Software Requirements Specification

SRS

EOX Team

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DESIDE - Software Requirements Specification

Destination Earth DESP Use Cases: DestinE Sea Ice Decision Enhancement (DESIDE) *Software Requirements Specification* SRS

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AMENDMENT HISTORY

This document shall be amended by releasing a new edition of the document in its entirety. The Amendment Record Sheet below records the history and issue status of this document.

Table 1. Amendment Record Sheet

ISSUE	DATE	REASON
0.1	11/12/2023	Initial in-progress draft
0.2	22/04/2024	Update for Review 1
1.0	22/04/2024	First released version
1.1	19/09/2024	Second released version

Chapter 1. Introduction

1.1. Purpose and Scope

This document represents the Software Requirements Specification (SRS) for the Destination Earth DESP Use Cases: DestinE Sea Ice Decision Enhancement (DESIDE) project 8482 with ESA contract 4000140320/23/I-NS.

This document describes the functional and non functional requirements applicable. This document forms the basis against which the detailed design, implementation, unit and integration testing, and the verification are performed and outlined in the Software Verification and Validation Plan (SVVP) and Software Verification and Validation Report (SVVR).

1.2. Structure of the Document

Chapter 2, *Overview*

> This section provides an overview of the Destination Earth DESP Use Cases: DestinE Sea Ice Decision Enhancement (DESIDE).

Chapter 3, *Software Requirements Specification*

> This section provides the software requirements for the DESIDE DESIDE

1.3. Reference Documents

The following is a list of Applicable and Reference Documents with a direct bearing on the content of this document.

Reference	Document Details	Version
[SOW]	Statement of Work Destination Earth DESP Use Cases selection - Round 1 Reference: CS301353.Docref.0002	1.0
[Proposal]	Proposal No. 8482: DestinE Sea Ice Decision Enhancement (DESIDE)	1.1 06/06/2023

1.4. Terminology

The following terms have been used in this document.

Term	Meaning
Admin	User with administrative capabilities on a platform.
Code	The codification of an algorithm performed with a given programming language - compiled to Software or directly executed (interpreted) within the platform.

Term	Meaning
Discovery	User finds products/services of interest to them based upon search criteria.
Interactive Web Application	An Interactive Application for analysis provided as a rich user interface through the user's web browser.
Key-Value Pair	A key-value pair (KVP) is an abstract data type that includes a group of key identifiers and a set of associated values. Key-value pairs are frequently used in lookup tables, hash tables and configuration files.
Object Store	A computer data storage architecture that manages data as objects. Each object typically includes the data itself, a variable amount of metadata, and a globally unique identifier.
Products	EO data (commercial and non-commercial) and Value-added products.
Software	The compilation of code into a binary program to be executed within the platform on-line computing environment.
User	An individual using the services.
Visualization	To obtain a visual representation of any data/products held within the platform - presented to the user within their web browser session.
Web Coverage Service (WCS)	OGC standard that provides an open specification for sharing raster datasets on the web.
Web Feature Service (WFS)	OGC standard that makes geographic feature data (vector geospatial datasets) available on the web.
Web Map Service (WMS)	OGC standard that provides a simple HTTP interface for requesting geo-registered map images from one or more distributed geospatial databases.
Web Map Tile Service (WMTS)	OGC standard that provides a simple HTTP interface for requesting map tiles of spatially referenced data using the images with predefined content, extent, and resolution.
Web Processing Services (WPS)	OGC standard that defines how a client can request the execution of a process, and how the output from the process is handled.

1.5. Glossary

The following acronyms and abbreviations have been used in this document.

Term	Definition
ADD	Architecture Design Document
AOI	Area of Interest
API	Application Programming Interface
COG	Cloud optimized GeoTiff
EO	Earth Observation

Term	Definition
EOX	EOX IT Services GmbH
ESA	European Space Agency
FUSE	Filesystem in Userspace
ICD	Interface Control Document
JSON	JavaScript Object Notation
KVP	Key-value Pair
M2M	Machine-to-machine
OGC	Open Geospatial Consortium
PMP	Project Management Plan
REST	Representational State Transfer
SDD	Software Design Document
SFTP	Secure File Transfer Protocol
SRF	Software Reuse File
SRN	Software Release Note
SRP	Software Release Plan
SRS	Software Requirements Specification
SSH	Secure Shell
STAC	Spatio-Temporal Asset Catalog
SUM	Software User Manual
SVVP	Software Verification and Validation Plan
SVVR	Software Verification and Validation Report
TOI	Time of Interest
UMA	User-Managed Access
US	User Story
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
WMTS	Web Map Tile Service
WPS	Web Processing Service
WPS-T	Transactional Web Processing Service

Chapter 2. Overview

Polar View Earth Observation Limited is working in collaboration with EOX IT Services, Drift+Noise Polar Services, the Danish Meteorological Institute, the Norwegian Meteorological Institute, and the Finnish Meteorological Institute to develop a fully functional Use Case that utilizes the DESP/DestinE system capabilities and data and adds value to meet the needs of policy and decision makers who require information on the past, current, and forecasted sea ice and other relevant conditions for operational purposes in the Baltic Sea, European Arctic Ocean, and the rest of the polar regions.

The Use Case will build on and complement existing operational and climate sea ice products and services including those provided by the Copernicus Marine Service, the national Ice Services, the ESA Polar Thematic Exploitation Platform (Polar TEP), and the commercial Drift+Noise IcySea app. The Use Case will augment and improve on the current offerings by:

- Aggregating information of different types and from different sources to provide common products that span jurisdictional boundaries.

- Producing new products that will improve the ability of users to make good decisions.

- Making the products available in ways and means that are appropriate for the skills and requirements of different user communities.

One driver for the project is the regulation of the International Maritime Organization (IMO) of the United Nations mandating that ships operating in the polar regions meet certain requirements (the Polar Code). Among other things, the Polar Code specifies a range of information that ships traveling in polar waters are required to access for planning and operations. The Use Case will demonstrate the value of short and medium-term forecasts of sea ice, meteorological, and ocean conditions suitable for strategic and tactical decision making by ships and their owners.

A second driver for the project is the effect of climate change on polar conditions that will impact long-term planning and policy development for polar operations such as fishing, tourism, scientific research campaigns, oil and gas development, and supplying northern communities. The Use Case will deliver long-term forecasts of how changing sea ice and other conditions will affect where different types of ships will be able to travel in the polar regions compared to historical averages.

Benefits to polar operations and the rest of society will include increased safety of life and property, decreased pollution, and protection of sensitive environmental areas.

Chapter 3. Software Requirements Specification

This chapter lists the software requirements with a requirements matrix and references to documents.

Doc	Reference	Section	Title	Short Description	Compliance
UCD	REQ01	3.2., 3.3., & 3.4.	Interactive dashboard	DESIDE shall provide an online dashboard allowing users to interactively explore processed, integrated and combined dataset for the various covered regions and projections. Within the interactive dashboard users shall be able to compare historical sea ice indicators with future projections in order to establish a trust in future projections based on historical performance.	P, more data and analysis features are added in the Polar dashboard.

Doc	Reference	Section	Title	Short Description	Compliance
UCD	REQ02	3.2., 3.3., & 3.4.	Data access	Access to sea ice data including ice movement observations using both buoys and radars as well as forecasts of sea-ice movement and compression, and volume and deformation characteristics of sea ice shall be demonstrated and provided.	P, a first draft Jupyter notebook showing data access is available. More data needs to be made accessible through DESP platfrom and access demonstrated in the notebook.
UCD	REQ03	3.4.	Data transfer between IcySea and Polar TEP	The exchanging and sending of data between Polar TEP and IcySea application for display and analysis in both platforms shall be supported.	P, in development. First data examples are shown in the polar dashboard.

Doc	Reference	Section	Title	Short Description	Compliance
UCD	REQ04	3.2.	Available DESP Data	The interactive dashboard and notebook shall provide access to the following data served from DESP: • TOPAZ4b - Arctic Ocean Physics Reanalysis • TOPAZ5 - Arctic Ocean Physics Analysis And Forecast • All data referenced in the "Pre-conditions" row of the table in 3.2. of the UCD. Note: The availability of this data on DESP is a precondition.	N, as precondition is not met.
UCD	REQ05	3.2.	Available Data	The interactive dashboard and notebook shall still provide access to the following data in case it will not be available on DESP: • TOPAZ4b - Arctic Ocean Physics Reanalysis • TOPAZ5 - Arctic Ocean Physics Analysis And Forecast	C
UCD	REQ06	3.3.	Available DESP Data	The interactive dashboard and notebook shall provide access to the following data served from DESP: • TOPAZ4b - Arctic Ocean Physics Reanalysis • TOPAZ5 - Arctic Ocean Physics Analysis And Forecast • All data referenced in the "Pre-conditions" row of the table in 3.3. of the UCD. Note: The availability of this data on DESP is a precondition.	N, as precondition is not met.
UCD	REQ07	3.3.	Available Data	The interactive dashboard and notebook shall still provide access to the following data in case it will not be available on DESP: • TOPAZ4b - Arctic Ocean Physics Reanalysis • TOPAZ5 - Arctic Ocean Physics Analysis And Forecast	C

| Doc	Reference	Section	Title	Short Description	Compliance
UCD	REQ08	3.4.	Available DESP Data	The interactive dashboard and notebook shall provide access to the following data served from DESP: • TOPAZ4b - Arctic Ocean Physics Reanalysis • TOPAZ5 - Arctic Ocean Physics Analysis And Forecast • All data referenced in the "Pre-conditions" row of the table in 3.4. of the UCD. Note: The availability of this data on DESP is a precondition.	N, as precondition is not met.
UCD	REQ09	3.4.	Available Data	The interactive dashboard and notebook shall still provide access to the following data in case it will not be available on DESP: • TOPAZ4b - Arctic Ocean Physics Reanalysis • TOPAZ5 - Arctic Ocean Physics Analysis And Forecast	C
UCD	REQ10	3.4.	Available Data	The interactive dashboard shall provide access to the RADARSAT Constellation Mission (RCM) SAR imagery	C
UCD	REQ11	3.4.	Available Data	Sea Ice Charts are available for display in dashboard and as input for POLARIS algorithm	C

3.1. DESIDE project diagram
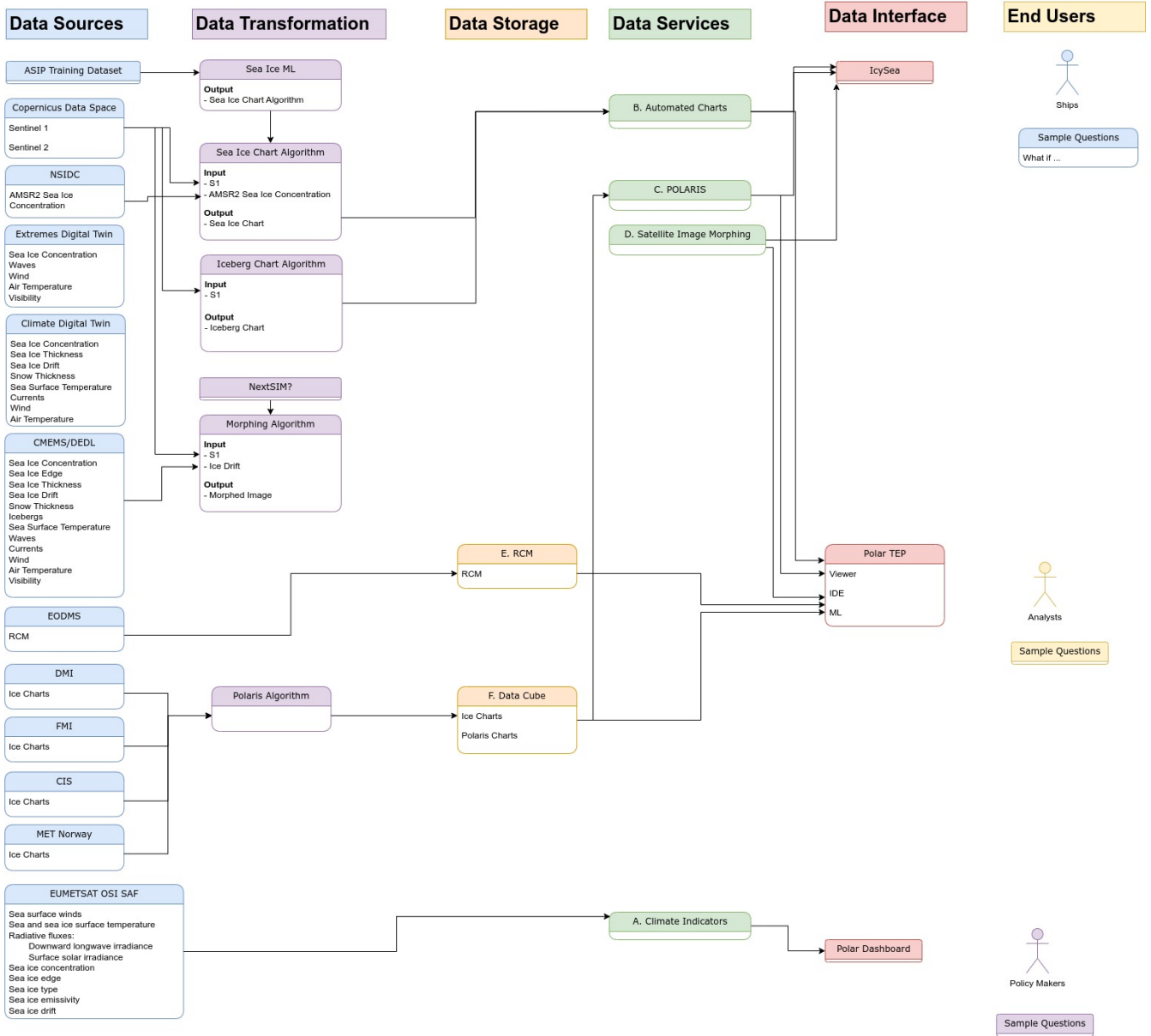
Figure 1. DESIDE diagram

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