's feedback.

In their reply to a ticket resolution confirmation, users will have the choice to express their level of satisfaction of the service. Additionally, a dedicated feedback field will allow users to provide their level of satisfaction on a scale of 1 to 5 and leave suggestions for improvement or other comments relating to each of the services.

Collected feedback will be analysed and will feed the envisaged reports (quarterly/annual). Moreover, such data will be published on the Executive Dashboard in a page accessible to ESA.

3.1.4.7 F4.7 User Training

This function allows users to discover official training content in the form of video tutorials, courses, MOOCs, training plans, and workshops related to the DestinE Platform and its registered services.

Through a dedicated link, Registered Users and Service Providers can access the Training Hub, an external Service dedicated to the creation and management of official and non-official trainings.

3.1.5 F5 Monitoring and Reporting

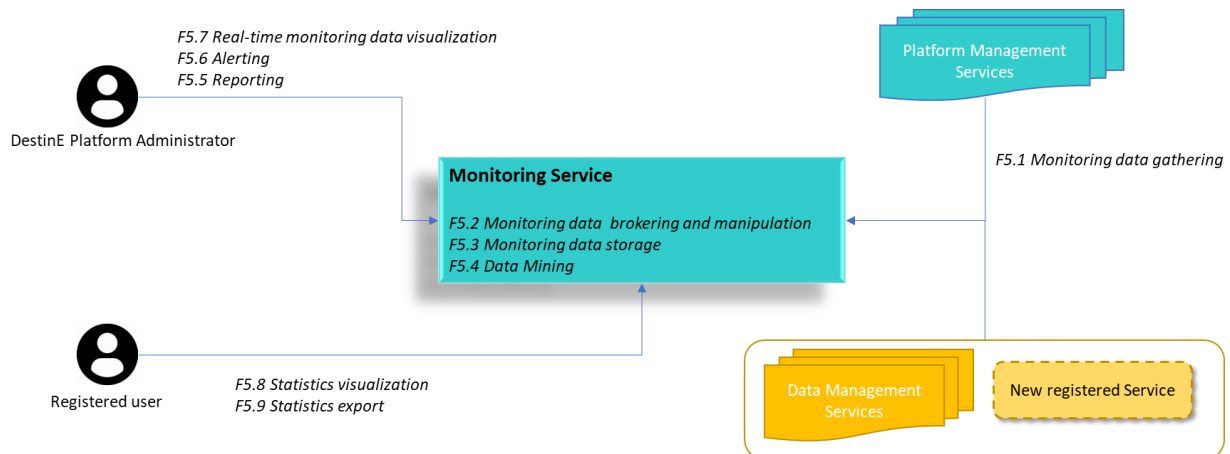


Figure 6: Monitoring and Reporting Functional Area

This functionality covers the following requirements (RD-2):

Requirement ID	Requirement Text
[DSP-TSR-028]	<i>The Contractor shall ensure the capability for user to export information published on the DESP Core Services dashboard to a format suited to the type of exported information (e.g., csv, excel, pdf).</i>
[DSP-TSR-029]	<i>The Contractor shall ensure the operations, maintenance, and evolution of an interactive Executive Dashboard Service highlighting and promoting the DESP Framework.</i>
[DSP-TSR-030]	<i>The Contractor shall ensure the availability of an Executive Dashboard Service configurable to provide selected statistics for public information without access control, and other statistics requiring password protection.</i>
[DSP-TSR-032]	<i>The Contractor shall guarantee that the Executive Dashboard Service presents cumulative and timeline statistics to illustrate the DESP Framework performances, including inter alia:</i> <i>• DESP Framework performance summary (including availability and reliability information)</i> <i>• Number of registered and active users</i> <i>• Number of registered and active services</i>
[DSP-TSR-033]	<i>The Contractor shall guarantee that the Executive Dashboard Service integrates annotations or news to highlight interesting events or anomalies (e.g., new service availability).</i>
[DSP-TSR-034]	<i>The Contractor shall ensure the availability of an API access to the executive dashboard to allow integration to external applications following written authorization from the Agency for the data related to the DESP Framework.</i>

[DSP-TSR-036]	<i>The Contractor shall ensure the availability of an online DESP Core Services operations monitoring dashboard allowing up-to-date real-time monitoring of the service operations status and performance.</i>
[DSP-TSR-037]	<i>The Contractor shall ensure the capability to restrict the access to the DESP Core Services operations monitoring dashboard to the ESA Technical Officer (TO) and individuals authorized by the ESA TO.</i>
[DSP-TSR-038]	<i>The Contractor shall ensure the capability to provide up-to-date access to the records of DESP Core Services operational incidents and anomalies.</i>
[DSP-TSR-039]	<i>The Operations monitoring dashboard shall allow querying the DESP Core Services operational incidents and anomalies, in particular, by occurrence date, severity, duration period, etc.</i>
[DSP-TSR-040]	<i>The operations monitoring dashboard shall provide an up-to-date view of the DESP Core Services operational interfaces, associated configuration, and status (e.g., nominally available, not available, degraded access, performance).</i>
[DSP-TSR-041]	<i>The operations monitoring dashboard shall provide an up-to-date view of the DESP Core Services performances for all services and sub-service, including all the parameters used for calculating service-level KPIs.</i>

3.1.5.1 F5.1 Monitoring Data Gathering

This function collects raw monitoring data from the following sources:

- Cloud Infrastructure
- Service Applications, including Platform Management Services (PMS) and Data Management Services (DMS)

Data collection is performed using two complementary approaches:

- Passive collection, where Service Applications expose raw data in a predefined format
- Active collection, where raw data is retrieved through APIs or dedicated endpoints

3.1.5.2 F5.2 Monitoring Data Brokering And Manipulation

This function encompasses data brokering, collection of gathered information as a message queue, data filtering, and pre-processing before storing the data for reporting purposes in the Real-time Monitoring (Service Operational Monitoring Dashboard) and Long-Term Monitoring (Executive Dashboard).

3.1.5.3 F5.3 Monitoring Data Storage

The purpose of this function is to store the information in suitable datastore structures according to a configurable and maintainable Data Model.

Data storages can be used for different purposes, such as:

- provide a persistent and virtually infinite store of records.
- provide access with minimal delay to the parameters of interest.

3.1.5.4 F5.4 Data Mining

This function retrieves data from archived datastores, aggregates and populates it into a dedicated DWH to reduce the execution time of predefined data mining queries, thereby producing reports. This ensures the availability of statistical data for reporting purposes.

3.1.5.5 F5.5 Reporting

This function implements the handling of statistical data, provided by the mining, to create automatic reporting and service reports.

3.1.5.6 F5.6 Alerting

This function provides feedback to authorized users regarding significant events related to monitored systems.

3.1.5.7 F5.7 Real-Time Monitoring

This function implements the publication and visualisation of metrics, enabling up-to-date real-time monitoring of the status and performance of all Services through the Service Operations Monitoring Dashboard Service. Users can create, explore, and share dashboards via the GUI or API, and export published information in CSV format.

3.1.5.8 F5.8 Statistics Visualization

This function enables unregistered and registered users to visualize statistics exposed by the DestinE Platform public Dashboard.

The Executive Dashboard, accessible to ESA, supports bar-charts, curves, histograms, pie-charts, Gantt Chart tables, textual tables, etc. It will be configurable by filtering the visualized information per mission, unit, or service. It will allow users to select any time range for the retrieved information.

3.1.5.9 F5.9 Statistics Export

This function allows DestinE Platform registered users to export Executive Dashboard statistics in various formats for ad-hoc further analysis.

Selected stakeholders can also export statistics related to Long-Term Monitoring information (data aggregated on a daily basis) via REST APIs provided by the DestinE Platform.

3.1.6 F10 Infrastructure Management

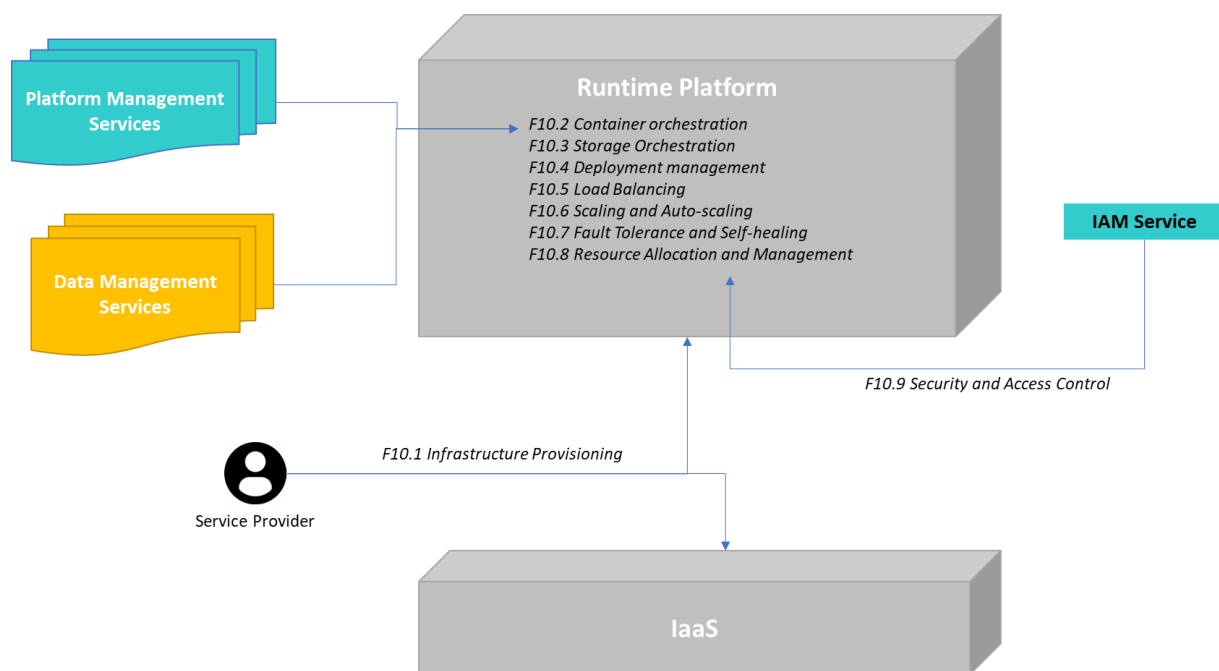


Figure 7: Infrastructure Management Functional Area

This functionality covers the following requirements (RD-2):

Requirement ID	Requirement Text
[DSP-TSR-004]	<i>The Contractor shall operate the DESP Core Services implemented in a public cloud environment accessible through commodity internet without restriction.</i>
[DSP-TSR-101]	<i>The Contractor shall demonstrate a container orchestration workflow for facilitating the integration of registered services.</i>

3.1.6.1 F10.1 Infrastructure Provisioning

This function covers the infrastructure provisioning of:

- the Runtime Platform – integrated with the OVHcloud Infrastructure layer.
- Cloud Services provided by the OVHcloud Infrastructure layer.

Within the Runtime Platform, the Service Provider is responsible for autonomously configuring and managing the following aspects:

- Deployment Management

- Scaling Policies and Management
- Resource Allocation
- Node Pool Sizing and Configuration

Alternatively, these capabilities can be delegated to an external Public Cloud provider located in Europe, upon explicit request by the Service Provider. In such scenario, infrastructure provisioning remains fully under the Service Provider's control. The functionalities described in the following paragraphs exclusively refer to the Runtime Platform and the OVHcloud Infrastructure layer.

3.1.6.2 F10.2 Container Orchestration

This functionality, available by default only within the Runtime Platform, enables automated deployment, management, and scaling of containers across a cluster of machines. It handles the entire container lifecycle, including deployment, scaling, and recovery.

Each Service Provider operates on dedicated node pool(s), which can be dynamically scaled from zero up to a maximum capacity defined by the Service Provider. Node pools may include CPU-based or GPU-based nodes, depending on workload requirements.

3.1.6.3 F10.3 Storage Orchestration

This functionality provides mechanisms to manage storage resources and allocate them to containers within the Runtime Platform. Supported storage types include:

1. Block Storage (Read Write Once)
2. File Storage (Read Write Many)
3. Object Storage (Read Write Many)

3.1.6.4 F10.4 Deployment Management

This functionality supports seamless updates and rollbacks of containerized applications without impacting the overall system availability.

Each Service Provider has access to a dedicated GitLab repository, where all deployment files can be defined and maintained. The entire update and rollback procedure is governed by the DestinE Platform PMS/DMS Integration Procedure Runtime ([RD-7] and [RD-8]), ensuring consistency and compliance with platform standards.

3.1.6.5 F10.5 Load Balancing

This functionality provides mechanisms to distribute incoming traffic across containers delivering a specific service.

At the OVHcloud Infrastructure Layer, load balancing is managed autonomously using the default OVH setup. Within the Runtime Platform, application-level load balancing is provided by default: when an application defines its ingress rules, an automatic URL is generated that points to the platform's load balancer. The appropriate size is selected in collaboration with the Service Provider, based on workload requirements.

Specific Services such as the Web Platform are provisioned with dedicated load balancers, available in multiple sizing options.

3.1.6.6 F10.6 Scaling And Auto-scaling

This functionality enables horizontal scaling by adding or removing container instances based on workload demands. It supports automatic scaling of replicas using metrics such as CPU utilization or custom-defined indicators.

Each Service Provider benefits from two distinct autoscaling mechanisms:

1. Horizontal Pod Autoscaling (HPA) – Provided by default through Kubernetes, allowing pods to scale dynamically based on defined metrics.
2. Node Pool Autoscaling – When the current node capacity prevents adding new pods, node pools can be scaled up or down. Node pools may include CPU or GPU nodes, and scaling can range from zero to a maximum defined by the Service Provider.

Service Providers are responsible for defining their own resource limits and scaling policies, ensuring alignment with workload requirements.

3.1.6.7 F10.7 Fault Tolerance And Self-healing

This functionality monitors the health of containers and nodes within the Runtime Platform, ensuring application availability and resilience.

At container level, Kubernetes provides built-in mechanisms: if a Pod fails, it is automatically restarted or recreated by default. At node level, recovery occurs only when a node is explicitly marked as dead.

All health check and recovery policies are defined during the Runtime Platform configuration phase, allowing Service Providers to tailor behaviour according to their operational requirements.

3.1.6.8 F10.8 Resource Allocation And Management

This functionality allows specifying resource requirements and limits for containers, ensuring optimal allocation within the cluster. It also provides monitoring and metrics for resource utilization to support performance tuning and capacity planning.

All these configurations are fully managed by the Service Provider, who is responsible for defining resource requests, limits, and related policies according to workload requirements.

3.1.6.9 F10.9 Security And Access Control

This functionality enforces security best practices and provides a controlled environment for containerized applications through platform-level policies.

Access control is managed via the Runtime Platform IAM, ensuring that each Service Provider can access only its own services on the Runtime Platform itself. Access to OVHcloud Project is managed via DestinE Platform IAM.

The Runtime Platform also includes a security setup pipeline, which is visible to the Service Provider and performs automated security checks during deployment phase.

These mechanisms guarantee compliance with security standards while maintaining isolation and integrity across multi-tenant environments.

All security related events that may occur on the Runtime platform will be logged, including server start or restart, shutdown and fault.

3.1.7 F11 Service Handling

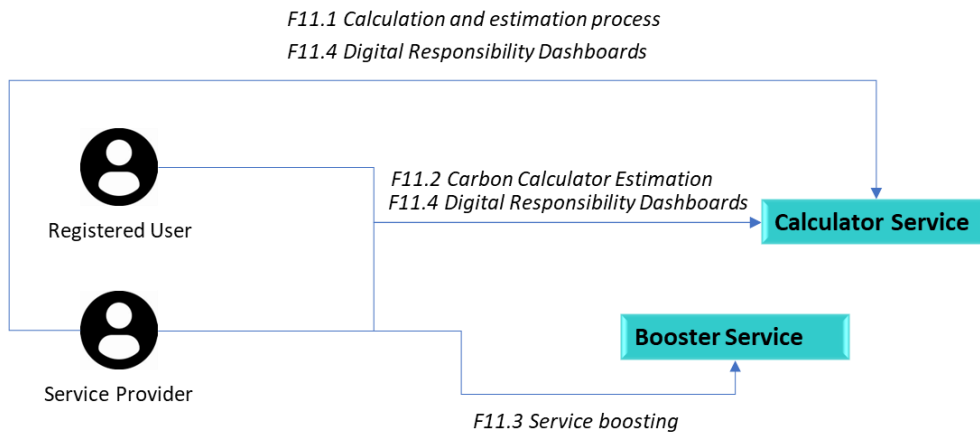


Figure 8: Service Handling Functional Area

Those functionalities are not reported in the original contract. They are requested by further Change Contract Notice (CCN) and are not covered by the original set of requirements.

3.1.7.1 F11.1 Calculation And Estimation Process

This function oversees the estimation of pricing required to host services on the DestinE Platform. It allows Service Providers to select OVHcloud or Runtime Platform resources they intend to use, choose between hourly or monthly billing types, and compute an estimated price for a specific time range.

3.1.7.2 F11.2 Carbon Calculator Estimation

This function enables registered users to estimate their carbon footprint based on their service configuration. It employs decision-tree logic that considers user profiles (e.g., DestinE/ESA versus External Projects) and selected infrastructure tenants. This approach ensures that the generated Bill of Materials reflects the correct pricing model, applying dynamic service fees to base resource costs according to the project's specific eligibility.

3.1.7.3 F11.3 Service Boosting

This function provides eligible DestinE Platform Services with access to additional resources funded by Booster Sponsor Entities (BSEs). Registered Service Providers can receive these temporary resource boosts to their services, enabling them to enhance service performance and improve user experience.

3.1.7.4 F11.4 Digital Responsibility Dashboards

This function provides visibility of the platform's environmental impact through a set of dashboards and a pre-sales simulation capability. At platform level, monthly GHG emissions for DestinE Platform IaaS compute and storage is published, with the possibility to switch between location-based and market-based factors. For Service Providers, the Platform dashboard exposes monthly stacked breakdowns with filters

(Total/Computation/Storage) and views per service and per user per service; each Service Provider also has an individual overview with trend and last-30-days composition visualizations. The pre-sales simulation extends the cost calculator to include GHG estimation, presenting unitary and total impacts alongside the financial estimate and supporting save/export actions.

3.1.8 F12 Data Management Services

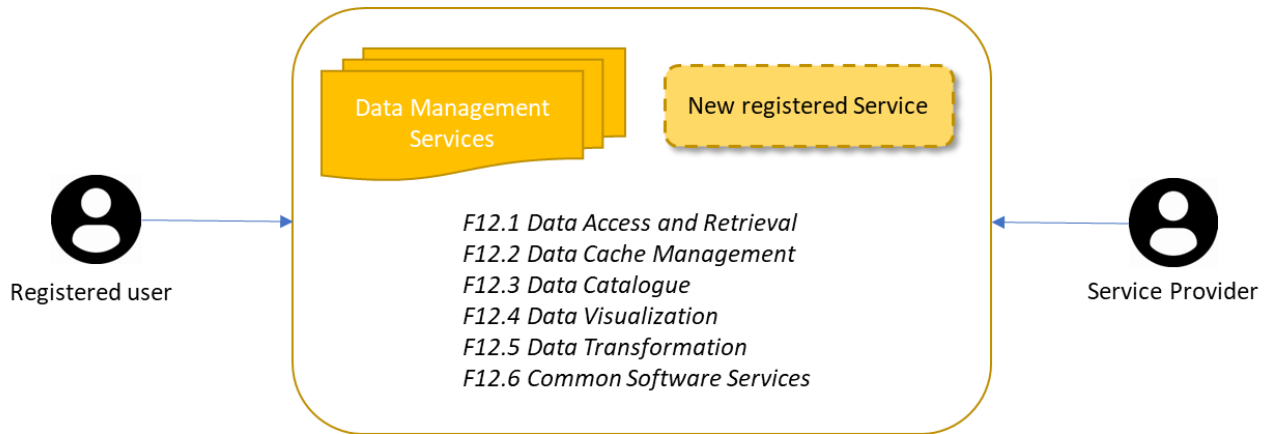


Figure 9: Data Management Services Functional Area

The DestinE Platform supports the onboarding of Data Management Services, which acts as the primary access point to data made available through the DestinE Data Lake. Depending on the services registered and integrated into the platform, the following categories of data may be accessible, among others:

- Satellite-based datasets from federated sources
- Locally Cached data
- Simulation outputs generated by DestinE Digital Twins

The capabilities described in this chapter represent functionalities that may be made available through hosted services integrated into the platform. These are not exhaustive nor guaranteed by default, as the actual feature set depends on the Service Providers and the services they register.

Each Service Provider is responsible for the design and implementation of its respective service capabilities. The platform ensures integration, interoperability, and compliance with overall customer requirements through the Service Registration functionality described in Section 3.1.3.1.

The following Customer Requirements (from [RD-2]) were part of the initial statement of work and have been translated into detailed service requirements in [RD-12]:

Requirement ID	Requirement Text
[DSP-TSR-056]	<i>The Contractor shall ensure the availability of a DESP Data Access Service for discovery, exploitation, and retrieval in compliance with the applicable Contractors Portfolio</i>

[DSP-TSR-057]	<i>The Contractor shall ensure the availability of any DEDL dataset and User Data through DESP Data Access Service.</i>
[DSP-TSR-058]	<i>The Contractor shall ensure the availability of a generic DESP Data Access Service inventory allowing referencing, querying and retrieval of User Data from external sources (DEDL, Copernicus) and through a wide range of interfaces and protocols.</i>
[DSP-TSR-061]	<i>The Contractor shall ensure the capability of performing data access to geographical subsets</i>
[DSP-TSR-062]	<i>The Contractor shall ensure the availability of a GUI that allows to inspect the available data and, in particular, to issue direct queries to extract subsets of data</i>
[DSP-TSR-064]	<i>The Contractor shall ensure efficient and direct access to data for exploitation including S3-like and NFS-like access as appropriate.</i>
[DSP-TSR-066]	<i>The Contractor shall extract or derive all the necessary metadata and browse information from the ingested User Data for cataloguing and allowing data retrieval.</i>
[DSP-TSR-071]	<i>The Contractor shall ensure that the DESP Data Access Service makes use of the Data Cache Management Service to pre-fetch highly used User Data as soon as available from DEDL or external sources.</i>
[DSP-TSR-072]	<i>The Contractor shall ensure the availability of a Data Cache Management Service to support optimized data access.</i>
[DSP-TSR-073]	<i>The Data Cache Management Service shall only be accessible to Registered Services</i>
[DSP-TSR-074]	<i>The Contractor shall ensure that the Data Cache Management Service offers the possibility of providing data analytics to evaluate the usage of stored data.</i>

[DSP-TSR-075]	<i>The Contractor shall ensure that the Data Cache Management Service offers the possibility to dynamically configure the cache strategy.</i>
[DSP-TSR-076]	<i>The Contractor shall ensure the availability of a Data Catalogue Service open to all potential users that reference at least all datasets described in [AD-DDL-DP] and all datasets available in the Copernicus Data Access.</i>
[DSP-TSR-077]	<i>The Contractor shall define a DESP Framework metadata approach that supports DESP Core Services data flows.</i>
[DSP-TSR-079]	<i>The Contractor shall explicitly include in the Data Catalogue, if the information is available, the software origin of the User Data.</i>
[DSP-TSR-080]	<i>The Contractor shall include, for each User Data, if available, a link to the configuration of the production including potentially source code, environment, software versions, etc.</i>
[DSP-TSR-081]	<i>The Contractor shall ensure the availability of highly performant data discovery interfaces that facilitate the creation of specialized Data Catalogues services for query and retrieval of the User Data.</i>
[DSP-TSR-086]	<i>The Contractor shall ensure the availability of a DESP Visualization Service that allows users to visualize DESP Core Services Datasets and User Data.</i>
[DSP-TSR-087]	<i>The Contractor shall ensure the availability of an interactive and immersive DESP Visualization Service for 2-D, 3-D, 4D (e.g. time series) User Data.</i>
[DSP-TSR-090]	<i>The Contractor shall allow users to create, export and receive visualization results.</i>
[DSP-TSR-091]	<i>The Contractor shall include the implementation of a visualization use case, based on Digital Twins</i>

	<i>data, attractive, and open to all non-registered users.</i>
<i>[DSP-TSR-092]</i>	<i>The Contractor shall ensure the capability of data extraction at User Data retrieval time.</i>
<i>[DSP-TSR-093]</i>	<i>The Contractor shall ensure the capability of performing geographical subsets at data retrieval time.</i>
<i>[DSP-TSR-094]</i>	<i>The Contractor shall ensure the capability of data repackaging and reformatting at data retrieval time (e.g. format conversion to Cloud optimized GeoTIFF, NetCDF, Zarr, ...),</i>
<i>[DSP-TSR-095]</i>	<i>The Contractor shall provide a generic DESP Data Transformation Service allowing local processing through a Platform as a Service paradigm.</i>
<i>[DSP-TSR-096]</i>	<i>The Contractor shall guarantee the existence of basic interactive coding services such as Jupyter LAB and Jupyter and Beaker Notebook extensions.</i>
<i>[DSP-TSR-097]</i>	<i>The Contractor shall make available a standard DESP Core Services software stack, including commonly used Python libraries (e.g., Xarray, PyTorch, and Tensorflow) together with examples of usage in relation to DESP Core Services APIs.</i>
<i>[DSP-TSR-099]</i>	<i>The Contractor shall implement a custom software stack service allowing users to install and configure their own development environment to exploit the DESP Core Services.</i>
<i>[DSP-TSR-100]</i>	<i>The Contractor shall ensure that all coding and development environments can flexibly be deployed on different backends, to support CPU and GPU data processing.</i>

3.1.8.1 F12.1 Data Access And Retrieval

This functionality enables users to discover, access, and explore datasets from both internal and federated sources through unified and interoperable interfaces. It supports spatial filtering, data inspection, and integrity verification, ensuring consistent and efficient access to distributed resources across the platform.

3.1.8.2 F12.2 Data Cache Management

This functionality ensures optimized data access by providing a dedicated caching service available only to registered services to optimize access to frequently used data. It includes capabilities for dynamic cache strategy configuration and offers analytics to monitor and evaluate the usage of stored data.

3.1.8.3 F12.3 Data Catalogue

This functionality enables users to explore and access services and datasets available on the DestinE Platform. It provides comprehensive metadata to support resource discovery, including provenance, quality, and configuration details. The system facilitates efficient querying and retrieval of resources through dedicated interfaces, ensuring interoperability and scalability across federated data sources.

3.1.8.4 F12.4 Data Visualization

This functionality allows users to interactively explore datasets and service outputs in 2D, 3D, and 4D formats, including time series and geospatial layers. It supports immersive experiences across devices and browsers, enabling users to generate, export, and share visual outputs.

3.1.8.5 F12.5 Data Transformation

The Data Transformation functionality enables users to process datasets at retrieval time by extracting relevant data, applying geographic sub setting, and converting formats to cloud-optimized structures. It also provides a generic transformation service that supports local data processing, facilitating flexible and efficient data manipulation within user workflows.

3.1.8.6 F12.6 Common Software Services

The Common Software Services functionality provides users with interactive development environments and preconfigured software stacks to support coding, testing, and integration with DestinE Platform Core Services. It includes standard libraries, notebook interfaces, and tools for customizing execution environments, enabling flexible and scalable user workflows across different platforms and cloud infrastructures.

3.2 Non-Functional Requirements

This section describes the quality attributes and operational constraints that the system must meet, grouped by category. These requirements influence architectural decisions, implementation strategies, and validation criteria.

In addition to guiding system-level design, these non-functional requirements have been translated into detailed service-level specifications contained in [RD-12], ensuring that hosted services comply with the same quality standards and operational constraints defined for the platform.

Service level agreements and KPIs applicable to the DestinE Platform are provided in [RD-16].

3.2.1 Performance & Scalability

Requirement ID	Requirement Text
[DSP-TSR-006]	<i>The Contractor shall ensure that in case the volume of users requesting any service exceeds the service capacities agreed in the [DSP-PDM-</i>

	<i>CM], the service remains available to all users, with a degraded performance if needed.</i>
<i>[DSP-TSR-069]</i>	<i>The Contractor shall ensure that the DESP Data Workflow Services performance guarantees the maximum performance provided by the external input interface delivery points</i>
<i>[DSP-TSR-070]</i>	<i>The Contractor shall ensure that the data gathering operations are scalable to cope with potential variations in the input data volumes</i>
<i>[DSP-TSR-089]</i>	<i>The Contractor shall ensure that the performance of the visualization services is consistent with user expectations for an interactive display.</i>

3.2.2 Availability, Reliability & Service Continuity

Requirement ID	Requirement Text
<i>[DSP-TSR-016]</i>	<i>The Contractor shall ensure the availability of a Service Desk that operates during NWD and NWH.</i>
<i>[DSP-TSR-017]</i>	<i>The Contractor shall ensure the availability of a Service Desk that acknowledges all user inquiries within 0,5 NWD. In case an investigation is needed, the user shall be informed of the likely time to fully respond and kept up to date with the investigation at least once per week.</i>
<i>[DSP-TSR-018]</i>	<i>The Contractor shall ensure the availability of a Service Desk that will ensure a timely management of the user queries with a nominal query resolution time of 5 NWD.</i>
<i>[DSP-TSR-103]</i>	<i>The Contractor shall ensure that all preventive maintenance activities are performed without any interruption of the DESP Framework.</i>
<i>[DSP-TSR-105]</i>	<i>The Contractor shall notify and manage DESP Framework operations anomalies (including those anomalies caused by external services) based on the Anomaly Management Procedures defined by the Contractor (see [DSP-SOW]).</i>

[DSP-TSR-107]	<i>The Contractor shall report, via the monitoring dashboard, any service unavailability and subsequent service resumption within 30 minutes of the start/end of the unavailability</i>
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3.2.3 Compliance & Access Control

Requirement ID	Requirement Text
[DSP-TSR-005]	<i>The Contractor shall publish DESP Core Services using the destine.eu domain</i>
[DSP-TSR-009]	<i>The Contractor shall consider the usage of the European electronic identification and trust services (eIDAS)</i>
[DSP-TSR-011]	<i>The Contractor shall provide requested support to ECMWF's DTE and EUMETSAT's DEDL teams for the integration of DESP IAM service interface.</i>
[DSP-TSR-031]	<i>The Contractor shall allow ESA to regularly evaluate the type of information shared with and without access control.</i>
[DSP-TSR-111]	<i>The Contractor shall publish the DESP Framework Annual Report only with prior written authorization from ESA Technical Officer.</i>

3.2.4 Usability

Requirement ID	Requirement Text
[DSP-TSR-055]	<i>The Contractor shall support multi-language web interfaces and documentation</i>
[DSP-TSR-088]	<i>The Contractor shall ensure that the visualization services are supported in all common web browsers and mobile platforms.</i>
[DSP-TSR-098]	<i>The Contractor should consider the inclusion of Rand Julia libraries and functionalities.</i>

3.2.5 Maintainability, Evolvability & Change Management

Requirement ID	Requirement Text
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[DSP-TSR-102]	<i>The Contractor shall define, document and release to ESA a DESP Framework Maintenance Plan covering all activities under the Contractors responsibility for the maintenance into operational conditions of the DESP Framework.</i>
[DSP-TSR-106]	<i>The Contractor shall publish information to the users about interfaces or functional evolutions leading to backward incompatibility with at least 6 months pre-notice.</i>
[DSP-TSR-050]	<i>The Contractor shall participate to Yearly User Open Reviews organized by ESA, distinct from the Yearly Service Review, where evolutions, achievements, actions, and consolidated feedback shall be presented and discussed, to help derive a consolidated roadmap for the following period.</i>
[DSP-TSR-104]	<i>The Contractor shall define, document and release to ESA the DESP Framework Contingency Management Plan covering all activities under the Contractors responsibility for the management of anomalies including any dependency caused by external services and impacting the operational conditions of the DESP Framework.</i>

3.2.6 Documentation

Requirement ID	Requirement Text
[DSP-TSR-002]	<i>The Contractor shall aggregate the list of DESP Core Services based on the following table: [see table]</i>
[DSP-TSR-003]	<i>As part of the [DSP-PDM-SDP] and of the [DSP-USR-SDP], the Contractor shall provide a coherent description of the service class including all services part of the class and highlighting commonalities and specificities</i>
[DSP-TSR-108]	<i>The Contractor shall provide an exhaustive Annual Report ([DSP-PDM-AR]) presenting the performance of the system and highlighting trends in the overall DESP Framework uptake</i>

[DSP-TSR-109]	<i>The Contractor shall include the provision of dynamically updated heat maps illustrating the main parameters (e.g., usage of services, access and download of data per user profile, etc.).</i>
[DSP-TSR-110]	<i>The Contractor shall deliver to ESA Technical Officer a preliminary version of the Annual Report on a quarterly basis.</i>
[DSP-TSR-112]	<i>The measurement data may be delivered as database dump or export and shall be accompanied by all relevant documentation necessary to retrieve and understand the full semantic of all data fields.</i>
[DSP-TSR-116]	<i>The Contractor shall create and regularly update DESP's interface control document [DSP-PDM-ICD]</i>
[DSP-TSR-078]	<i>The Contractor shall ensure that the DESP Framework metadata approach supports the documentation of processes related to data quality and uncertainty quantification.</i>

3.2.7 Interoperability & Quality

Requirement ID	Requirement Text
[DSP-TSR-059]	<i>The Contractor shall adhere to common standards that ensure interoperability of the DESP Data Access Service with other communities and infrastructures (e.g., Copernicus Data Access, OGC, the European Data Portal, INSPIRE infrastructures, and GEOSS).</i>
[DSP-TSR-060]	<i>The Contractor shall ensure the availability of the DESP Data Access service through fully documented APIs.</i>

3.2.8 Community, Dissemination & Training

Requirement ID	Requirement Text
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[DSP-TSR-048]	<i>The Contractor shall ensure the availability of image gallery service that publishes at least one DestinE story highlight every two weeks.</i>
[DSP-TSR-051]	<i>The Contractor shall regularly collect user feedback and seek for a continuous service improvement</i>
[DSP-TSR-052]	<i>The Contractor shall provide free to the users engineering support service to generate a joint plan with users requesting to onboard services or applications making use of the DESP Framework.</i>
[DSP-TSR-053]	<i>The Contractor shall foresee and prepare regular training sessions (at least 4 times per year) for selected user categories.</i>
[DSP-TSR-054]	<i>The Contractor shall document and publish on its website an annual report analyzing the attractiveness of DESP for users and external stakeholders</i>

3.2.9 Economics & Cost Model Constraints

Requirement ID	Requirement Text
[DSP-TSR-068]	<i>The Contractor shall ensure that the DESP Data Access Service Cost Model is independent of the number of input interface delivery points for data collection (e.g., it is not considered a key characteristic of the Service Usage Profile).</i>

3.2.10 Verification & Validation (V&V) / Testability

Requirement ID	Requirement Text
[DSP-TSR-117]	<i>The Contractor shall contribute to the definition of DESP testing and verification procedures, accompanied by the regular update of the document [DSP-PDM- VP].</i>
[DSP-TSR-118]	<i>The Contractor shall guarantee DESP operability by implementing test addressing all DESP functionalities (including environments, services, and interfaces).</i>

<i>[DSP-TSR-120]</i>	<i>The Contractor shall support DestinE system testing and validation, [DSP- TSR-121]</i>
<i>[DSP-TSR-122]</i>	<i>The Contractor shall report on DestinE system test procedures, implementation, and anomalies through a commonly used anomaly management tool (e.g., Jira).</i>

These requirements are realized through the V&V activities described in [RD-15], which provides V&V Strategy & Acceptance Criteria.

4. Overall architecture

DestinE Platform supports an open ecosystem of services for DestinE data exploitation and information sharing, including the provision of **Core Services** for the benefit of the DestinE users and Third-Party entities.

The conceptual model of a Service, together with its properties and relations to other platform entities, is formalised by the *desp:Service* class of the DestinE Platform Ontology [RD-28], which provides the authoritative semantic definition of all platform resources, services, and entities. This class specialises *dcat:DataService* in accordance with DCAT-AP 3.0 [RD-27], the European DCAT Application Profile for data portals, thereby inheriting its standard semantics for data service description.

Services are conceptually grouped into two categories according to their role in the ecosystem:

- **Platform Management Services (PMS):** trusted, unique entities within the ecosystem that establish trust among participants and act as pillars of the platform set-up.
- **Data Management Services (DMS):** services allowing consumers to access data and applications. Their access is protected; they are driven by user demand and leverage the platform's scalability and elasticity.

This document focuses on Platform Management Services, which enable other services to integrate with the platform.

This decomposition is represented in the Block Definition Diagram in the following figure.

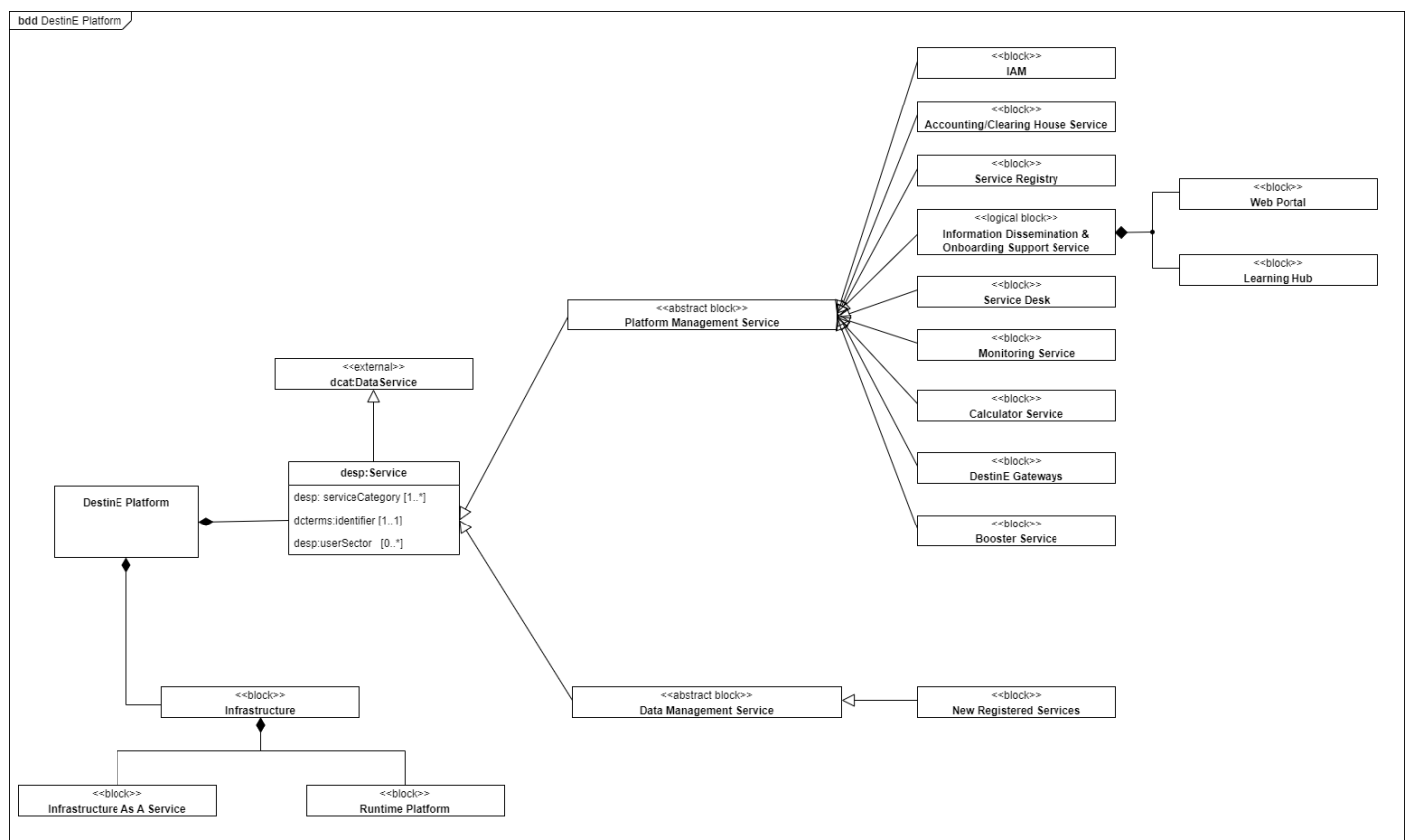


Figure 10: DestinE Platform Block Definition Diagram

This diagram represents the DestinE Platform as composed of an infrastructure and a set of *Services*. The abstract *Service* block corresponds to the `desp:Service` class, which defines common properties and behaviours shared by all services in the platform; the concrete service blocks shown in the diagram represent instances of `desp:Service` in the current platform deployment. Both PMS and DMS categories are conceptual types, not physical components, and serve as an abstraction that groups multiple concrete services within the ecosystem.

Information Dissemination & Onboarding Support Service is represented as a logical block and is not a deployable component. It serves as a grouping of functionalities and processes aimed at user information sharing and service onboarding.

In following Section 4.1, a high-level description of DestinE Platform System elements is provided.

4.1 DestinE Platform Elements

4.1.1 Platform Management Services

The DestinE Platform elements implementing the functions described in Section 3.1 are the Platform Management Services.

These, described in the following paragraphs, are:

- Identity and Access Management (IAM) Service
- Accounting & Clearing House Service
- Service Registry
- Information Dissemination & Onboarding Support Service
- Service Desk
- Monitoring Service
- Calculator Service
- Booster Service
- DestinE Gateways

4.1.1.1 IAM Service

The *Identity and Access Management (IAM) Service* is the unified DestinE Platform user management service, controlling and granting access to all authorised registered Services based on the same digital identity.

It provides the means of authenticating end-users and authorizing their access to resources depending on the specific resource and access privileges.

The IAM Service provides also means for other Entities and Ecosystems to federate with DestinE Platform, leveraging standard protocols like SAML and OpenID Connect.

Tenancy Management Component

Tenancy Management Component is a section of the User Profile management web application provided by the IAM Service.

This component provides graphical user interface to support Tenancy scenarios which include:

- Tenancy Management
- Project Management
- Consumptions Tracking
- Resource Discovery and Allocation

Among these scenarios, the Resource Registry enables Service Providers to publish the Tenancy Resources they offer and allows Tenancy/Project Admins to discover, select and allocate them to their Projects, while keeping track of the Resources already allocated. The Resource Registry builds upon the Service Registry, which holds the published Tenancy Resources (see Section 4.1.1.3).

4.1.1.2 Accounting & Clearing House

The Accounting & Clearing House collects and stores all the transactions executed by DestinE Platform Services. It tracks information about service consumptions by platform users.

From the Accounting & Clearing House perspective, a Service is composed of one or more Transactions. Each Transaction describes an allocated Service Resource that may trigger Consumptions by authorised Users. Specifically, an Accounting Transaction describes the characteristics of a Service functionality wrapped as a Tenancy Resource, enabling the Service App to log related Consumptions.

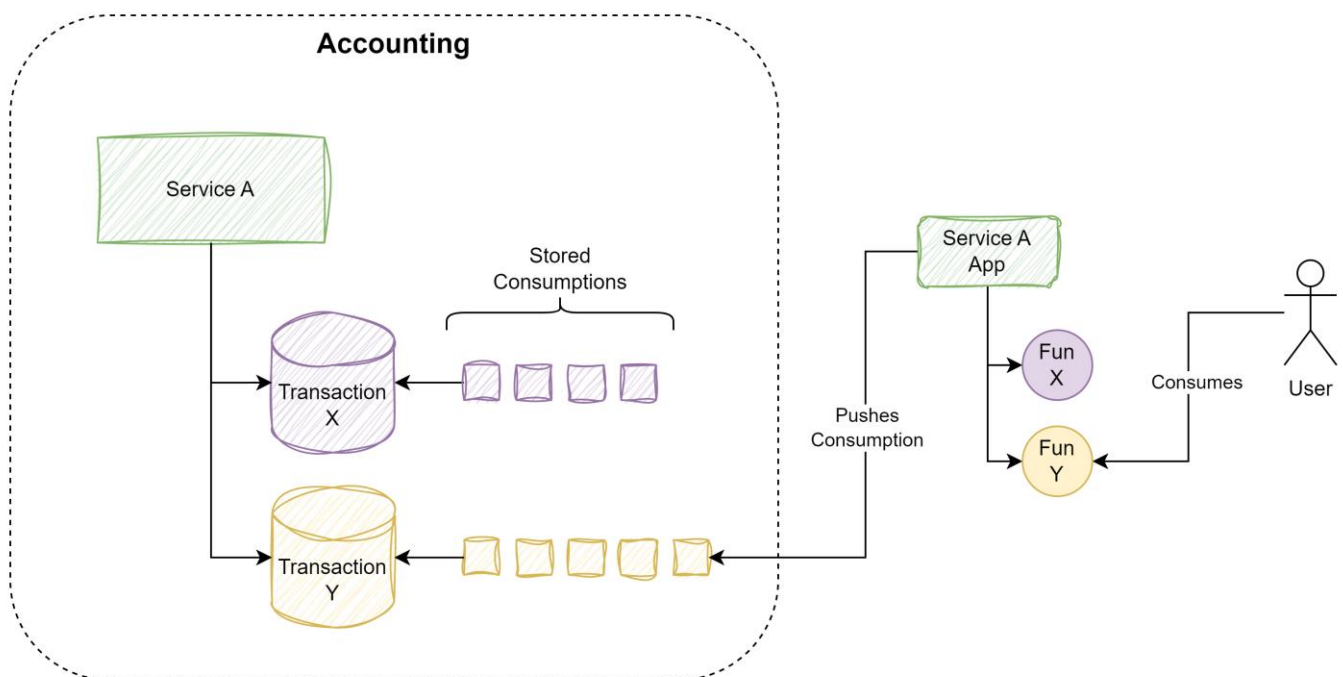


Figure 11: Accounting & Clearing House

4.1.1.3 Service Registry

The *Service Registry* component maintains a catalogue of all services integrated within the DestinE Platform, including Core Services delivered under this contract, onboarded services, DEDL Services operated by EUMETSAT, and DT Services operated by ECMWF.

It maintains a searchable database of all the available services and data portfolio, consistent with the DestinE Platform Service Catalogue.

The Service Registry leverages a maintainable and extensible data model defined in [RD-19], which specifies the structural representation of service metadata and related artefacts, together with the operational scenarios supporting long term evolution and interoperability.

As part of the Service Onboarding detailed in [RD-5], information and metadata of new Services are registered in the Service Registry according to this Data Model and made available to DestinE users.

In addition to Services, the Service Registry stores the Tenancy Resources made available within the DestinE Platform. Service Providers publish their Tenancy Resources as Resource Offers, which are registered into the Service Registry by DestinE Platform Administrators and thereby become discoverable for allocation to Tenancy Projects. Their discovery, selection and allocation are operated through the Resource Registry sub-component of the Tenancy Management Component (see Section 4.1.1.1), for which the Service Registry acts as the underlying catalogue. The Tenancy Resources management is further detailed in [RD-13].

4.1.1.4 Information Dissemination & Onboarding Support Service

The *Information Dissemination & Onboarding Support Service* is a logical grouping of functionalities and processes aimed at providing information, supporting user onboarding, and fostering community engagement.

It is implemented through:

- The Web Portal component, which delivers the technical capabilities for information dissemination and community interaction.
- The Learning Hub component, which provides centralised access to training resources and educational material for DestinE Platform Registered Users.
- Human onboarding activities, performed by User Community Team to assist users in registering services within the platform.
- User Engagement Material, supporting structured communication and engagement activities with users and stakeholders.

Web Portal

The *Web Portal* provides the main entry point for users to access information, documentation, and community features of the DestinE Platform. It includes:

- A web presence layer (website, knowledge base, technical documentation, news).
- Community engagement features (feedback, suggestions, service ratings).
- Access to official policies and guidelines (Code of Conduct, Terms and Conditions, Privacy Policy).

The Web Portal also provides a link to the Learning Hub for training resources.

Learning Hub

The *Learning Hub* is an independent service acting as the central gateway for knowledge sharing and training within the DestinE Platform ecosystem.

It provides users with an intuitive interface to access official and community-driven educational resources, such as documents, articles, FAQs, video tutorials, and webinars. Its primary goal is to enhance user skills and understanding of the platform's services and data, while fostering community engagement.

The Learning Hub is accessible via a link from the Web Portal and allows users to easily discover and follow courses, training plans, and workshops, ensuring flexible and accessible learning opportunities for diverse user groups.

Details about Learning Hub design are provided in [RD-18].

4.1.1.5 Service Desk

The *Service Desk* enables users to interact with the DestinE Platform and Community by submitting issues, support requests, and information requests. It manages the relevant ticketing system and oversees user feedback analysis and reporting.

In addition to the technical capabilities, the Service Desk includes human-operated support activities carried out by the User Support Team, ensuring effective handling of user interactions and operational incidents.

Among the submitted User Requests, the Service Desk also handles onboarding requests, for which dedicated and specialised support is provided to Service Providers to ensure a smooth and compliant integration process.

The Service Desk additionally manages interactions with DestinE elements and third-party application services during anomaly and maintenance management. The User Support Team raises internal tickets for specific issues, such as detected system anomalies or faults, and for documenting and processing suggestions for workflow or process improvements.

Details about how Service Desk handles anomalies, issues and User request related to the DestinE Platform Services are provided in [RD-6].

4.1.1.6 Monitoring Service

The *Monitoring Service* provides end-to-end visibility, reporting and alerting across DestinE Platform Components and Registered Services, collecting and integrating data such as Service Availability, Service Reliability, User Satisfaction, Active Users and other relevant events or metrics related to all Services within the Platform. All the Platform Management Services and the New Registered Services must integrate with the Monitoring Service within the Platform context following the procedure described in [RD-17].

It implements Monitoring & Reporting capabilities and operates within the Runtime Platform.

Monitoring Service outputs power three dashboards: DestinE Platform Dashboard (public platform-level usage), Executive Dashboard Service (aggregated long-term analytics for authorized stakeholders), and

Service Operations Monitoring Dashboard Service (real-time operational monitoring for Service Administrators and ESA Technical Officer).

Monitoring Service also exposes Long-Term Monitoring data on a set of dedicated APIs, accessible by selected stakeholders.

Details about Monitoring Service design are provided in [RD-14].

DestinE Platform Dashboard

The *DestinE Platform Dashboard* provides live information on key metrics regarding platform usage, such as the total number of registered users, trends by user profile, registered users by country, monthly active users per service, the number of tasks in the public roadmap for each phase, and the total number of services. This page is public and accessible to anyone visiting the platform via the Web Portal.

Executive Dashboard Service

The *Executive Dashboard Service* provides detailed live information about the DestinE Platform usage, performance and status as well as relevant statistics coming from the platform registered Services.

Pages of the executive dashboard present a set of dedicated statistic panels designed to match reporting needs and will be accessible to the authorized users (ESA, EC) to support strategic decision-making on the DestinE Platform.

Service Operations Monitoring Dashboard Service

The *Service Operations Monitoring Dashboard Service* allows real-time monitoring of DestinE Platform operations and performance, supporting the Operations team's daily activities and enabling instant anomaly detection. Access is restricted to Serco (as DestinE Platform Administrator and Operations Managers) and the ESA Technical Officer (including individuals authorised by the ESA Technical Officer).

All the Events are delivered by parsing relevant logs and system metrics useful for operations.

4.1.1.7 Calculator Service

The *Calculator Service* is a Platform Management Service integrated within the Runtime Platform, providing an online tool and a machine-to-machine API for registered Service Providers to estimate the costs of OVH Public Cloud services.

It retrieves current price information from OVHcloud pricing interfaces, produces monthly and hourly cost estimations based on user selections, and supports saving and exporting estimates to the user account.

The service exposes a landing page for user-type and infrastructure pre-selection. Its back-end implements a configurable pricing engine that applies variable multipliers (OVH and Runtime fees) to raw OVHcloud data. These fee modifiers are managed via external configuration, allowing updates to business rules without code changes.

In addition to cost estimation, the Calculator Service computes environmental impact for selected configurations, presenting unitary and total GHG emissions alongside the financial estimate. The service supports inclusion of the environmental impact in the product basket, displays the overall impact after configuration, and enables saving and exporting of both financial and environmental estimations.

Details about Calculator Service design are provided in [RD-11].

4.1.1.8 Booster Service

The *Booster Service* is a Platform Management Service integrated within the DestinE Runtime Platform. It provides a managed, policy-driven broker that temporarily augments the capacity of selected DestinE Registered Services through resource boosts sponsored by Booster Sponsor Entities (BSEs).

Eligible services may benefit from resource boosts through a formal request process: the Registered Service Provider identifies requirements via the Calculator Service, while the Booster Sponsor Entity manages the funding request and documentation via the DestinE Platform Service Desk. The Service Desk and DestinE Platform Team facilitate the approval, signing of Work Orders, and subsequent resource provisioning.

Details about the Booster Service design are provided in [RD-10].

4.1.1.9 DestinE Gateways

The *DestinE Gateways* are Platform Management Services acting as the main entry point for DestinE user requests towards OVHcloud Services and/or specific Data Management Services API. It performs advanced proxy functions combined with identity verification and quota enforcement. Specifically, the Gateways:

- Authenticate and validate user identity, leveraging the IAM Service.
- Check consumptions quotas to ensure compliance with platform policies.
- Mediate interactions with OVHcloud services or specific Data Management Services API by using its own dedicated service account.
- Route and process requests securely, applying centralized controls for resource usage and access.

The primary purpose of this component is to enable DestinE users to access OVHcloud Services and specific Data Management Services APIs in a secure and controlled manner. Its introduction is justified by the need to meet non-functional requirements critical for platform reliability and compliance, such as security and isolation.

4.1.2 New registered Services

Within the DestinE Platform, a New Registered Service is a specific function operated by a Service Provider based on a service-level agreement.

A DestinE Platform New Registered Service is listed in the Service Registry, and available with open access to registered users. Each registered Service providing data access, information, or software should state the applicable access conditions and licenses and required registered Users acceptance.

External service providers, data providers and infrastructure providers can grow and expand the DestinE Platform offering by registering their own data and services on the platform or by offering their infrastructural resources to host the Services.

From a design perspective, a new registered service should adhere to the following principles:

- NRSD#1: It should follow the FAIR (Findability, Accessibility, Interoperability, Reuse) principles for scientific data management.

- NRSD#2: It should foster interaction and collaboration amongst the user community by providing dedicated collaborative interfaces and frameworks.
- NRSD#3: It should enable seamless access to a complete suite of services, which shall serve expert development activities while allowing discovery of the Earth system and interaction with its representation by the general public.
- NRSD#4: It could enable smooth integration of resources not funded by DestinE but that provide operational continuity and create a seamless scalability for registered user operations.

As a minimum, a new registered service should be:

- Registered on the Service Registry.
- Integrated with the IAM Service.

4.1.3 Infrastructure elements

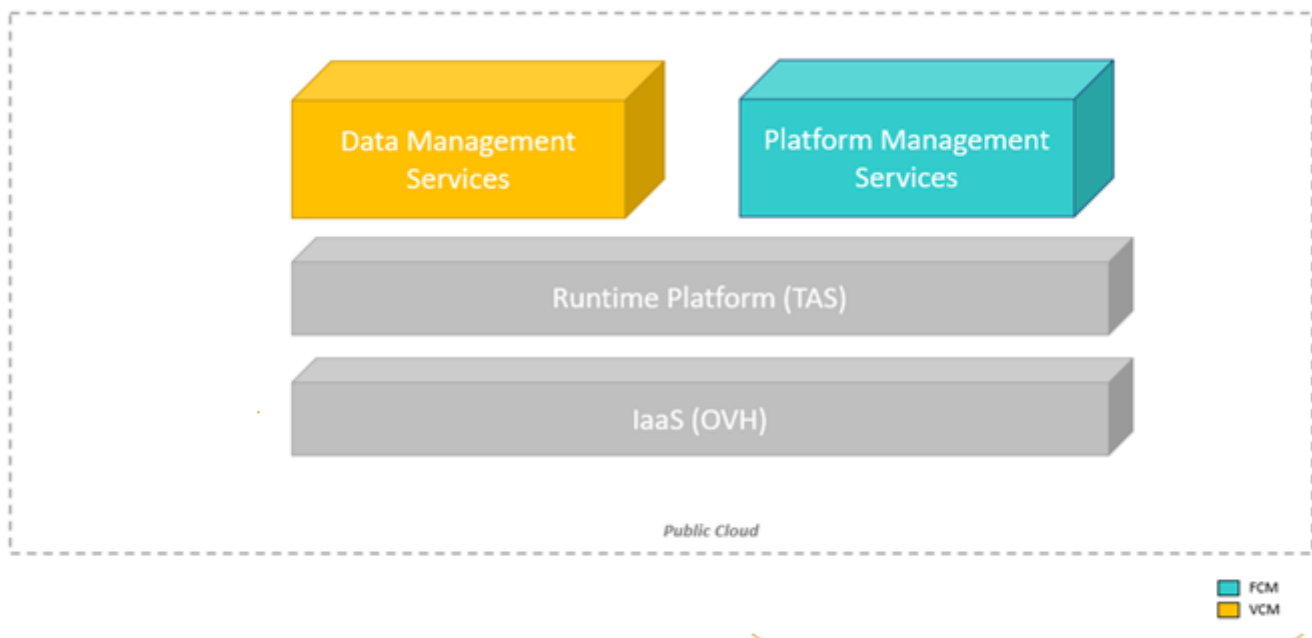


Figure 12: Deployment model of DestinE Platform System elements

The DestinE Platform also allows Service Providers to host their services on the Runtime Platform, on the OVHcloud Infrastructure or on a custom Public Cloud provider infrastructure. The last hosting model is out of scope for this document, as it is fully managed by the Service Provider who is responsible for the provisioning, configuration, and operation of the chosen infrastructure, without relying on the orchestration or management capabilities of the Runtime Platform.

4.1.3.1 Infrastructure as a Service (IaaS)

The DestinE Platform is hosted on the infrastructure provided by OVHcloud. This infrastructure is composed of several Kubernetes clusters managed by TAS and hosted on VMs in OVHcloud (OpenStack-based).

4.1.3.2 Runtime Platform (PaaS and CaaS)

The DestinE Platform *Runtime Platform*, built by Thales Alenia Space, is a common layer for the deployment and operation of most of the DestinE Platform services.

The Runtime Platform integrates the following components:

- The cloud infrastructure layer provided by OVH;
- The Virtual Machines built on top of the cloud infrastructure using TAS provided secured operating System;
- The Orchestration platform (Kubernetes-based CaaS) provided by TAS. Containers are the infrastructure core building block on which the exposed services physically reside, in which one or more applications may be run;
- The Orchestration support services provided by TAS.

On the Runtime Platform, the Platform Management Services will provide the needed functions to enable Data Management Services to perform their own functions.

The Platform Management Services integrated in the runtime platform are:

- Identity and Access Management Service (IAM)
- Accounting & Clearing House Service
- Service Registry
- Web Portal
- Learning Hub
- Monitoring Service
- Calculator Service
- Booster Service
- DestinE Gateways

The Runtime Platform ensures automation relevant to the configuration, coordination, and management of computing resources and applications. The Orchestrator distributes containers across the Compute, Storage, and Network layers, providing each container with the necessary resources. The Orchestration Platform may also leverage other infrastructure providers, such as DEDL computing services, HPC providers, or other cloud providers aiming to federate with the DestinE Platform.

The Runtime Platform provides two distinct operational contexts: Staging (pre-production) and Production. The Staging environment closely mirrors the Production environment in terms of infrastructure, configuration, and software components, and is used for testing and validation of new Services or updates prior to operational release. The Production environment is where Services are executed and made available to end-users.

To support software deployment and verification and validation activities within Staging environment, three functional sub-environments are defined:

- **Development (DEV):** Used by Service Providers after delivering a Service version to test integration with Runtime components and to run security pipeline.
- **Integration (IVV / SANDBOX):** Dedicated to system-level integration testing and IVV for functional and quality verification, used by Platform Management Services.
- **End-to-End (E2E):** Closely mimics Production; verification activities on Data Management Services and New Registered Services are performed in a fully representative environment, using real-world data and E2E scenarios. This ensures smooth transition to Production and prevents unforeseen issues.

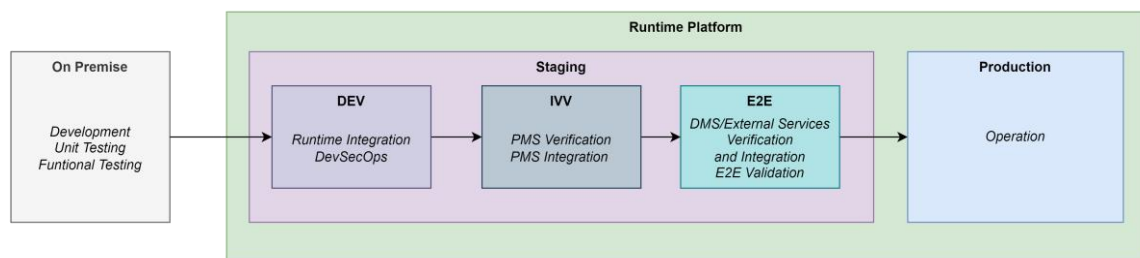


Figure 13: Runtime Platform Environments

The following diagram illustrates the deployment architecture of the Production environment within the OVHcloud infrastructure. It highlights the main components and provides a clear view of how services and dependencies are organized across projects.

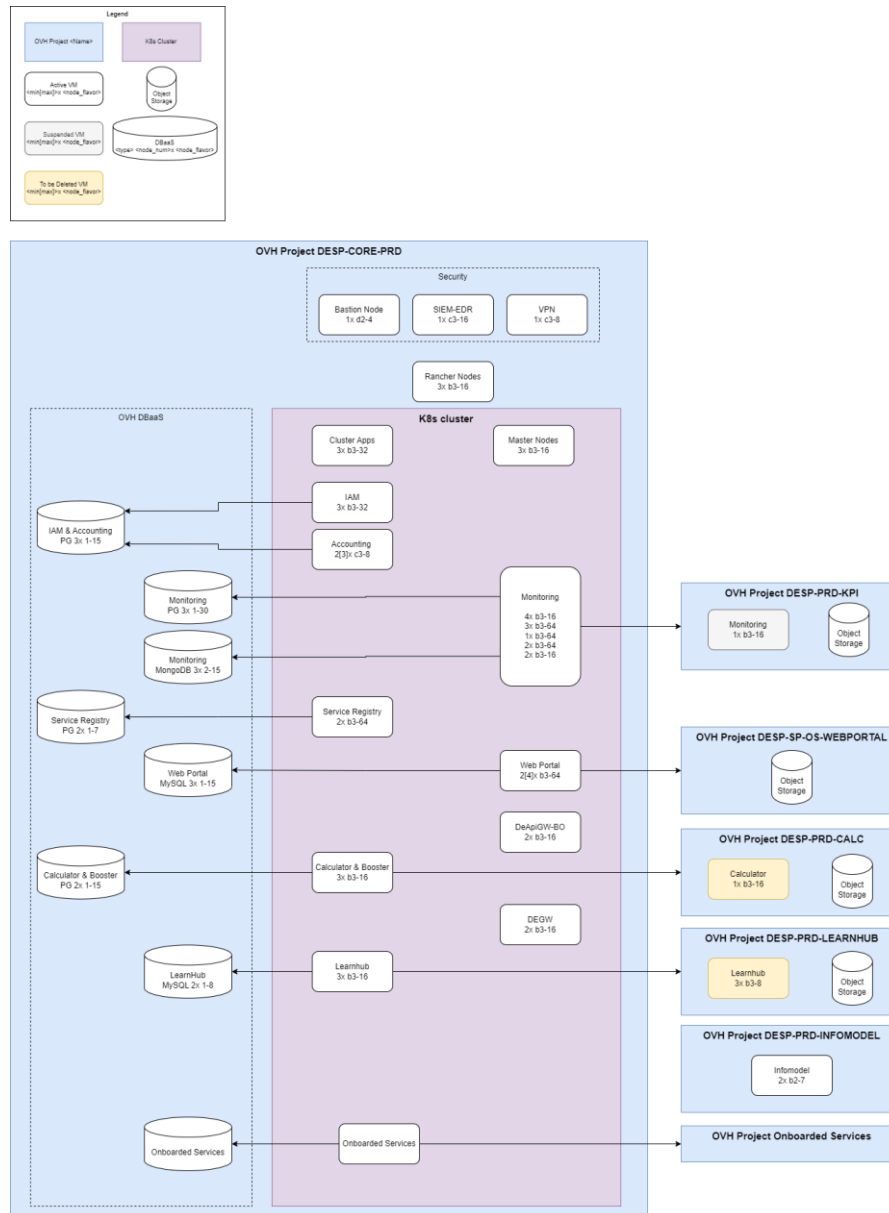


Figure 14: Production Environment Deployment Diagram

The blue rectangle represents the primary OVH project hosting the production environment, divided into two logical areas: Security and the Kubernetes cluster.

On the left, DBaaS instances provide database services to services running in the cluster. On the right, additional OVH projects host storage resources and development machines, supporting auxiliary operations.

The Infomodel component resides in an independent OVH project, ensuring isolation for specialized data modelling tasks.

Onboarded Services within the cluster may include their own DBaaS instances or dependencies on resources from other OVH projects, reflecting a flexible and federated architecture.

4.2 DestinE Platform Elements Mapping

4.2.1 Requirements Mapping

The following Table 3 provides a traceability matrix mapping each functional requirement reported in [RD-2] to the corresponding architectural component(s). The purpose is to ensure that every requirement has a clear implementation responsibility in the architecture.

Non-functional requirements are intentionally excluded from this matrix, as they are not allocated to any individual component but are satisfied by the design of the system, through architectural decisions and cross-cutting mechanisms that span all components.

Table 3: Component vs Requirements Traceability Matrix

Element(s)	Requirement(s)
IAM Service	DSP-TSR-007 DSP-TSR-008 DSP-TSR-010 DSP-TSR-063 DSP-TSR-012 DSP-TSR-073
Accounting & Clearing House Service	DSP-TSR-001
Service Registry	DSP-TSR-012 DSP-TSR-013 DSP-TSR-014
Information Dissemination & Onboarding Support Service	DSP-TSR-026 DSP-TSR-033 DSP-TSR-038 DSP-TSR-042 DSP-TSR-043 DSP-TSR-044 DSP-TSR-045 DSP-TSR-046 DSP-TSR-047 DSP-TSR-049 DSP-TSR-051 DSP-TSR-052 DSP-TSR-055
Service Desk	DSP-TSR-015 DSP-TSR-019 DSP-TSR-020 DSP-TSR-021 DSP-TSR-022 DSP-TSR-023 DSP-TSR-024 DSP-TSR-025 DSP-TSR-027
Monitoring Service	DSP-TSR-028 DSP-TSR-029 DSP-TSR-030 DSP-TSR-032 DSP-TSR-034 DSP-TSR-036 DSP-TSR-037 DSP-TSR-039 DSP-TSR-040 DSP-TSR-041
Cloud Infrastructure layer	DSP-TSR-004

Runtime Platform	DSP-TSR-004 DSP-TSR-101
Calculator Service	N/A ¹
Booster Service	N/A ¹
DestinE Gateways	N/A ²
New registered Services ³	DSP-TSR-056 DSP-TSR-057 DSP-TSR-058 DSP-TSR-061 DSP-TSR-062 DSP-TSR-064 DSP-TSR-066 DSP-TSR-071 DSP-TSR-072 DSP-TSR-073 DSP-TSR-074 DSP-TSR-075 DSP-TSR-076 DSP-TSR-077 DSP-TSR-079 DSP-TSR-080 DSP-TSR-081 DSP-TSR-086 DSP-TSR-087 DSP-TSR-090 DSP-TSR-091 DSP-TSR-092 DSP-TSR-093 DSP-TSR-094 DSP-TSR-095 DSP-TSR-096 DSP-TSR-097 DSP-TSR-099 DSP-TSR-100

4.2.2 Functionalities Mapping

This section provides a consolidated view of how the functionalities defined in Section 3.1 are covered by the DestinE Platform elements described in Section 4.1.

The purpose of this mapping is to ensure traceability between high-level functionalities and the corresponding system components, supporting verification and validation activities.

The mapping table below lists these relationships in three columns: Functionality, Function and Component.

Table 4: Functions, Services & Elements mapping matrix

Functional Area	Function	Element(s)
F1 Identity and Access Management	F1.1 User Registration	IAM Service
	F1.2 Authentication & authorization	IAM Service

¹ Those functionalities are not reported in the original contract. They are requested by further Change Contract Notice (CCN) and are not covered by the original set of requirements.

² Introduced to satisfy non-functional requirements: security, quota management, integration.

³ Those requirements are satisfied through the New Registered Service operated by a Service Provider and available with free access to authorized registered users.

	F1.3 Login	IAM Service
	F1.4 User Profile management	IAM Service
	F1.5 Federation	IAM Service
	F1.6 Management Web Interface	IAM Service Information Dissemination & Onboarding Support Service (Web Portal)
F2 Tenancy Management	F2.1 Tenancy Administration	IAM (Tenancy Management Component)
	F2.7 Query User Consumptions	Accounting & Clearing House Service IAM Service (Tenancy Management Component)
	F2.8 Query Service Consumptions	Accounting & Clearing House Service IAM (Tenancy Management Component)
	F2.9 Query Tenancy Project Consumptions	Accounting & Clearing House Service IAM (Tenancy Management Component)
F3 Service Registration and Discovery	F3.2 Service Registration	Service Registry
	F3.3 Service repository management	Service Registry
	F3.4 Service Discovery	Service Registry
	F3.6 Service Feedback	Service Registry
F4 User Community Management	F4.1 Access to Web Portal	Information Dissemination & Onboarding Support Service (Web Portal)
	F4.2 Website content search	Information Dissemination & Onboarding Support Service (Web Portal)
	F4.3 Website content management	Information Dissemination & Onboarding Support Service (Web Portal)
	F4.4 Community feedback management	Information Dissemination & Onboarding Support Service (Web Portal)
	F4.5 Issue tracking and management	Service Desk
	F4.6 User feedback analysis and reporting	Service Desk
	F4.7 User Training	Information Dissemination & Onboarding Support Service (Learning Hub)
F5 Monitoring and reporting	F5.1 Monitoring data gathering	Monitoring Service
	F5.2 Monitoring data brokering and manipulation	Monitoring Service
	F5.3 Monitoring data storage	Monitoring Service
	F5.4 Data Mining	Monitoring Service
	F5.5 Reporting	Monitoring Service
	F5.6 Alerting	Monitoring Service
	F5.7 Real-time monitoring	Monitoring Service
	F5.8 Statistics visualization	Monitoring Service
	F5.9 Statistics export	Monitoring Service
F10 Infrastructure Management	F10.1 Infrastructure Provisioning	Cloud Infrastructure layer
	F10.2 Container orchestration	Runtime Platform

	F10.3 Storage Orchestration	Runtime Platform
	F10.4 Deployment management	Runtime Platform
	F10.5 Load Balancing	Runtime Platform DestinE Gateways
	F10.6 Scaling and Auto-scaling	Runtime Platform
	F10.7 Fault Tolerance and Self-healing	Runtime Platform
	F10.8 Resource Allocation and Management	Runtime Platform
	F10.9 Security and Access Control	Runtime Platform IAM Service DestinE Gateways
F11 Service Handling	F11.1 Calculation and estimation process	Calculator Service
	F11.2 Carbon calculator estimation	Calculator Service
	F11.3 Service boosting	Booster Service
	F11.4 Digital Responsibility Dashboards	Calculator Service
F12 Data Management Services	F12.1 Data Access and Retrieval	New registered Services
	F12.2 Data Cache Management	New registered Services
	F12.3 Data Catalogue	New registered Services
	F12.4 Data Visualization	New registered Services
	F12.5 Data Transformation	New registered Services
	F12.6 Common Software Services	New registered Services

4.3 DestinE Platform Components Interaction

The Component Diagram in Figure 15 provides a logical view of the DestinE Platform architecture, illustrating how functionalities are allocated to components and how services depend on and interact with one another.

This representation complements the mapping provided by Table 4 by offering a concise visualization of logical dependencies and service interactions across the platform.

The diagram focuses strictly on logical allocation, dependencies, and interfaces; it does not depict physical deployment or network configuration.

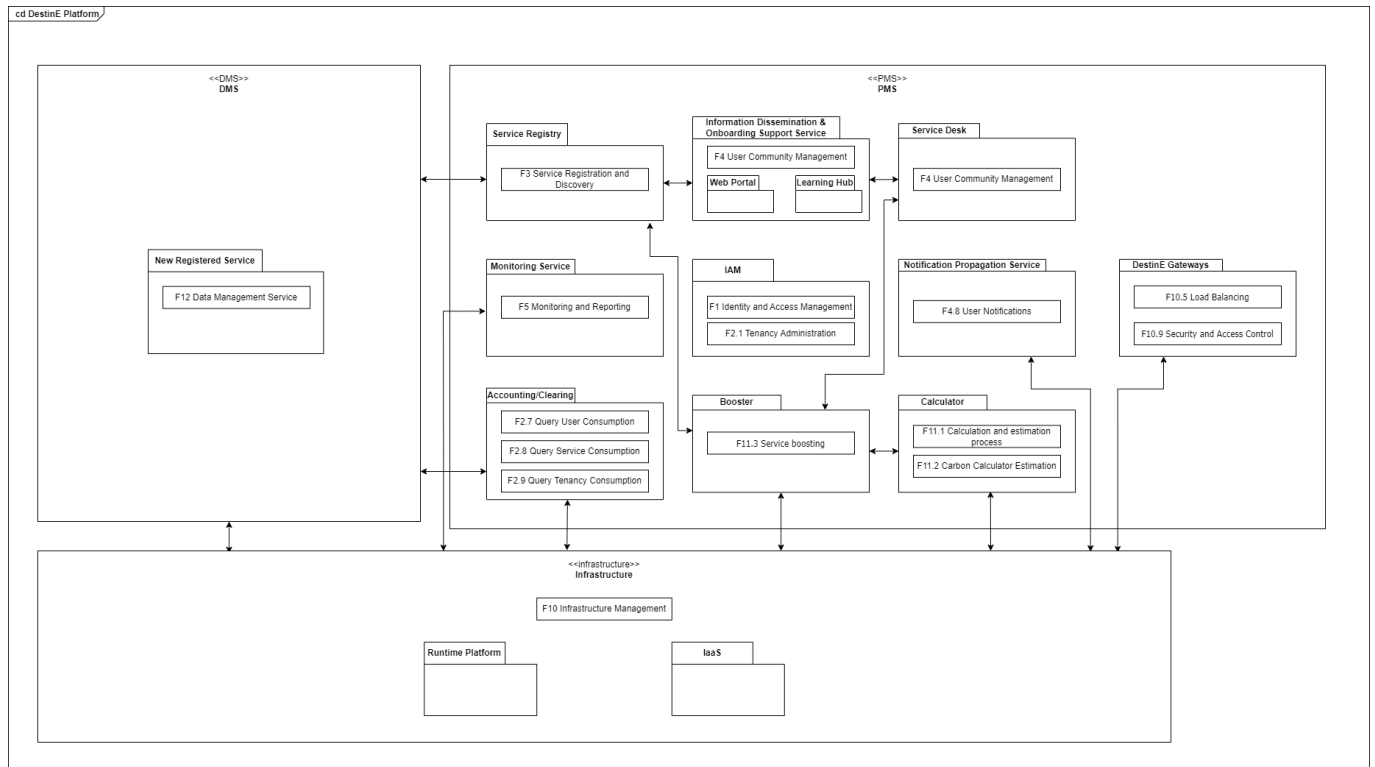


Figure 15: DestinE Platform Component Diagram

All Platform Management Services and Data Management Services interface with the IAM Service and the Monitoring Service, respectively for identity and access control and for operational visibility, logging, and reporting; these common links are omitted from the component diagram for clarity.

The high-level interactions between components and external actors are also illustrated through Sequence diagrams for the following relevant operational scenarios:

- Registration & Login
- User Community Management
 - Service Onboarding
- Monitoring Pipeline

4.3.1 Registration & Login

The sequence diagrams in Figure 16 and Figure 17 present respectively the standard successful component interactions and flow for end-user self-registration and login on the DestinE Platform. Main actors are the User, any Service Application (registration and login page can be reached from any service page, including the Web Portal), and the Identity & Access Management (IAM) service. The flow covers acceptance of Terms & Conditions, credential verification and user email validation by IAM, culminating in session establishment for the requested Service. Federated identities are supported by the platform but are out of scope for this diagram, as are any alternative or error paths.

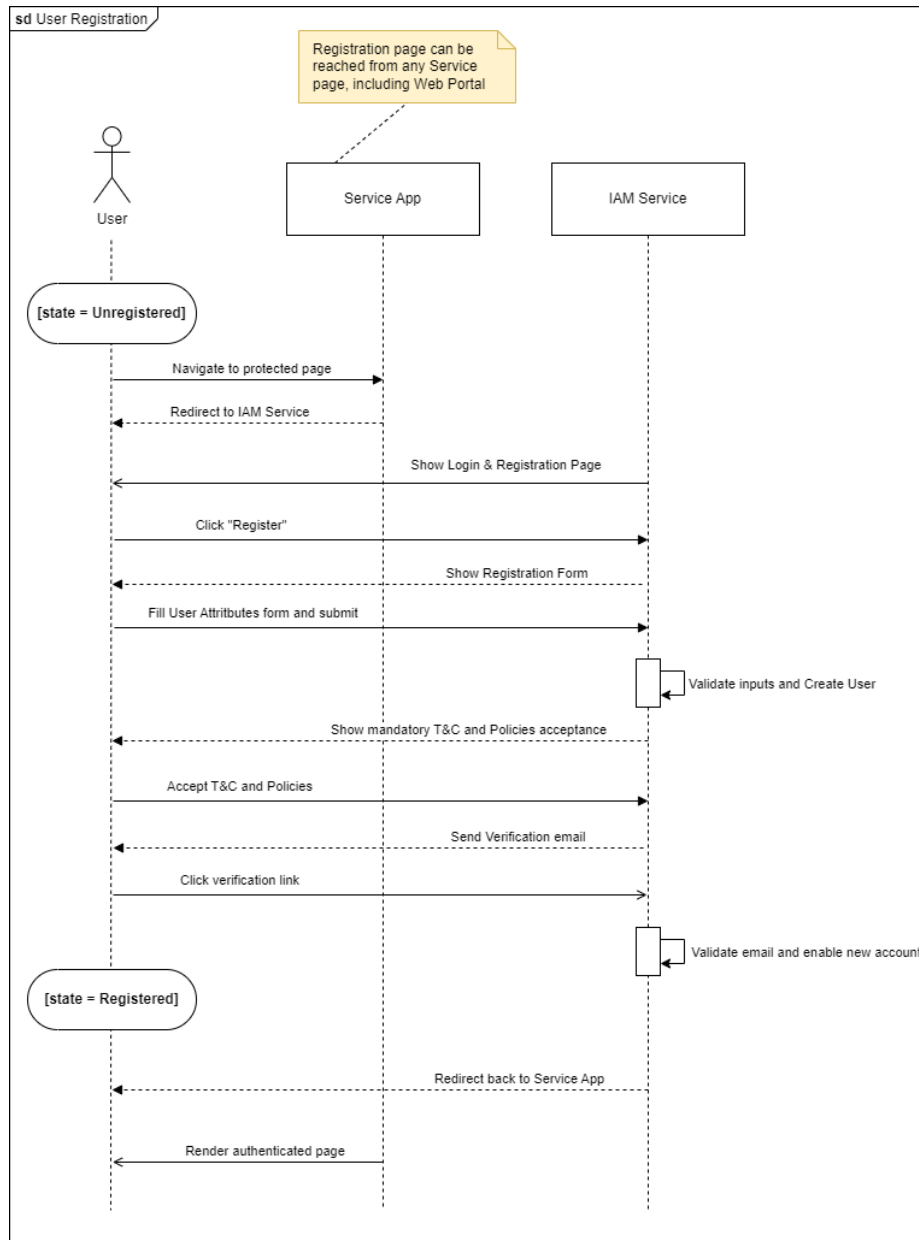


Figure 16: User Registration Sequence Diagram

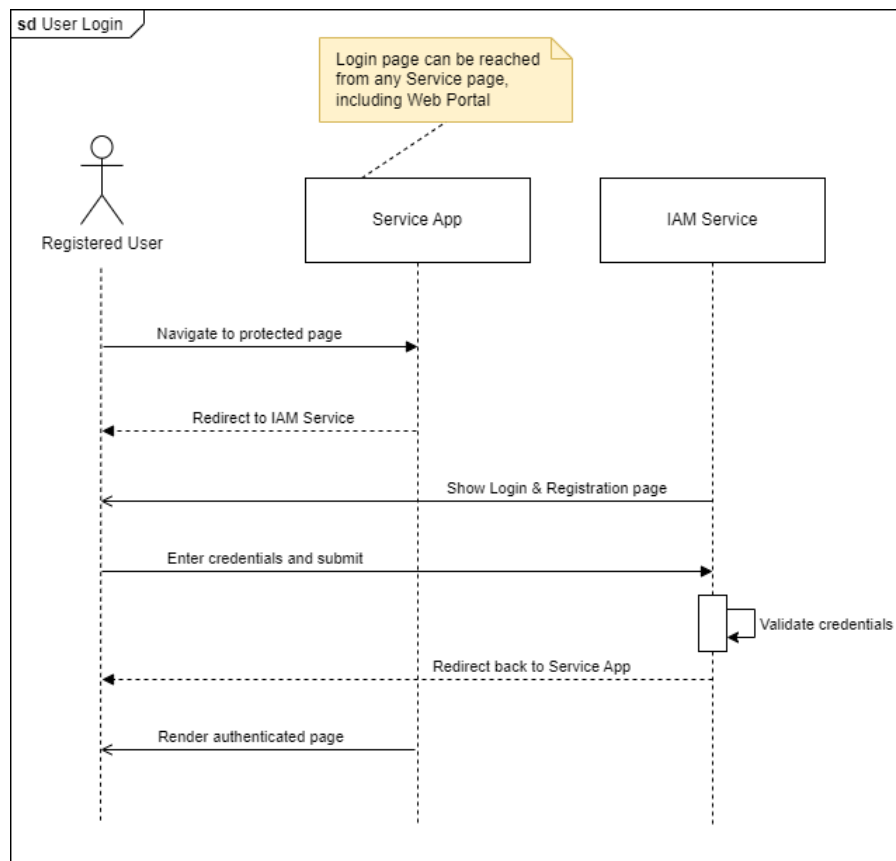


Figure 17: User Login Sequence Diagram

4.3.2 User Community Management

4.3.2.1 Service Onboarding

This high-level sequence diagram in Figure 18 summarizes the end-to-end onboarding flow for a New Registered service on the DestinE Platform, as defined by [RD-5].

It captures the three official stages (Service Onboarding Request, Service Evaluation, and Service Integration/Deployment) highlighting the principal actors, key interactions, decision points, and optional variants (e.g., hosting choices and optional integrations).

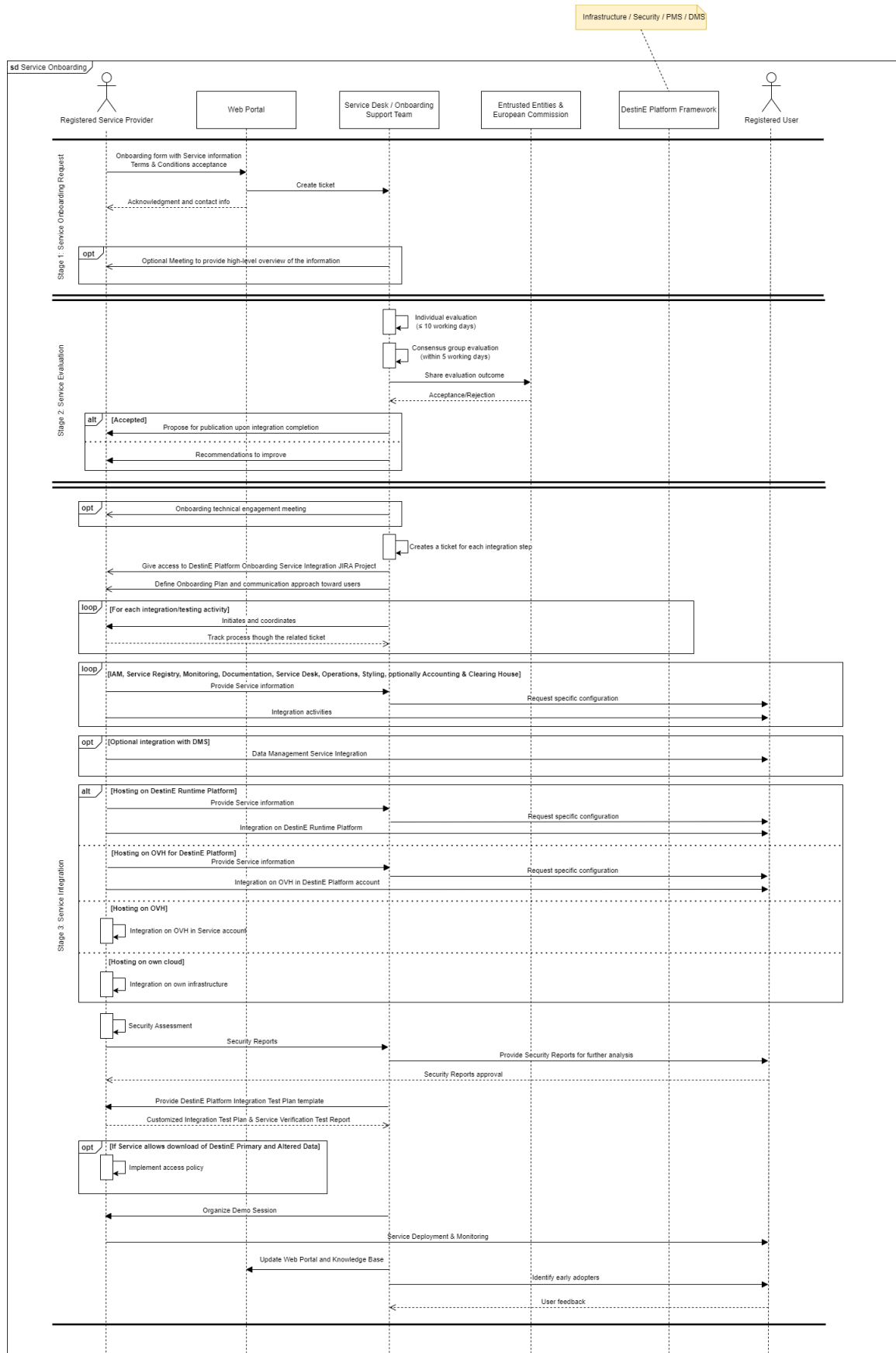


Figure 18: Service Onboarding Sequence Diagram

4.3.3 Monitoring Pipeline

The Sequence Diagram in Figure 19 represents the interaction between external Services and Actors and the DestinE Platform Components across the full Monitoring Pipeline, from data capture to visualization, including the active and passive data ingestion into the centralized Monitoring Service, where data is normalized and persisted for real-time use.

Real-time rules evaluate incoming data to raise alerts to platform operators, while a daily aggregation path stores long-term metrics without rolling to enable historical analysis and executive reporting.

Access to Operations and Executive Dashboards is mediated by IAM-based RBAC as well as the access to the metrics exporting API and the Public Dashboard is exposed via the DestinE Web Portal.

For clarity of illustration, the diagram models the DestinE Administrator accessing the Service Operations Dashboard, the ESA Technical Officer accessing the Executive Dashboard, and the Registered User accessing the Public Dashboard. This representation is intentionally simplified: the DestinE Administrator is authorized to access the Executive Dashboards too and both the DestinE Administrator and the ESA Technical Officer can access the Public Dashboard.

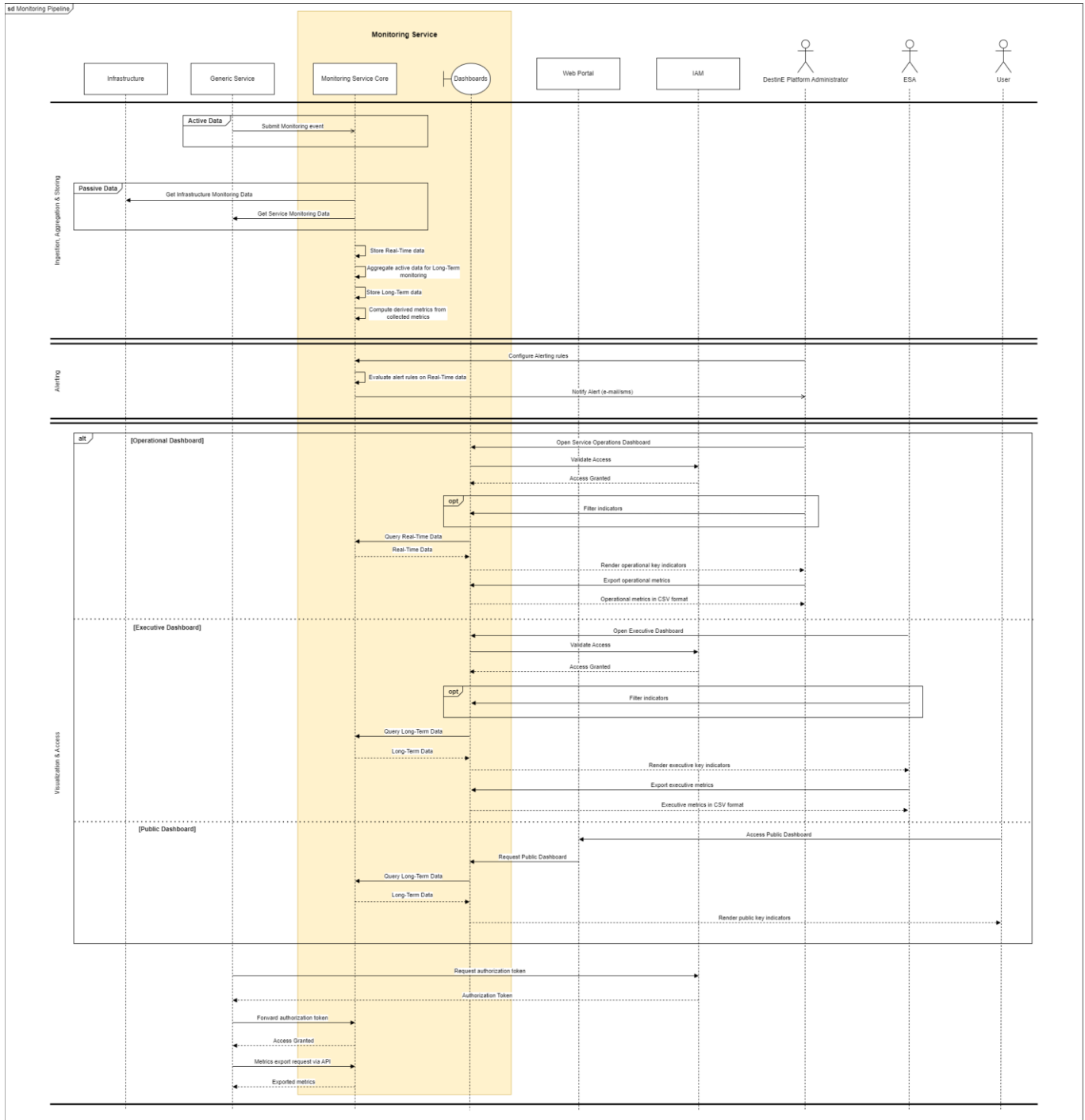


Figure 19: Monitoring Pipeline Sequence Diagram

4.4 Security Design

The DestinE Platform adopts a defence-in-depth architecture implementing the Security requirements provided by [RD-3] to preserve confidentiality, integrity, availability and accountability across all Platform Management Services, Data Management Services and New Registered Services.

Security controls are implemented as cross-cutting concerns that apply uniformly to north-south (user-to-platform) and east-west (service-to-service) interactions.

4.4.1 Identity and Access Control

Identity and access management is centralised and consistent: all interactive and machine-to-machine access relies on the platform IAM to authenticate principals and to authorise access to protected resources. Authorisation is enforced both at the platform edge and within the service mesh: requests present time-bound access tokens over HTTP and are further strengthened with mutual TLS between services to prevent token replay and unauthorised lateral movement.

4.4.2 Data in Transit Protection and Secret Management

Protection of data in transit is ensured through end-to-end encryption using TLS 1.3 for all external and internal traffic; certificate termination and validation are performed at well-defined trust boundaries (e.g., ingress gateways or mesh sidecars), providing confidentiality, integrity and peer authentication while supporting automated certificate lifecycle management. Secrets (such as API keys, credentials and private keys) are never embedded in code, images or configuration artefacts; they are managed centrally in a dedicated vault with access mediated by the platform identity, short-lived credentials where feasible, and policy-driven rotation.

4.4.3 Security Monitoring and Incident Response

All platform and service components emit structured logs, audit trails and security-relevant metrics to a centralised logging and monitoring backbone; correlation and anomaly detection enable early identification of misconfigurations and malicious activity.

Security event handling, from detection through triage and containment to eradication and recovery, follows the operational playbooks defined for the DestinE Platform and is aligned with the Cybersecurity Incident Management Plan [RD-20]; day-to-day response activities are executed according to the Security Operations Procedure [RD-21], with escalation and communications coordinated as required.

4.4.4 Secure Software Supply Chain and DevSecOps Gates

The software supply chain follows a secure-by-design and secure-by-default approach integrated into the DevSecOps toolchain. Source code complies with the platform Security Coding Rules [RD-26]; automated pipelines enforce security checks (including code quality, dependency and image scanning, and configuration linting) as a gate to promotion across environments, and compliance with the DestinE Platform PMS Integration procedure [RD-8] is required prior to operational release.

4.4.5 Data governance and assessment

Data governance is supported by a structured data assessment, performed via an Excel-based register [RD-25]. The assessment captures essential metadata on data objects and applies a platform classification to determine sensitivity and constraints; optional expectations on integrity and availability may be recorded to inform protection needs. Completion of the assessment is mandatory prior to any decision to use data for actionable insights; based on its outcome, the Data Owner retains final responsibility to decide what can be done, who may access, and how data can be exploited to derive value.

4.4.6 Risk Management and Security Governance

Risk management is continuous and informs design and operations. Threats and risks are assessed using the Security Risk Assessment approach based on EBIOS Risk Manager and conformant with ISO

27005:2022; the resulting treatment plans drive prioritisation of controls and verification activities (ref. [RD-22]). Operational security is governed within the Security Management Plan [RD-23], including roles, communications and documentation control, ensuring that security objectives remain aligned with service evolution and stakeholder needs. Preparation and management of major incidents and crises follow Cyber Crisis Management [RD-24] guidance, ensuring coordination with platform operations and stakeholders.

5. Interface Control Document

This Section provides the Master ICD of the DestinE Platform, listing the external interfaces of the system.

Each Interface is labelled with a unique code as follows:

<component ID>-<EXT=external>-IF-<P/R>-<progressive number>

Where:

- 1) *<component ID>* is the acronym of the DestinE Platform component exposing the interface externally. The identified acronyms, listed in alphabetical order, are:
 - **ACC** = Accounting & Clearing House Service
 - **BOOST** = Booster Service
 - **CALC** = Calculator Service
 - **DSK** = Service Desk
 - **DSP** = DestinE Platform System
 - **GTW** = DestinE Gateways
 - **IAM** = Identity and Access Management Service
 - **IDOS** = Information Dissemination & Onboarding Support Service
 - **MNS** = Monitoring Service
 - **SRG** = Service Registry
- 2) *<EXT=external>* indicates that the interface is external to the system.
- 3) *<P/R>* specifies the interface type: P if provided or R if required.
- 4) *<progressive number>* is a zero-padded four-digit number (e.g., 0001, 0010, 0020, etc.).

Table 5 provides the list of the interfaces with their short description.

For each identified interface, the following properties are reported:

- Interface unique identifier
- Description
- Source (i.e. provided service and owner of the interface details in the relevant applicable service documentation)
- Destination

In the interface list, the *Source* and *Destination* fields identify the provider and consumer of the interface, respectively. *Source* refers to the service that exposes the interface and owns its technical documentation. *Destination* refers to the consumer of the interface (e.g., an end user or another external system).

The direction of data flow (i.e., who sends and who receives messages) is not described in this section.

Table 5: List of the External interfaces of DestinE Platform

Interface ID	Interface Description	Source	Destination	Notes
DestinE Platform System				
DSP-EXT-IF-R-0010	Access to simulation data and immediate service	DTE (ECMWF)	DestinE Platform	
DSP-EXT-IF-R-0020	On-demand data access & processing	DEDL (EUMETSAT)	DestinE Platform	
IAM-EXT-IF-P-0030	Registration & Login interface	IAM Service	DestinE Platform User	
IAM-EXT-IF-P-0040	Interface between IAM Service and a Federated IAM Service	IAM Service	Federated IAM Service	
ACC-EXT-IF-P-0050	Report of user consumptions	Accounting & Clearing House Service	DestinE Platform Registered User	via API
IDOS-EXT-IF-P-0060	Registered users can provide feedback for the services	Information Dissemination & Onboarding Support Service (Web Portal)	DestinE Platform Registered Users	
IDOS-EXT-IF-P-0070	Registered and unregistered users can discover the services	Information Dissemination & Onboarding Support Service (Web Portal)	Unregistered and Registered users	
IDOS-EXT-IF-P-0080	Registered and unregistered users can discover official training content	Information Dissemination & Onboarding Support Service (Learning Hub)	DestinE Platform Registered Users	
DSK-EXT-IF-P-0090	Interface allowing users to send feedback on quality and satisfaction of support and raise of user requests, including service onboarding	Service Desk	DestinE Platform Registered Users	[RD-6]
DSK-EXT-IF-P-0100	Feedback gathering report on user satisfaction about the received support, including service onboarding	Service Desk	DestinE Platform Registered users	[RD-6]
DSK-EXT-IF-P-0110	Link with DTE's service support to transmit specific requests in relation to DTE services	Service Desk	DTE	[RD-6]
DSK-EXT-IF-P-0120	Link with DEDL's support service to transmit specific requests in relation to DEDL services	Service Desk	DEDL	[RD-6]
MNS-EXT-IF-P-0130	Dashboards allowing the exposure of services real-time and long-term metrics information	Monitoring Service	DestinE Platform Registered users	DestinE Platform Dashboard is publicly accessible Executive Dashboard Service is accessible only to Serco teams

				and stakeholders (ESA) Service Operations Monitoring Dashboard is accessible only to Serco teams and ESA Technical Officer. [RD-9]
MNS-EXT-IF-P-0140	Interface allowing external stakeholders to access Long-Term Monitoring information	Monitoring Service	DestinE Platform Registered users	via REST APIs [RD-9]
CALC-EXT-IF-P-0150	Registered Users can access the DestinE Platform Calculator Service	Calculator Service	DestinE Platform Registered users	via the website GUI or via external API client
CALC-EXT-IF-P-0160	Dashboards presenting monthly GHG emissions (kgCO ₂ eq) for compute and storage at platform and service levels	Calculator Service	DestinE Platform Registered users	
BOOST-EXT-IF-P-0170	Interface of the Booster Service to submit booster requests	Booster Service	Booster Sponsor Entity	
BOOST-EXT-IF-P-0180	Interface of the Booster Service to manage booster requests reports.	Booster Service	DestinE Platform Administrator	
GTW-EXT-IF-R-0190	Answers to validated requests from OVH Infrastructure to the Gateway's dedicated account	OVHcloud Infrastructure layer	DestinE Gateways	
SRG-EXT-IF-P-0220	Registered and unregistered users can discover the services in a programmatic way	Service Registry	Unregistered and Registered users	Via APIs
SRG-EXT-IF-P-0230	Interface allowing DestinE Platform Administrator to create, update and delete data in the Service Registry catalogue	Service Registry	DestinE Platform Administrator	Via APIs

5.1 API Interfaces

This section summarizes the external-facing interfaces that expose key capabilities of the DestinE Platform to users and stakeholders in a controlled manner. The goal is to provide a concise view of what each API is intended to do, who is expected to use it, and how access is governed.

5.1.1 Accounting & Clearing House API

Table 6: Accounting & Clearing House API Interface

Field	Value
Interface ID	ACC-EXT-IF-P-0050

Functionality	F2.7 Query User Consumptions F2.8 Query Service Consumptions F2.9 Query Tenancy Project Consumptions
API Name	DestinE Platform Accounting Backend API
Swagger URL	DestinE Platform Accounting Backend API
Purpose	Provides access to consumptions information and reports related to platform resources and services, supporting user, service, and tenancy-project consumption queries.
Audience	Registered Users; Service Providers; Tenancy/Project Administrators.
Authentication Policy	Access is mediated by the platform's IAM and granted to registered accounts with appropriate roles and approvals.

5.1.2 Monitoring Service API

Table 7: Monitoring Service API Interface

Field	Value
Interface ID	MNS-EXT-IF-P-0140
Functionality	F5.9 Statistics export
API Name	DestinE Platform Monitoring APIs
Swagger URL	DestinE Platform Monitoring APIs
Purpose	Offers programmatic access to long-terms monitoring information and statistics export produced by the Monitoring Service, for reporting and analysis purposes.
Audience	Registered Users; Service Providers.
Authentication Policy	Access is mediated by the platform's IAM and granted to registered accounts with appropriate roles and approvals: Registered Users can read the public dashboard data. An additional IAM role grants read access to four dedicated views.

5.1.3 Service Registry API

Table 8: Service Registry API Interface

Field	Value
Interface ID	SRG-EXT-IF-P-0220 SRG-EXT-IF-P-0230
Functionality	F3.2 Service Registration F3.3 Service Repository Management F3.4 Service Discovery
API Name	Service Registry Public API
Swagger URL	Service Registry Public API
Purpose	Exposes, in a programmatic way, the data that are visible and filterable in the Service Registry interface. The administrator can also perform insert and delete operations.
Audience	Registered Users; DestinE Platform Administrators.
Authentication Policy	Discovery is accessible to Registered User. Access to create, update and delete operations is mediated by the platform's IAM and granted to DestinE Platform Administrator.

End of the Document